Project

Residential Development,

Capdoo,

Clane,

Co. Kildare

Report Title

Site Specific Flood Risk Assessment

May 2019

Document Control

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Approved By:

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Distribution: **An Bord Pleanala**

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Draft	Aug 2018	Draft	ED	BK	
-	Sep 2018	For ABP Pre-App Meeting	ED	BK	
A	**Apr 2019**	**For SHD Application**	**ED**	**BK**	

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1.0 INTRODUCTION

1.1 Background

DBFL Consulting Engineers have been instructed to prepare a Site-Specific Flood Risk Assessment (SSFRA) to support a planning application for a proposed residential development at Capdoo, Clane, Co. Kildare.

The proposed development ("the site") comprises of 366 residential dwellings and a one-storey childcare facility on a 11.442 Ha site (approximately 0.7km north of Clane Town Centre).

The Net Developable Area is approximately 9.6778 Ha (omitting Capdoo Link Road, upgrade of Brooklands / Capdoo Link Junction and construction of the site's surface water outfall).

The proposed site layout is shown on McCrossan O'Rourke Manning Architects Drawing Number 16016-PL02 (included in Appendix A).

This SSFRA should be read in conjunction with DBFL's Infrastructure Design Report (162074-rep-002).

1.2 Objectives

The objectives of this report are to inform the planning authority in relation to flood risk associated with the site.

The report will assess the site in accordance the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices (Office of Public Works, November 2009).

This flood risk assessment will outline the following;

- Information to allow an informed decision by the planning authority in relation to flood risk
- The site's flood zone category
- Appropriate flood risk mitigation and management measures for any residual flood risk

1.3 Flood Risk Assessment Scope

This SSFRA relates only to the proposed development lands at Capdoo, Clane, Co. Kildare and its immediate surroundings.

This SSFRA uses information obtained from various sources in order to carry out an assessment of flood risk for the existing land and proposed development.

1.4 Approach

Section 2.0 of this SSFRA considers "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices as they relate to the site.

Flood risk identification is presented in Section 3.0, an initial flood risk assessment is carried out in Section 4.0, while a more detailed flood risk assessment is presented in Section 5.0.

Conclusions and recommendations are outlined in Section 6.0.

1.5 Existing Site

The site (currently greenfield) is situated in the northern environs of Clane town (refer to Figure 1.1) and is currently in agricultural use. A farmhouse and stables are located adjacent to the eastern boundary.

Capdoo Park is located to the south of the site and Mainham Woods and College Road East are located to the west of the site. Rural roads are located to the north and east of the site ("Capdoo Common"). Several existing residential dwellings are located along these rural roads.

The proposed route of the Capdoo Link Road traverses the site (linking the Kilcock Road. to Celbridge Road).

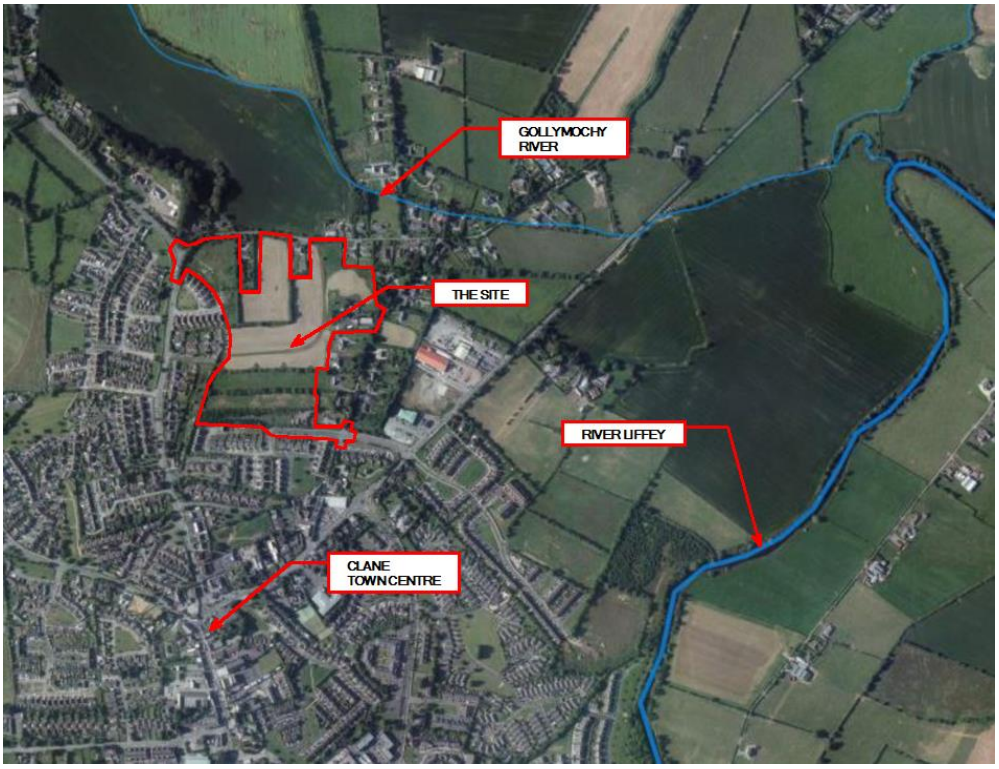

Figure 1.1 Extract from EPA Online Mapping Service (Site Boundary Indicative Only)

The site generally falls from west to east at gradients ranging from 1/15 to 1/100. (refer to Figure 1.2 and Appendix B for Topographic Survey Plans prepared by Land Surveys).

A network of open drains is located to the east of the site which ultimately discharge to the Gollymochy Stream (refer to Figure 1.1).

Existing public surface water drains are located to the south and west of the site (refer to Figure 1.2 below). As the site naturally falls from west to east, it is proposed to construct a surface water outfall along the roads north east of the site and discharge to the Gollymochy Stream north (refer to DBFL Drawing 162074-3002). The majority of the site will discharge to this outfall with the link road and an isolated section north west of the site draining to the public surface water drains to the south and north-west.

Existing topographic survey information is shown in the background of the Proposed Road Layout Plans (refer to DBFL Drawing No's. 162074-2000, 162074-2001, 162074-2002 and 162074-2003).

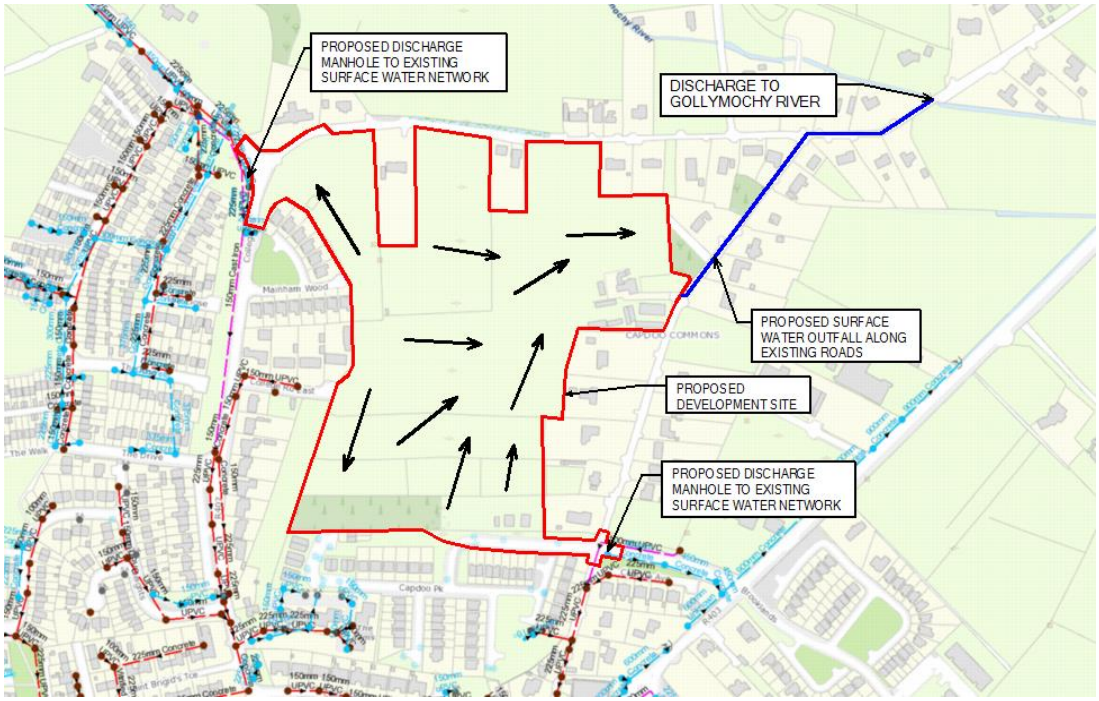

Figure 1.2 Extract from Irish Water Utility Plan.

1.6 Proposed Development

The proposed development comprises of 366 residential dwellings, a one-storey childcare facility and associated engineering infrastructure including provision of surface water drainage, foul drainage and water supply connections (refer to DBFL Drawings 162074-3001, 162074-3002, 162074-3003, 162074-3005, 162074-3006 and 162074-3007). It also includes the completion of the Capdoo Link Road and associated roundabout on the R407 (Kilcock Road) which will also facilitate primary access to the proposed development.

2.0 PLANNING SYSTEM FLOOD RISK MANAGEMENT GUIDELINES

2.1 General

"The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices outline the requirements for a Site Specific Flood Risk Assessment.

Table 3.1 of the guidelines classify "dwelling houses" as "highly vulnerable development".

Table 3.2 of the guidelines indicates that a "highly vulnerable development" is classified as "appropriate" once located in Flood Zone C i.e. where probability of flooding from rivers is low (less than 0.1% AEP or 1 in 1,000 year).

If a "highly vulnerable development" is to be located in Flood Zone A or Flood Zone B a Justification Test is required.

2.2 Sequential Approach

This SSFRA will initially use existing flood risk information to determine the flood zone category of the site i.e. to determine whether the development is considered appropriate or whether a justification test is required (see Figure 2.1 below).

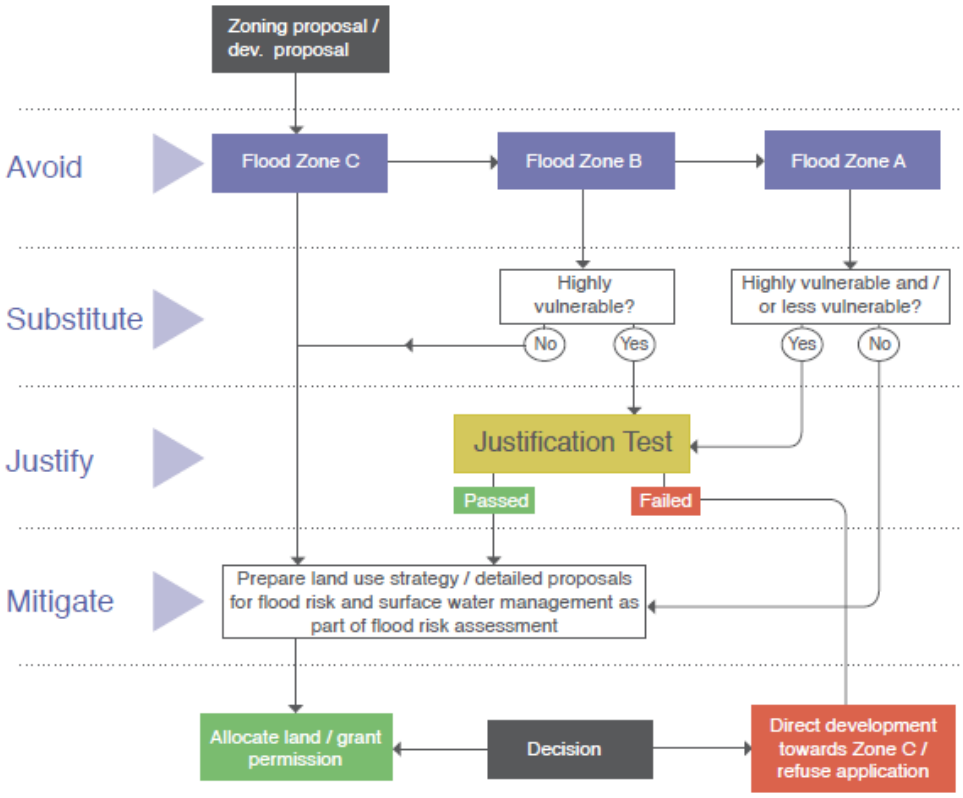

Figure 2.1 – Extract from The Planning System and Flood Risk Management Guidelines (*Fig. 3.2: Sequential Approach Mechanism in the Planning Process*)

2.3 Flood Risk Assessment Stages

The stages of a Flood Risk Assessment as defined by "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices are as follows:

- Stage 1 – Flood Risk Identification
- Stage 2 – Initial Flood Risk Assessment
- Stage 3 – Detailed Flood Risk Assessment

The following sections of this SSFRA follows this approach.

3.0 STAGE 1 – FLOOD RISK ASSESSMENT

3.1 General

The flood risk identification stage uses existing information to identify whether there may be any flooding or surface water management issues related to the site that may require further investigation.

3.2 Information Sources

Information sources consulted for the identification exercise are outlined in Table 3.1 below.

Information Source	Comments
Predictive and historic flood maps, and Benefiting Lands Maps, such as those at www.floodmaps.ie.	Information obtained (and reviewed) from www.floodmaps.ie (OPW website).
Expert advice from OPW who may be able to provide reports containing the results of detailed modelling and flood-mapping studies, including critical drainage areas, and information on historic flood events, including flooding from all sources.	Information obtained (and reviewed) from www.floodmaps.ie (OPW website) e.g. minutes from flood hazard mapping meeting with KCC Area Engineer.
Predictive flood maps produced by OPW	Floodinfo.ie providing access to Eastern CFRAM study Flood Maps –Fluvial Flood Extents and Fluvial Flood Depth Maps consulted.
Previous Strategic Flood Risk Assessments;	Eastern CFRAM Study consulted.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	Site topographic survey undertaken (refer to Appendix B).
Information on flood defence condition and performance;	No flood defences identified in the immediate vicinity of the site.

Maps of the Geological Survey of Ireland (which would allow the potential for the implementation of source control and infiltration techniques and for groundwater and overland flood risk to be assessed). These maps, while not providing full coverage, can indicate areas that have flooded in the past (the source of the alluvium) and may be particularly useful at the early stages of the FRA process where no other information is available.	GSI maps consulted.
Walkover survey to assess potential sources of flooding, likely routes for flood waters and the site's key features, including flood defences, and their condition;	Walkover survey carried out.
National, regional & local spatial plans, such as the National Spatial Strategy, regional planning guidelines, development plans & local area plans provide key information on existing and potential future receptors.	Kildare County Council Development Plan and Clane Local Area Plan (LAP) consulted.
'Liable to flood' markings on the old '6 Inch' maps;	Historic OSI maps consulted.

Table 3.1 - Information Sources Consulted

3.2.1 OPW National Flood Hazard Mapping and Benefitting Lands Mapping

OPW's Summary Local Area Report is included in Appendix C (Flood Hazard Information). This report is sourced from the OPW website (www.floodmaps.ie) and summarises all flood events within 2.5 km of the site. No flood events are noted in the immediate vicinity of the site.

3.2.2 Eastern CFRAM Study

Extracts from OPW's Eastern CFRAM Study (www.floodinfo.ie) show Fluvial Flood Extent and Fluvial Flood Depth Plans and are included in Appendix C (Flood Hazard Information).

No fluvial flooding is indicated in the vicinity of the site.

3.2.3 Clane Local Area Plan (2017-2023)

Map ref. 9.1 from the Clane Local Area Plan 2017 to 2023 (see Appendix C Flood Hazard Information) which identifies the site being partially located in an area where "development proposals for lands outlined thus are to be the subject of site specific flood risk assessment in accordance with the flood risk management guidelines and appropriate to the type and scale of the development being proposed".

3.2.4 Other Sources

Other information sources were consulted to determine if there was any additional flood risk to the site including:

- Topographical surveys of the area – the site is significantly elevated above the predicated 0.1% AEP fluvial flood level as shown in the Eastern CFRAM Study's Flood Extent Maps.
- Soils and Groundwater Data from the GSI – no alluvium deposits or groundwater wells / springs are shown within the site on the GSI online mapping system.
- Groundwater information from IGSL – Ground water (seepage) was noted in trial pits and infiltration tests carried out in the north east of the site. The depth at which seepage was observed in these trial pits ranged from 0.9m to 2.2m below existing ground level. Refer to refer to Appendix D.
- Walkover survey carried out in November 2017 – no potential sources of flooding identified.
- Clane Local Area Plan (LAP) – the site is zoned for residential development.
- Irish Water Records – Existing surface water and foul drainage network are located to the south and west of the site.
- 6 inch OSI Map – no evidence of flooding or marsh areas shown within the site.

Review of the 'other sources' of information noted above do not indicate evidence of flood risk to the site.

3.3 Source Pathway Receptor Model

A Source-Pathway-Receptor model has been produced to summarize the possible sources of floodwater, the pathways by which flood water could reach receptors and the receptors that could be affected by potential flooding, see Table 3.2 below.

It outlines effects of various potential sources, the performance and response of pathways and the consequences to the receptors in the context of the proposed development.

These sources, pathways and receptors will be assessed further by the initial flood risk assessment stage.

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Fluvial	Overbank from the Gollymochy Stream approximately 150m north-east of the site (refer to Figure 1.1)	People and Property (the proposed development).	Low	Medium	Low
Surface Water (Pluvial)	Blockage and / or surcharging of the proposed surface water drainage network	People and Property (the proposed development).	Possible	Medium	Medium
Human / Mechanical Error (Pluvial)	Failure of proposed SuDS measures (e.g. Hydrobrake failure)	People and Property (the proposed development).	Possible	Medium	Medium
Groundwater	Rising groundwater levels within the site	People and Property (the proposed development).	Remote	Medium	Low

Table 3.2 - Source-Pathway-Receptor Analysis

4.0 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

Flood risks identified during Stage 1 – Flood Risk Identification, are outlined in Table 3.2 (Source Pathway Receptor Analysis) and noted below. These risks are assessed further in this section of the SSFRA.

- Low risk of fluvial flooding
- Medium risk of pluvial flooding (surface water and human / mechanical error)
- Low risk of groundwater flooding

The information sources identified in Section 3.2 are considered adequate for the purpose of an Initial Flood Risk Assessment of the site and no further technical studies are proposed.

4.1 Initial Fluvial Flood Risk Assessment

The Eastern CFRAM flood extents mapping identifies the location of the predicated 1% AEP and 0.1% AEP fluvial flood events associated with watercourses in the Clane area (refer to Appendix C). No fluvial flooding is indicated in the vicinity of the site.

The closest modelled node to the site is located on the Gollymochy Stream (Node 09GOLL00135), approximately 150m north of the site.

The location of this node is shown on CFRAM Drawing E09CLA_EXFCD_F1_11 (refer to Appendix C).

- Node 09GOLL00135, 1% Fluvial AEP Event +66.22
- Node 09GOLL00135, 0.1% Fluvial AEP Event +66.33
- Lowest Proposed FFL (see DBFL Drawing 162074-2002) +67.98
- Freeboard from 1% AEP Flood Level 1.76 m

Note: Min. freeboard from 1% AEP required by GDSDS – 500mm.

4.2 Initial Pluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified a medium risk of pluvial flooding relating to the proposed surface water drainage network and human / mechanical error. This risk can be mitigated by designing the surface water network in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) including attenuation of the 1% AEP storm event and implementation of SuDS methodologies.

Proper operation and maintenance of the drainage system should also be implemented to reduce the risk of human or mechanical error causing pluvial flood risk from blockages, fuel / oil interceptor operation problems, Hydrobrake failure etc.

4.3 Initial Groundwater Flood Risk Assessment

During the site walkover survey, no marshy ground was observed. No groundwater wells or marsh areas are located within the site (based on review of information available on the GSI and OSI websites).

Therefore, the risk of groundwater flooding occurring at the site is considered negligible.

4.4 Flood Zone Category

On completion of Stage 2 – Initial Flood Risk Assessment, the site is considered to be located in Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.

The proposed development (“dwelling houses”) is therefore considered appropriate.

5.0 STAGE 3 – DETAILED FLOOD RISK ASSESSMENT

5.1 General

As the Initial Flood Risk Assessment considers the site to be located in Flood Zone C and the proposed development is considered appropriate the Detailed Flood Risk Assessment Stage will only consider pluvial flood risk in relation to the following;

- Proposed Surface Water Management Measures and SuDS
- Flood Exceedance.
- Impact on Adjacent Areas.
- Climate Change.
- Access and Egress for Emergency Services during Flood Events.
- Residual Risks.
- Effectiveness of Flood Mitigation Measures.

5.2 Surface Water Management Measures and SuDS

The Gollymochy Stream is approximately 150m to the north of the site. The Gollymochy is expected to provide a suitable surface water discharge point for the proposed development, via a proposed surface water outfall constructed along rural roads to the north-east of the site (refer to DBFL Drawing 162074-3002). This will serve the majority of the site with the Capdoo Link Road and an isolated section north west of the site draining to the existing public surface water drainage network. The north west section and the upper link road will discharge to an existing surface water manhole north west of the site on College Road and the lower link road will discharge to an existing surface water manhole south east of the site adjacent to Capdoo Avenue.

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates from the proposed surface water drainage network will be controlled by a Hydrobrake type flow control device and associated underground attenuation tanks (Stormtech Chambers). Surface water discharge will also pass via a full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tank, flow control device and separator arrangement as noted above.

Surface water runoff from the site's road network and link road will be directed to the proposed pipe networks via conventional road gullies while surface water runoff from driveways will be captured by permeable paving.

Surface water runoff from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways (providing an additional element of attenuation).

5.2.1 SuDS Methodoligies

The following methodologies are being implemented as part of a SuDS treatment train approach:

- Permeable paving in driveway areas
- Surface water runoff from roofs will be routed to the proposed surface water pipe network via the stone reservoirs beneath permeable paved driveways. Note, this detail does not rely on infiltration, the stone reservoir is intended to provide an additional element of attenuation storage
- Attenuation of the 100-year return period storms within Stormtech Attenuation Chambers, note our calculated attenuation volume does not rely on infiltration.
- "Smart Manholes" (with internal weir) to ensure attenuation systems and Hydrobrakes continue to operate up to and including the 1.0% AEP storm event.
- Installation of a Hydrobrake (limiting surface water discharge from the site to 2.0 l/sec/ha)
- Surface water discharge will also pass via a Class 1 full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

5.2.2 Surface Water Attenuation and Storage

Attenuation volumes have been calculated based on an allowable outflow / greenfield runoff rate of 2.0 l/sec/ha.

5.3 Flood Risk Exceedance

During storms greater than the 1% AEP pluvial event, the development's drainage network design will be exceeded and areas with low ground levels will begin to flood.

Generally, proposed road levels fall towards the west and north. Overland flow is therefore directed towards open space areas, rural roads located to the north and west of the site and the proposed Capdoo Link Road (refer to Figure 5.1).

Figure 5.1 – Flood Exceedance (>1%AEP) Overland Flow Routes UPDATE

5.4 Impact on Adjacent Areas

Adjacent areas will not be impacted by the development up to the 1% AEP flood event.

Storms greater that the 1% AEP (exceeding the design capacity of the site's drainage system) may result in overland flow being directed towards open space areas, rural roads located to the north and west of the site and the proposed Capdoo Link Road.

5.5 Climate Change

The potential impact of climate change has been allowed for as follows;

- Pluvial flood risk - attenuation storage design allows for a 20% increase in rainfall intensities, as directed by Kildare County Council's Water Services Engineer.
- Pluvial flood risk - drainage system design allows for a 20% increase in flows, as recommended by the GDSDS.

5.6 Access and Egress for Emergency Services During Flood Events

Access and egress to the site is provided primarily by way of the proposed Capdoo Link Road which will transverses the site. The proposed apartments located in the north west corner of the site can be accessed from a regional road running north of the proposed development.

The Capdoo Link Road and regional road north of the site are located in Flood Zone C as defined by the OPW guidelines therefore, it is expected that the site can be safely accessed during storm events up to 1% AEP event.

5.7 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the private drainage system related to pipe blockage, flood exceedance or mechanical failure.
2. Pluvial flooding from the development's drainage system for storms in excess of the 1% AEP storm event.

5.8 Mitigation Measures

Proposed mitigation measures to address residual flood risks are summarized below;

M1. Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.

M2. In the event of storms exceeding the 1% AEP design capacity of the attenuation system, possible overland flow routing towards open space areas should not to be blocked. At these locations, the site's boundaries should be permeable to facilitate flood routing onto adjacent public roads.

5.2.1 Effectiveness of Mitigation Measures

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

Should extreme pluvial flooding occur that is in excess of the development's attenuation capacity (i.e. greater than 1%AEP), then overland flow routes directed towards open space areas are provided in order to protect the proposed development.

6.0 CONCLUSIONS

The Site-Specific Flood Risk Assessment for proposed development at Capdoo, Clane was undertaken in accordance with the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices.

Following the Flood Risk Assessment, it has been determined that is located in Flood Zone C as defined by the Guidelines.

It is concluded that the;

- Proposed residential development is appropriate for the site's flood zone category.
- The sequential approach outlined in Planning System and Flood Risk Management Guidelines has been adhered to and that the 'Avoid' principal has been achieved.

In conclusion, the proposed development is considered to have the required level of flood protection up to and including the 1% AEP flood event.

Overland flow paths have been identified for pluvial flooding exceeding the capacity of the surface water drainage network.

APPENDIX A – PROPOSED SITE LAYOUT

N

GENERAL NOTES

SITE BOUNDARY OUTLINED IN RED

THIS DRAWING TO BE READ IN CONJUNCTION WITH-
ARCHITECT'S DRAWINGS
CONSULTANT ENGINEER'S DRAWINGS AND SPECIFICATIONS
LANDSCAPE ARCHITECT'S DRAWINGS AND SPECIFICATIONS

FOR ROAD AND SITE LEVELS REFER TO DBFL CONSULTING ENGINEERS DRAWINGS

Schedule of Accomodation:-

Dwelling Type	Total (and %)
2 bedroom house	20 (5.46%)
3 bedroom house	75 (20.49%)
4 bedroom house	77 (21.03%)
5 bedroom house	12 (3.28%)
Total houses	**184** (50.27%)
1 bed own door apartment	12 (3.28%)
1 bed apartment	16 (4.37%)
2 bed apartment	82 (22.4%)
2 bed own door apartment under duplex	36 (9.84%)
3 bed own door duplex	36 (9.84%)
Total Apartments/ Duplexes	**182** (49.73%)
TOTAL NO. OF DWELLINGS	**366**
APPLICATION SITE AREA (RED LINE BOUNDARY)-	11.442HA
SITE AREA IN APPLICANT'S OWNERSHIP	10.798HA
NET DEVELOPMENT AREA (OMITTING Spine Road)	9.6778HA
GROSS DENSITY (366/ 10.798)	33.89 /HA
NET DENSITY (366/ 9.6778)	37.82 /HA

Public Open Space

Total Public Open Space	1.6125HA
As a % of Development Area	16.668%

Data Source / Reference:
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PRIME2

File Format:
==========
Autodesk AutoCAD (DWG_R2013)

File Name:
==========
v_50016012_1.dwg

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LRX,LRY= 688133.6823,728073.566
ULX,ULY= 687303.6823,728688.566
URX,URY= 688133.6823,728688.566

Projection / Spatial Reference:
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Centre Point Coordinates:
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X,Y= 687718.6823,728381.066

Data Extraction Date:
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Date= 17-Jul-2018

Version / Release:
==========
Version= 1.0

License / Copyright:
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EXTENT OF SHEET 16016 PL03

EXTENT OF SHEET 16016 PL04

NOTES:

DO NOT SCALE FROM DRAWINGS. WORK TO FIGURED DIMENSIONS ONLY. ARCHITECT TO BE NOTIFIED OF ALL DISCREPANCIES.

REVISIONS

DATE	DESCRIPTION	No.

MCORM
MCCROSSAN O'ROURKE MANNING ARCHITECTS

PROJECT TITLE: Capdoo, Clane
DRAWING TITLE: Residential Development Site Layout
DATE: July 2018
DRAWN BY: PMcN
SCALE: 1:1000
REVISION:
JOB NO: 16016
DRAWING NO: PL02

Albert Place West, Harcourt Lane, Dublin 2, Ireland.
Tel: 01-4788700 Fax: 01-4788711 E-Mail: arch@mcorm.com

APPENDIX B – TOPOGRAPHIC SURVEY PLANS

N 728600
N 728500
N 728400
N 728300
E 687500
E 687600
E 687700

Ridge:80.23
Eaves:76.21
Ridge:79.86
Eaves:77.21
Tarmac Road
Overhead Power Lines
Bank Btm
Bank Top
Hedge
Dense Scrub
Drain
P&W Fence
Fence
Rtn Wall
Grass
Eaves:76.45
Ridge:79.59
Concrete
Ruin
Wall/Top:78.00
Wall/Top:78.47
Wall/Top:77.78
ToF:77.57
Wall/Top:78.67
Wall/Top:79.44
Wall/Top:79.93
Wall/Top:80.31
Wall/Top:80.27
Wall/Top:80.36
Wall/Top:76.19
Rail/Top:77.58
Wall&Rail
Eaves:78.85
Ridge:83.24
Eaves:79.19
Ridge:83.55
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Eaves:79.81
Ridge:81.53
Eaves:79.75
Eaves:74.13
Ridge:76.44
Kerb
Top of Bank
Post
Hedge
Fence
Fence @ c/l Hedge
Overhead Power Lines
Tarmac Road
Drain
Bank Top
Bank Btm
c/l Hedge
c/l Hedge @ Bank Top
Bank Btm
College Road East
To Clane
MH(SW) cl:72.14 il:70.73 ø225
MH(FS) cl:72.38 il:70.78 ø225
MH(SW) cl:73.51 il:71.48 ø225
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il:73.88
il:78.38
il:73.68
il:71.39
il:72.06

Sheet 1 of 3

NOTE:

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LAND SURVEYS
22 Mellifont Avenue, Dun Laoghaire, Co. Dublin.
Ph: 2805212 Fax: 2302535 info@landsurveys.ie

Site at:

Capdoo, Clane, Co. Kildare

Client:

Ardstone Residential

Scale:	1:500 (A1)
Contour:	0.5m Interval
Datum:	O.S. Malin Hd.
Issued:	04.04.2017
Ref:	D15468-F2D

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E 687700 E 687800 E 687900

N 728600 N 728500 N 728400 N 728300

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Ridge:73.40
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Eaves:70.43 Ridge:73.96
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Eaves:70.34 Ridge:72.18
Ridge:74.91 Eaves:70.42
Eaves:71.25 Ridge:73.89
Eaves:71.22 Ridge:75.22

Drain
Fence
Ramp 69.67
Tarmac Road
Wall
Overgrown
Hedge
c/l Hedge
Line of Pines
TOW:69.09
Overhead Power Lines
Bank
Trees/ Overgrown
Tank
Building Ridge:73.20 Eaves:71.34 TFL:68.73
Stables
Fence
Bank Bim
Tarmac
Tarmac Driveway
Trees
Bank Top
Ridge:74.21 Eaves:72.75 FFL:68.40
Tarmac Yard
Concrete
Born Ridge:73.81 Eaves:72.22
Stables Ridge:70.83 Eaves:70.30 FFL:67.71
Overgrown Boundary Inaccessible
Stables Ridge:71.00 Eaves:70.23 FFL:67.79
Stables Ridge:71.77 Eaves:71.39 FFL:68.09
Stables Ridge:71.38 Eaves:70.60 FFL:67.72
Concrete
Tarmac Road
To Clane
c/l Hedge @ Bank Top
Bank Btm
Paint Mark
P&W Fence

Sheet 2 of 3

LAND SURVEYS
22 Mellifont Avenue, Dun Laoghaire, Co. Dublin.
Ph: 2805212 Fax: 2302535 info@landsurveys.ie

Site at:
Capdoo, Clane, Co. Kildare

Client:
Ardstone Residential

Scale:	1:500 (A1)
Contour:	0.5m Interval
Datum:	O.S. Malin Hd.
Issued:	04.04.2017
Ref:	D15468-F2D

College Road East

To Clane 6km

N 728300

N 728200

N 728100

E 687800

E 687700

E 687600

Sheet 3 of 3

NOTE:

Portion of Ordnance Survey Detail Shown Grey Digitally Reproduced under Ordnance Survey Ireland Licence No. SU 0001417 © Government of Ireland.

LAND SURVEYS
22 Mellifont Avenue, Dun Laoghaire, Co. Dublin.
Ph: 2805212 Fax: 2302535 info@landsurveys.ie

Site at: Capdoo, Clane, Co. Kildare

Client: Ardstone Residential

Scale:	1:500 (A1)
Contour:	0.5m Interval
Datum:	O.S. Malin Hd.
Issued:	04.04.2017
Ref:	D15468-F2D

APPENDIX C – FLOOD HAZARD INFORMATION

OPW National Flood Hazard Mapping

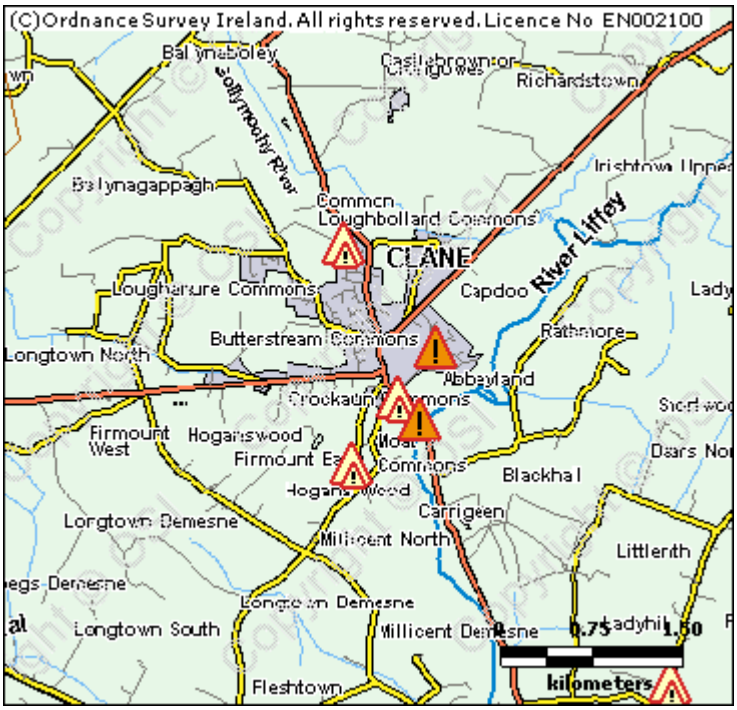
Summary Local Area Report

This Flood Report summarises all flood events within 2.5 kilometres of the map centre.

The map centre is in:

County: Kildare

NGR: N 875 276



Map Scale 1:62,129

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

5 Results

1. Liffey Clane Dec 1954
Start Date: 08/Dec/1954
County: Kildare
Flood Quality Code:2
Additional Information: Reports (2) Press Archive (1) More Mapped Information

2. Morrell Clane 30th Dec to 1st Jan 2010
Start Date: 30/Dec/2009
County: Kildare
Flood Quality Code:3
Additional Information: Reports (1) More Mapped Information

3. Loughbollard, Clane Recurring
Start Date:
County: Kildare
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

4. Millicent Rd, Clane Recurring
Start Date:
County: Kildare
Flood Quality Code:4
Additional Information: Reports (1) More Mapped Information

5. Commons, Clane Recurring
Start Date:
County: Kildare
Flood Quality Code:4

MINUTES OF MEETING

Reference:	**P4D403A – F310 – 017 – 004-001**	**Page 1 of 3**
Project No.:	**P4D403A**	
Project Title:	**OPW Flood Hazard Mapping – Phase 1**	
Purpose of Meeting:	**Kildare County Council – Oral Report – Area Engineer – Clane**	
Participating:	**Area Engineer** **Supervisor** **Search Manager**	**Kildare County Council** **Kildare County Council** **ESBI**
Venue:	**Clane**	
Date of Meeting:	**22/03/05**	
Copies to: **Compiled by:**	**Search Manager ESBI**	
Status	**Draft**	
Approved for ESBI:		
Approved for Kildare County Council		
Date:		

Meeting with Area Engineer for Clane 22/03/05

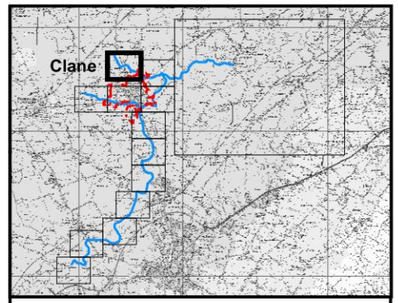
The Area Engineer and his supervisor outlined 29 areas that are or were prone to flooding. These are: -

1. Newtown – River Blackwater overflows its banks after heavy rain. This occurs every year.
   Flood Id = 1272
2. Timoltan/Fanagh – Drain overflows after heavy rain every year. A property is affected. Road is liable to flooding.
   Flood Id = 1274
3. Clonshanbo – The Clonshanbo river overflows its banks after heavy rain every year. The main Clane – Kilcock road is liable to flooding and was flooded in January 2005. Road has been raised by the council.
   Flood Id = 1276
4. Staplestown at mill pond – Mill pond over flows after heavy rain a couple of times per year. County road is liable to flooding.
   Flood Id = 1277
5. Allenwood – Low lying area floods after heavy rain. Road is liable to flooding. No property is affected
   Flood Id = 1278
6. Prosperous – A property is flooded after heavy rain every year
   Flood Id = 1279
7. Killinagh – Area floods after heavy rain every year. The culvert of a stream under the Grand Canal can't take volume of water.
   Flood Id = 1280
8. Bluetown– Flooding occurs after heavy rain every year. This is due to inadequate drainage and drains being filled in by property owners
   Flood Id = 1281
9. Staplestown Bog– Road is liable to flooding after heavy rain every year.
   Flood Id = 1282
10. Killeenmore - Flood plain of Morell river and tributaries. A number of properties were flooded in November 2000 and November 2002. OPW have undertaken remedial work
    Flood Id = 1283
11. Ladyhill– River overflows its banks onto flood plain after heavy rain. Road is liable to flood.
    Flood Id = 1284
12. Commons, Clane- The Butterstream overflows its banks after heavy rain every year. A property is affected. Road is liable to flooding
    Flood Id = 1285
13. Ballycaghan – Low lying land floods every year. Road is liable to flooding
    Flood Id = 1287
14. School Street, Kilcock – Low lying land floods after heavy rain every year due to inadequate drainage
    Flood Id = 1288
15. Kilcock – Low lying land floods after heavy rain every year due to inadequate drainage
    Flood Id = 1289
16. Ryewater, Kilcock – Ryewater overflows its banks after heavy rain every year onto flood plain.
    Flood Id = 1290
17. Millicent Road, Clane – Low lying area floods after heavy rain every year due to inadequate and blocked drainage. Road is liable to flood . There has been significant development.

Flood Id = 1291

18. Laragh– Stream overflows its banks after heavy rain every year. Road is liable to flood. This area flooded in 2005
    Flood Id = 1292
19. Loughballard, Clane – Low lying area floods every year after heavy rain due to inadequate drainage
    Flood Id = 1293
20. Clonfert – Property is flooded after heavy rain. Water flows off high land and stream overflows
    Flood id = 1294
21. Carrick Hill – Low point in upland area floods after heavy rain. The council may have resolved the issue.
    Flood id = 1295
22. Boyne Bridge, Edenderry – Flood plain of the River Boyne
    Flood Id = 1296
23. Ballycowan – Flood plain of the River Boyne
    Flood Id = 1297
24. Thomastown – Stream overflow its banks after significant rainfall. Last flooded November 2000
    Flood Id = 1298
25. Calfstown – Low lying area floods after heavy rain. The garden of a Property has been flooded
    Flood Id = 1299
26. Oldcourt Road – Water flows across road after heavy rain
    Flood Id = 1300
27. Moyvally – Water flows off the main road into the side road after heavy rain every year
    Flood Id = 1301
28. Carbury – Standing water in bog every winter
    Flood Id = 1302
29. Knockanally/Dysart – Flood plain of tributaries of River Blackwater.
    Flood Id = 1303

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09GOLL00308	71.80	1.62	71.93	3.09	71.98	6.45
09GOLL00289I	71.77	N/A	71.86	N/A	71.89	N/A
09GOLL00252	70.33	N/A	70.74	N/A	70.85	N/A
09GOLL00208	68.78	N/A	69.14	N/A	69.50	N/A
09GOLL00175	67.10	N/A	67.50	N/A	67.67	N/A
09GOLL00135	65.85	2.85	66.22	5.33	66.33	9.73



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

09GOLL00308
09GOLL00289I
09GOLL00208
09GOLL00252
09GOLL00175
09GOLL00135

NORTHERN EXTENT OF PROPOSED DEVELOPMENT

NORTH-WEST CORNER OF SITE

286400 286600 286800 287000 287200 287400 287600 287800 288000

229800 229600 229400 229200 229000 228800 228600

0 50 100 200 300 400 500 Metres

FINAL

REV:	NOTE:	DATE:
01	Aquaduct was clipped from Page 4 of all maps	30/10/17

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

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F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map: Clane Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By : C.C.	Date : 30 October 2017
Checked By : M.W.	Date : 30 October 2017
Approved By : S.P.	Date : 30 October 2017
Drawing No. :	E09CLA_EXFCD_F1_11
Map Series :	Page 11 of 13
Drawing Scale :	1:5,000 @A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF04072	63.69	N/A	64.11	N/A	64.46	N/A
09LIFF04052	63.40	95.85	63.83	128.20	64.19	160.93
09LIFF04020	63.06	96.80	63.55	129.65	63.93	162.86
09LIFF03996	62.94	N/A	63.42	N/A	63.80	N/A
09GOLL00120I	65.70	N/A	65.99	N/A	66.07	N/A
09GOLL00097aD	64.38	3.05	64.50	3.71	64.61	9.01
09GOLL00070	64.08	3.24	64.31	5.93	64.47	7.09

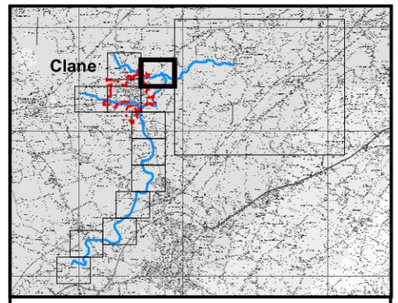
09GOLL00120I
09GOLL00097aD
09GOLL00070
09LIFF04020
09LIFF03996
09LIFF04052
09LIFF04072

EASTERN EXTENT OF PROPOSED DEVELOPMENT

CAPDOO
CAPDOO COMMONS

288000 288200 288400 288600 288800 289000 289200 289400 289600
229400 229200 229000 228800 228600 228400 228200

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Aquaduct was clipped from Page 4 of all maps	30/10/17

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
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RPS

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F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map: Clane Fluvial Flood Extents

Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.C.	Date : 30 October 2017
Checked By :	M.W.	Date : 30 October 2017
Approved By :	S.P.	Date : 30 October 2017

Drawing No. : E09CLA_EXFCD_F1_12

Map Series : Page 12 of 13

Drawing Scale : 1:5,000 @A3

CAPDOO PARK / BROOKLANDS JUNCTION (SOUTH-EAST OF PROPOSED DEVELOPMENT)

09LIFF04112

09LIFF04152

09LIFF04162

09LIFF04261

09LIFF04280

09LIFF04214

RATHMORE

ABBEYLAND

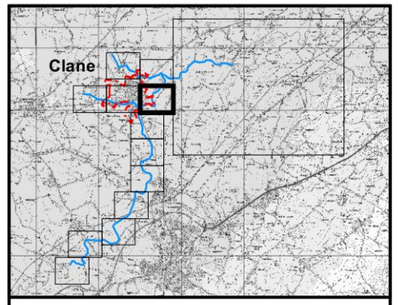
River Libaw

288000 288200 288400 288600 288800 289000 289200 289400 289600

228200 228000 227800 227600 227400 227200 227000

0 50 100 200 300 400 500 Metres

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF04280	65.32	95.45	65.71	127.78	66.00	165.50
09LIFF04261	65.19	N/A	65.58	N/A	65.85	N/A
09LIFF04214	64.89	N/A	65.30	N/A	65.59	N/A
09LIFF04162	64.43	N/A	64.88	N/A	65.18	N/A
09LIFF04152	64.34	95.67	64.76	128.02	65.06	161.63
09LIFF04112	64.10	N/A	64.53	N/A	64.83	N/A



IMPORTANT USER NOTE:
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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Aquaduct was clipped from Page 4 of all maps	30/10/17

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW Oifig na nOibreacha Poiblí The Office of Public Works

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Map: Clane Fluvial Flood Extents

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn By :	C.C.	**Date :**	30 October 2017
Checked By :	M.W.	**Date :**	30 October 2017
Approved By :	S.P.	**Date :**	30 October 2017

Drawing No. : E09CLA_EXFCD_F1_10

Map Series : Page 10 of 13

Drawing Scale : 1:5,000 @A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF04295	65.50	95.19	65.90	127.28	66.20	148.75
09COTT00178I	74.31	N/A	74.65	N/A	74.74	N/A
09COTT00175I	74.14	N/A	74.28	N/A	74.40	N/A
09COTT00155D	72.48	N/A	72.66	N/A	73.11	N/A
09COTT00152D	72.19	N/A	72.35	N/A	72.91	N/A
09COTT00138bI	70.84	N/A	71.00	N/A	71.17	N/A
09COTT00090J	68.74	N/A	68.91	N/A	69.02	N/A
09COTT00081I	68.63	N/A	68.78	N/A	68.89	N/A
09COTT00039J	65.49	N/A	65.87	N/A	66.25	N/A
09COTT00011J	65.45	1.95	65.85	2.69	66.14	5.08

CLANE

CLANE MAIN STREET - APPROX. 700M SOUTH OF PROPOSED DEVELOPMENT

09COTT00178I
09COTT00175I
09COTT00155D
09COTT00152D
09COTT00138bI
09COTT00081I
09COTT00090J
09COTT00039J
09COTT00011J
09LIFF04295

CROCKAUN COMMONS

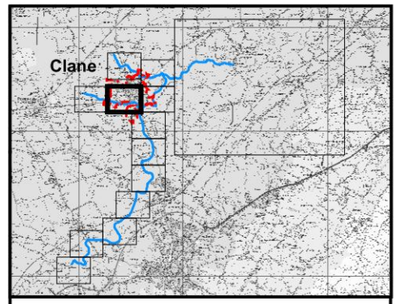
BOANSWOOD EAST

MOAT COMMONS

286400 286600 286800 287000 287200 287400 287600 287800 288000

228200 228000 227800 227600 227400 227200 227000

0 50 100 200 300 400 500 Metres



IMPORTANT USER NOTE:
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Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

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EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

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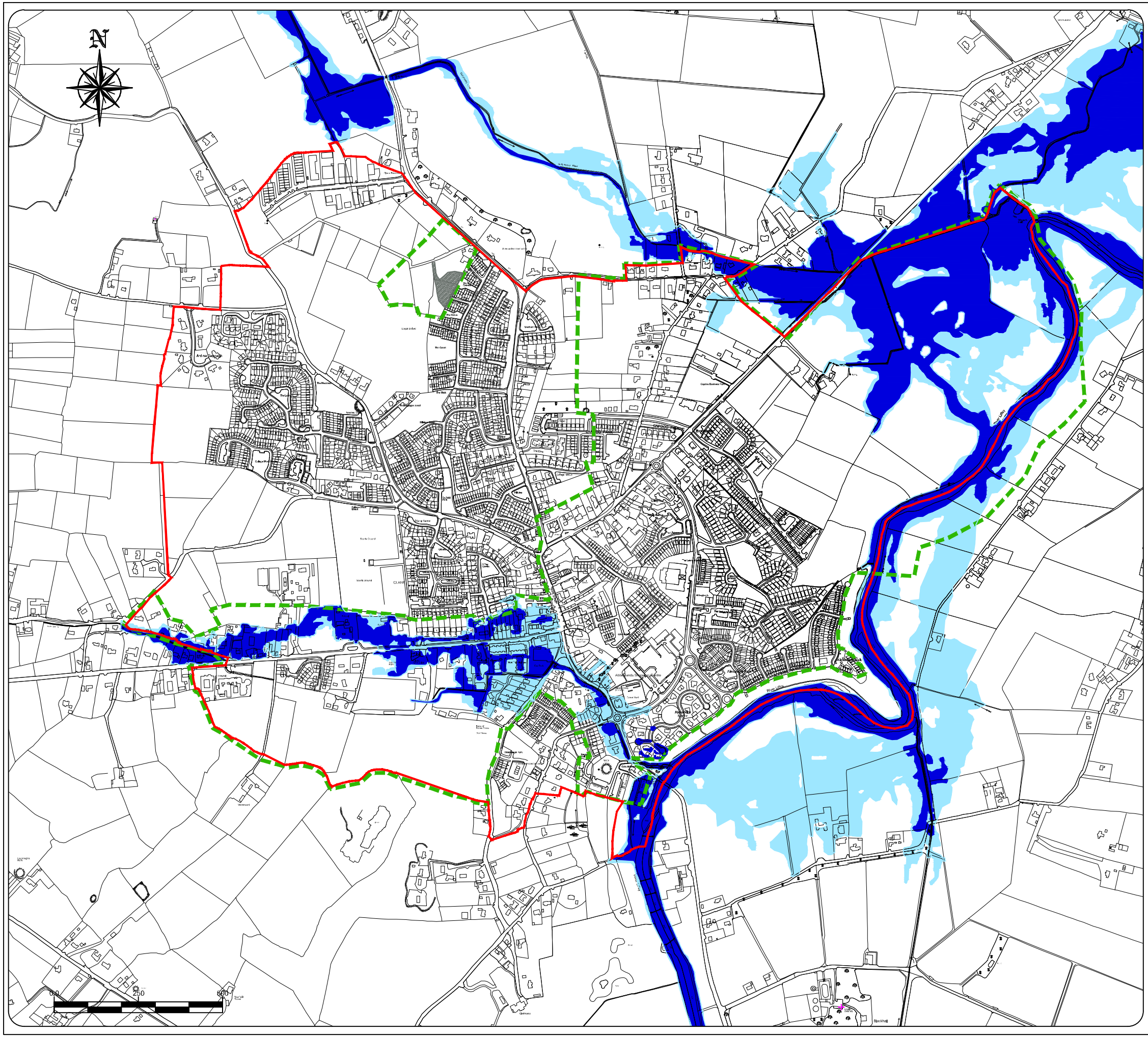
Map: Clane Fluvial Flood Extents

Map Type:	EXTENT	
Source:	FLUVIAL	
Map Area:	HPW	
Scenario:	CURRENT	
Drawn By :	C.C.	Date : 30 October 2017
Checked By :	M.W.	Date : 30 October 2017
Approved By :	S.P.	Date : 30 October 2017

Drawing No. : E09CLA_EXFCD_F1_09

Map Series : Page 9 of 13

Drawing Scale : 1:5,000 @A3



Kildare County Council
Planning Department
Áras Chill Dara,
Devoy Park, Naas,
Co Kildare.

Clane Local Area Plan 2017 - 2023

Legend

Local Area Plan Boundary

Development proposals for lands outlined thus are to be the subject of site-specific Flood Risk Assessment in accordance with the Flood Risk Management Guidelines and appropriate to the type and scale of the development being proposed.

Such Development Proposals shall also:

- Indicate and quantify loss of floodplain storage arising from the development proposal;
- Provide compensatory storage located within or adjacent to the proposed development;
- Indicate measures to ensure that water-vulnerable elements of the Development would not be flooded during the 1000year flood;
- Ensure that existing flow paths for flood waters will not be compromised.

Flood Risk Zone A (1.0% AEP)

Flood Risk Zone B (0.1% AEP)

Pluvial Flood Risk Zone

Source:

KILGALLEN & PARTNERS
CONSULTING ENGINEERS
KYLEKIPROE, WELL ROAD, PORTLAOISE, CO. LAOIS
Tel: +353 57 86 62860, Fax: +353 57 86 62861
E-mail: info@kilgallen.ie, Web: www.kilgallen.ie

Strategic Flood Risk Assessment Recommendations

Scale: N.T.S.	Map Ref.: 9.1
Date: June 2017 (Adopted LAP)	Drawing No.: 200/16/1000
	Drawn by: M.Kennedy/B.R

This drawing is to be read in conjunction with the written statement

APPENDIX D – IGSL SITE INVESTIGATION REPORT (EXTRACTS)

PROPOSED HOUSING DEVELOPMENT CAPDOO CLANE FOR ARDSTONE

DBFL CONSULTING ENGS

CONTENTS

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 (1999), '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 numbers 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 HOUSING DEVELOPMENT AT CAPDOO CLANE COUNTY KILDARE FOR ARDSTONE RESIDENTIAL

DBFL CONSULTING ENGINEERS

Report No 20159 **JULY 2017**

I Introduction

A major residential development is planned for a site located at Capdoo in Clane, County Kildare.

A comprehensive investigation of sub soil conditions in the area of development has been ordered by DBFL Consulting Engineers on behalf of Ardstone Residential Fund.

The programme of the field investigation included the construction of boreholes, trial pits and dynamic probes to establish geotechnical criteria on which to base foundation and infra-structural design. Work was carried out in accordance with BS 5930, Code of Practice for Site Investigations (1999).

In addition plate bearing tests were scheduled to determine in situ CBR values while soakaway testing was performed in several locations in accordance with BRE Digest 365.

A programme of laboratory testing to confirm geotechnical and environmental soil parameters followed site operations.

This report includes all factual data pertaining to the project and comments on the findings relative to foundation and infrastructural design.

II Fieldwork

The site is predominantly a green field one located at Capdoo in Clane. A site location map and a drawing indicating the exploratory positions are enclosed in Appendix VII. This has been provided by DBFL engineers.

The various exploratory positions have been determined by DBFL and set out by the site engineer. Locations have been referenced to national grid and O.D. levels have been established.

Each location was electronically scanned to ensure that underground services were not disrupted. At borehole locations a trial pit was opened by hand to a depth of 1.20 metres to confirm this.

The scope of the field investigation included the following elements:

* 3 nr. Conventional Boreholes .
* 23 nr Machine Excavated Trial Pits
* 20 nr. Plate Bearing Tests (In Situ CBR)
* 50 nr H.D. Dynamic Probes
* 8 nr Percolation Tests to BRE Digest 365

Following the field operations samples were selected for laboratory analysis. This included standard geotechnical testing and detailed environmental analysis carried out by specialist laboratory.

a.Boreholes

The exploratory holes were bored with conventional 200mm cable-tool methods using a Dando 2000 Rig. One re-bore (BH02A) was carried out after shallow refusal in BH02.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement.

Some variation in stratification was indicated. At BH01 surface top soil overlies a thin stratum of brown sandy gravelly CLAY. From 1.10 to 8.80 metres, medium dense to dense silty sandy GRAVEL is penetrated, with refusal noted at 8.80 metres. Ground water was observed at 4.20 metres BGL.

Boreholes BH02 and BH02A encountered stiff to very stiff brown sandy gravelly CLAY below top soil to respective refusal depths of 3.90 and 3.20 metres.

In BH03, very stiff brown gravelly CLAY extends from 0.20 to 2.20 metres with dense underlying GRAVEL 2.20 to 3.30 metres. Boulders at 3.30 metres prevented further advancement. No ground water was encountered in BH02, BH02A and BH03.

Both boreholes BH2 and BH3 were dry during the investigation period.

b. Trial Pits

Trial pits were scheduled at twenty five locations. Because of access restraints TP01 and TP02 were omitted. Trial Pitting was carried out using a light tracked excavator under geotechnical engineering supervision. Samples were recovered at intervals, ground water was noted where relevant and detailed trial pit records prepared. These records are contained in Appendix II to this report with supporting photographs.

Top soil varying in thickness from 300mm to 600mm overlies the site. In the majority of trial pit locations a thin stratum of firm gravelly SILT/CLAY is then noted. This continues to depths between 1.00 and 2.00 metres. Below this stratum and directly below the top soil in some locations a stratum of silty or clayey gravelly SAND or sandy GRAVEL is found. Trial Pits continued to completion in this stratum at depths between 2.50 and 3.00 metres.

Ground water was noted in Trial Pits TP07 to TP12, associated with collapse of side walls in some instances. Some minor wall collapse was also recorded in dry non-cohesive soils.

c. Plate Bearing Tests

In situ CBR values were established by Plate Bearing Test at twenty one specified locations. Testing was carried out directly below the top-soil zone at a depth of approximately 0.50 metres. Test locations were referenced CBR05 to CBR25. Four locations CBR01 to CBR04 were not accessible.

A 450mm diameter steel plate is loaded incrementally and deflection is recorded. The plate is then off loaded and recovery measured (Load Cycle). The process is then repeated (Re-Load Cycle).

The equivalent CBR value is calculated for both cycles. Detailed individual results are presented in Appendix III and the data is summarised in the following table.

TABLE A CBR SUMMARY DATA

Test No.	CBR at Load Cycle (%)	CBR at RE-Load (%)
05	54.9	68.7
06	2.8	3.7
07	1.5	3.4
08	0.2	0.2
09	1.0	1.5
10	3.7	5.0
11	5.1	7.1
12	2.5	3.6
13	1.0	3.1
14	N/A	N/A
15	4.3	6.1
16	1.2	3.1
17	2.6	5.5
18	4.1	6.0
19	8.1	9.8
20	1.2	2.2
21	1.4	3.9
22	2.5	10.0
23	1.1	2.6
24	1.0	1.7
25	1.6	4.6

The high CBR values noted at locations CBR05 and CBR 19 may reflect coarse dry surface material. The results over the remainder of the site reflect average CBR values on load cycle of 2.3% with an average CBR value of 3.6 % on reload.

A design CBR value of 3% would be appropriate for this site.

d. Dynamic Probes

Probing was scheduled at fifty locations to establish a pattern of soil strength with depth. Access was restricted at DP01 and DP02 and these probes were omitted. Forty-eight probes were completed.

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.

Some variation in probe resistances and associated soil strength were observed. Soft zones (defined by N_{100} values < 1) were noted in several locations. A dynamic probe resistance of $N_{100} = 3$ (with no dramatic underlying deterioration) would be the normal minimum requirement for conventional two storey house foundations.

Probe results are summarised with the depth to $N_{100} = 3$ indicated as well as soft unsuitable zones. Final probe refusal depths are also indicated, these depths are not indicative of rock horizon.

Probe No.	Soft Zones	Depth to $N_{100} = 3$	Final Depth
DP03	0 – 0.30	0.30	1.00
DP04	0.80 – 1.30	1.70	3.20
DP05	0 – 0.20	0.30	1.40
DP06	0.80 – 1.90	2.20	2.60
DP07	0 – 1.80	2.00	2.40
DP08	0 – 1.60	1.70	2.70
DP09	0 – 0.20	0.60	3.10
DP10	0 – 0.30	0.70	3.60
DP11	0 – 0.10	0.30	1.70
DP12	0.80 – 1.40	1.60	2.50
DP13	0 – 0.80	0.90	5.00
DP14	0 – 1.10	1.20	1.50
DP15	0 – 0.20	0.50	2.00
DP16	0 – 0.30	0.60	2.50
DP17	0 – 1.80	1.90	5.00
DP18	0 – 1.60	1.70	2.90
DP19	0 – 0.50	0.60	3.60
DP20	1.80 – 2.40	0.70	3.60
DP21	0 – 0.20	0.40	1.50
DP22	0 – 0.20	0.40	3.50
DP23	0 – 1.80	2.00	4.80
DP24	0 – 1.50	1.70	5.00
DP25	0 – 0.20	0.40	2.60
DP26	0 – 0.20	0.40	2.00
DP27	0 – 0.20	0.50	5.00
DP28	0 – 1.00	1.20	1.60
DP29	0 – 0.50	1.00	4.00
DP30		0.70	3.50
DP31	0 – 0.30	0.70	4.80
DP32		1.20	2.60
DP33	0 – 0.60	0.80	2.60
DP34	0 – 0.20	0.40	5.00
DP35		0.40	1.20
DP36	0 – 0.80	1.00	5.00
DP37	0 – 0.50	1.20	3.70
DP38	0 – 1.40	1.50	2.60
DP39	0 – 1.30	1.40	5.00
DP40	0 – 0.40	1.00	5.00
DP41	0 – 0.30	0.50	5.00
DP42	0 – 0.70	1.00	2.80
DP43	0 – 0.80	1.00	2.00
DP44	0 – 0.20	0.80	1.40
DP45	0 – 1.00	1.20	3.40
DP46	0 – 0.20	0.60	2.40
DP47	0 – 0.40	0.70	1.20
DP48	0 – 0.40	1.00	2.00
DP49	0 – 0.50	0.60	3.00
DP50	0 – 1.50	1.70	4.90

e. BRE Digest 365 Soakaway

A total of eight percolation tests were scheduled.

Infiltration testing was performed in accordance with BRE Digest 365 'Soakaway Design'. To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. This operation is generally performed over two cycles of soakage and dispersion following initial soakage.

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.

Records for each test are presented in Appendix V. The stratification and water table in each test pit is noted and a record of fall in water level with time is made.

Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle. The infiltration rate (f) is calculated and the results for the individual tests indicate that the soils in the test areas are relatively impermeable with little or no infiltration recorded.

The results reflect the variation in ground conditions over the site area. In two locations a high water table was noted , precluding completion of the test. Impermeable clay matrix soils were also encountered and some percolation was achieved in the more granular soils.

The Infiltration Rate (f) for each location with brief comment is noted as follows:

Test No.	**Infiltration Rate (f) (metres / min)**	**Comment**
IT01	0.00000	Silt/Clay
IT02	0.00054	Silty SAND
IT03	0.00163	SAND
IT04	0.00094	Silty SAND
IT05	No Test Possible	Water Table @ 1.30m
IT06	No Test Possible	Water Table @ 0.90m
IT07	0.00238	Sandy GRAVEL
IT08	0.00014	Silty SAND

III Testing

(a) In-Situ :

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes to measure relative in-situ soil strength. N values are noted in the right hand column of the boring records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate

The results of the tests are summarised as follows:

STRATUM	N VALUE RANGE	COMMENT
Sandy GRAVEL	12 to 52	Medium Dense to Dense
Gravelly CLAY	23 to 32	Stiff

In several instances refusal of SPT apparatus was noted, probably on boulder obstructions and results are presented as blows for specific penetration and refusal.

(b) Geotechnical and Environmental Laboratory :

All samples from the boreholes and trial pits have been returned to the IGSL laboratory for initial visual inspection, a schedule of testing was prepared and tests as appropriate carried out. The programme of testing included the following elements and all results are presented in Appendix VI.

a. Moisture Content and Classification (Liquid and Plastic Limits)
b. Particle size distribution (Sieve Analysis / Hydrometer)
c. Sulphate and pH determination.
d. RILTA Environmental Suite

Geotechnical testing was carried out by IGSL in it's INAB accredited facility. Chemical and environmental testing was carried out by Chemtest Limited in their UKAS laboratory.

Classification

The liquid and plastic limits were established for several samples of the upper cohesive soils. Results reflect variation from clay matrix to silt matrix material, essentially material of similar origin. Moisture contents range from 9 to 18% and the material is of low plasticity and sensitivity to moisture content variation.

Grading

Grading tests were carried out on the main soil strata using wet sieve and hydrometer analysis as appropriate.

The grading curves reflect the variation in soil type over the site area. Clean sandy GRAVEL, finer silty SAND, gravelly SILT and gravelly CLAY have all been identified.

Sulphate and pH.

Three samples were selected for sulphate and pH analysis. Sulphate concentrations (SO4 2:1 extract) of from 0.010 to 0.017 g/l were established with an average pH of 8.3 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

Two soil samples were submitted for detailed environmental analysis to RILTA (WAC) parameters.

The results indicate that the soils can be classified as INERT with little or no elevated contaminant levels recorded. Material excavated from this site can be readily disposed of to a regular licensed landfill facility and no problems are anticipated with personnel operating on the site.

IV Discussion

The proposed residential development is for traditional housing on a site located at Capdoo in Clane, County Kildare.

The area is an undulating greenfield one with ground level varying from about 67.00 to 80.00 OD. Access to part of the site was restricted and a number of scheduled Trial Pits, CBR Tests and Probes were omitted following consultation with the client and engineer.

A comprehensive investigation of ground conditions has been carried out on the instructions of DBFL involving Borehole and Trial Pit investigation with supporting Dynamic Probes, Plate Bearing Tests and Percolation Tests.

It is assumed that the development will as far as possible follow existing contours, however some cut and fill operations may be required.

Ground water was noted at approximately 4.00 metres in one of the boreholes and in rare trial pits generally below 1.00 metres.

Foundations:

Soil strength has been determined by SPT tests in the three boreholes and by Dynamic Probe resistance in the fifty locations examined. Visual assessment of soil strength in the trial pits has also been used in assessing allowable bearing parameters.

Standard penetration tests in boreholes at 1.00 metre BGL were in excess of N = 20. This would suggest an allowable bearing pressure of 150 kN/sq.m. based on the lowest SPT value.

A Dynamic Probe resistance of $N_{100} = 3$ with an increasing underlying strength trend will permit an allowable bearing pressure of 100 kN/sq.m. Similarly a probe resistance of N100 = 5 will equate to 150 kN/sq.m.

Based on the data obtained we would suggest the use of traditional reinforced strip or pad foundations, founded at approximately 1.00 metre BGL and using an allowable bearing pressure of 100 kPa. This scenario will be applicable over most of the site. In about ten probe locations soft or weak soils were noted to depths in excess of the normal 1.00 metre. The relevant probes are DPs 4,6,7,8,12,17,18,23, 24 and 50. Apart from Probe 50, these are generally located in the northern section of the site.

Careful visual assessment of excavated formation will be essential to accurately define the soft zones which should be removed and replace with lean nix concrete up to base of reinforced foundation.

It is quite likely that variation from granular to cohesive soils will occur over relatively short distances. Ideally individual structures (detached or semi-detached) should be founded on similar material to ensure that differential settlement is avoided.

Settlement of foundations under the indicated loads will be of the order of 10 to 15mm. In the mainly granular soils settlement should be relatively rapid. Settlement in the clay soils will be mote long term.

Well-reinforced foundations will assist in bridging any local discontinuities in the formation soils.

Ground Floor Slabs

The sub soils below the top-soil at a depth of about 0.50 metres should readily support lightly loaded ground floor slabs. All organic soils and all FILL material should be removed and imported hardcore infill should fully comply with current building regulations.

Excavation

Ground water was not observed at proposed foundation depth and should not be of concern in shallow excavation. While trial pit excavations remained stable over the short term of the investigation, some instability may occur in longer term excavations.

Some ground water may however be encountered in deep service trench excavations.

Statutory safety regulations prohibit personnel entering unsupported excavations greater than 1.20 metre deep, irrespective of apparent stability.

Roads and Pavements

CBR tests at shallow depth indicate an average CBR of about 3%. Excavated road or pavement formation should be inspected to ensure that all organic or unsuitable material is removed.

Percolation

The variation in soil type over the site area has been outlined in the detailed test sheets with low percolation noted in clay based soils and test failure where high water table is present. Infiltration tests in the granular soils indicate that it should be suitable for dispersion of surface water.

Concrete

Tests indicates low sulphate concentration (< 0.017 g/l) and pH of 8.3. The results indicate a design classification of DS-1 (ACEC Classification). No special precautions are deemed necessary to protect foundation concrete.

Environmental

Tests carried out on samples from this site indicate that the soils can be classified as INERT with extremely low contamination levels.

Material excavated from this site can be disposed of to licensed landfill or utilised within the site for non-engineering purposes, landscaping etc.

SUMMARY

Conventional shallow reinforced strip or pad foundations are recommended for this housing development with allowable bearing pressures as follows:

100 kPa for foundations placed at about 1.00 metre BGL using a dynamic probe resistance of $N_{100} = 3$ as a baseline. In areas where soft deposits occur depth of excavation to a suitable formation will increase. In these areas lean mix concrete can be used as backfill up to underside of main foundation.

Variation in founding medium from cohesive material (gravelly CLAY or SILT) to non-cohesive (SAND / GRAVEL) to intermixed zones (gravelly CLAY / clayey GRAVEL) can be expected over the site area.

IGSL/JC
July 2017

Appendix II Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,618.36 E 728,452.58 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	79.46
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.30	79.16						
Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		0.60	78.86		AA78690	B	0.80		
1.0									
Grey to black sandy fine to coarse subrounded GRAVEL.		1.70	77.76		AA78691	B	1.80		
2.0									
Grey slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded.		2.40	77.06		AA78692	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00	76.46						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,669.68 E 728,454.80 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	75.82
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
		0.30	75.52						
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.					AA78693	B	0.50		
1.0 Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		1.00	74.82		AA78694	B	1.20		
		1.90	73.92						
2.0 Stiff brown gravelly SILT/CLAY with a medium cobble content and a low boulder content. Gravel is fine to coarse subangular. Cobbles are subrounded. Boulders up to 400mm subrounded.		2.00	73.82		AA78695	B	1.90		
End of Trial Pit at 2.00m									
3.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,727.70 E 728,443.79 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	73.07
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Grey slightly silty fine to coarse SAND.		0.60	72.47		AA67769	B	0.60		
Grey silty gravelly fine to coarse SAND. Gravel is fine to coarse subangular to subrounded.		1.60	71.47		AA67770	B	1.60		
End of Trial Pit at 2.50m		2.50	70.57		AA67771	B	2.50		

1.0
2.0
3.0

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	TRIAL PIT NO.	TP06
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	CO-ORDINATES	687,753.62 E 728,441.59 N
			DATE STARTED 15/06/2017
			DATE COMPLETED 15/06/2017
CLIENT	Ardstone	GROUND LEVEL (m)	71.06
ENGINEER	DBFL	EXCAVATION METHOD	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.		0.50	70.56						
Grey slightly silty fine to coarse SAND.					AA67766	B	0.60		
1.0									
Grey gravelly cobbly fine to coarse SAND. Gravel is fine to coarse subrounded. Cobles are subrounded.		1.90	69.16		AA67767	B	1.80		
2.0									
End of Trial Pit at 2.50m		2.50	68.56		AA67768	B	2.50		
3.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,774.50 E 728,496.33 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	69.55
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Brown to grey silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content.		0.30	69.25		AA78667	B	0.50		
1.0 Grey slightly gravelly medium SAND. Gravel is fine subangular.		1.30	68.25		AA78668	B	1.40		
2.0 Black slightly gravelly fine to medium SAND. Gravel is fine subangular.		2.00	67.55		AA78669	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00	66.55						

Groundwater Conditions
Slow seepage at 2.0m

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP08**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,770.37 E 728,541.91 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	68.38
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.		0.30	68.08						
Soft to firm light brown slightly gravelly SILT/CLAY. Gravel is fine to medium subrounded.		0.80	67.58		AA78664	B	0.50		
Grey slightly gravelly fine to medium SAND. Gravel is fine to coarse subangular to subrounded.		1.40	66.98		AA78665	B	0.90		
1.0									
Grey to black slightly gravelly medium to coarse SAND. Gravel is fine subangular.		2.20	66.18		AA78666	B	1.60		
2.0									
End of it due to wall collapse. End of Trial Pit at 2.20m									
3.0									

Groundwater Conditions
Slow seepage at 1.4m

Stability
Wall collapse from 1.4m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,813.53 E 728,508.36 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	67.21
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.		0.30	66.91						
Stiff dark brown very gravelly slightly sandy SILT/CLAY. Gravel is fine to coarse subangular to subrounded.					AA78662	B	0.50		
1.0									
Dark grey clayey sandy fine to coarse subangular to subrounded GRAVEL.		1.20	66.01		AA78663	B	1.20		
End of pit due to wall collapse. End of Trial Pit at 1.50m		1.50	65.71						
2.0									
3.0									

Groundwater Conditions
Moderate seepage at 0.8m

Stability
Wall collapse from 1.2m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP10**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,818.29 E 728,452.90 N
		DATE STARTED	15/06/2017
		DATE COMPLETED	15/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	67.74
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly sandy SILT/CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded.		0.30	67.44		AA78655	B	0.50		
Grey to light brown gravelly medium to coarse SAND. Gravel is fine to coarse subangular to subrounded of limestone.		0.60	67.14		AA78656	B	0.70		
1.0 Firm grey to light brown sandy gravelly SILT with a low cobble content. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded of limestone. Cobbles are subrounded of limestone.		1.00	66.74		AA78657	B	1.20		
Stiff dark brown gravelly CLAY with a medium cobble content and a low boulder content. Gravel is medium to coarse subrounded. Cobbles are subrounded. Boulders up to 400mm subrounded.		1.50	66.24		AA78658	B	1.60		
Black fine subrounded to subangular sandy GRAVEL.		1.70	66.04						
2.0									
End of pit due to groundwater. End of Trial Pit at 2.30m		2.30	65.44						
3.0									

Groundwater Conditions
Groundwater at 2.0m

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP11**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,869.45 E 728,445.76 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	68.02
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
		0.40	67.62						
Grey to light brown gravelly medium to coarse SAND. Gravel is fine to coarse subangular to subrounded of limestone.					AA78659	B	0.50		
		0.70	67.32						
Stiff dark brown very gravelly slightly sandy SILT/CLAY. Gravel is fine to coarse subangular to subrounded.					AA78660	B	0.80		
1.0									
		1.40	66.62						
Black gravelly coarse SAND. Gravel is fine to medium.					AA78661	B	1.50		
2.0 End of pit due to wall collapse. End of Trial Pit at 2.00m		2.00	66.02						
3.0									

Groundwater Conditions
Moderate seepage at 1.4m

Stability
Wall collapse from 1.4m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP12**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,784.26 E 728,411.11 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	69.03
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly sandy SILT/CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded.		0.40	68.63		AA78651	B	0.50		
Firm grey to light brown sandy gravelly SILT with a low cobble content. Sand is fine to medium. Gravel is fine to coarse subangular to subrounded of limestone. Cobbles are subrounded of limestone.		0.90	68.13		AA78652	B	1.00		
Stiff dark brown gravelly CLAY with a medium cobble content and a low boulder content. Gravel is medium to coarse subrounded. Cobbles are subrounded. Boulders up to 400mm subrounded.		1.50	67.53		AA78653	B	1.60		
Dark brown to black fine to coarse subrounded to subangular GRAVEL with a medium cobble content and a low boulder content. Cobbles are subrounded. Boulders up to 400mm subrounded.		2.00	67.03		AA78654	B	2.00		
End of pit due to groundwater. End of Trial Pit at 2.50m		2.50	66.53						

Groundwater Conditions
Groundwater at 2.2m

Stability

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP13**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,675.92 E 728,416.81 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	75.27
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.30	74.97						
					AA78696	B	0.50		
Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		0.60	74.67						
1.0					AA78697	B	1.20		
2.0									
Black sandy fine to coarse subounded to rounded GRAVEL.		2.50	72.77		AA78698	B	2.50		
3.0 End of Trial Pit at 2.50m		3.00	72.27						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP14**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,623.19 E 728,411.99 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	78.03
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.40	77.63		AA78686	B	0.60		
1.0 Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		0.90	77.13		AA78687	B	1.20		
2.0					AA78688	B	2.00		
Grey sandy fine to coarse subrounded GRAVEL.		2.30	75.73		AA78689	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00	75.03						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP15**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,619.03 E 728,356.62 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	76.61
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.		0.40	76.21						
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.					AA78679	B	0.60		
1.0									
Black gravelly coarse SAND. Gravel is fine to medium.		1.40	75.21		AA78680	B	1.60		
2.0									
End of pit due to wall collapse. End of Trial Pit at 2.80m		2.80	73.81		AA78681	B	2.80		
3.0									

Groundwater Conditions

Stability
Minor wall collapse from 1.4m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP16**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,667.37 E 728,360.19 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	74.06
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.40	73.66		AA78682	B	0.60		
Brown silty fine to coarse subangular to rounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subrounded to rounded.		0.80	73.26		AA78683	B	1.20		
1.0									
2.0					AA78684	B	2.50		
End of pit due to boulder. End of Trial Pit at 2.70m		2.70	71.36						
3.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP17**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,724.68 E 728,357.77 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	71.69
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL.									
	Grey silty fine to coarse rounded to subangular GRAVEL with a medium cobble content. Cobbles are subrounded to rounded.		0.40	71.29		AA78672	B	0.60		
1.0										
2.0	Grey slightly gravelly fine to coarse SAND. Gravel is fine to medium subrounded.		2.00	69.69		AA78673	B	2.00		
3.0	End of Trial Pit at 3.00m		3.00	68.69		AA78674	B	3.00		

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP18**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,776.84 E 728,364.82 N
		DATE STARTED	14/06/2017
		DATE COMPLETED	14/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	69.26
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.40	68.86		AA78670	B	0.50		
1.0 Grey to brown silty fine to coarse subangular to angular GRAVEL with a medium cobble content and a low boulder content. Cobbles subangular to subrounded. Boulders up to 400mm subrounded.		0.90	68.36		AA78671	B	1.10		
2.0 End of pit due to boulder. End of Trial Pit at 2.00m		2.00	67.26						
3.0									

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	TRIAL PIT NO.	TP19
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	CO-ORDINATES	687,729.97 E 728,319.16 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	GROUND LEVEL (m)	71.49
ENGINEER	DBFL	EXCAVATION METHOD	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Dark grey to black fine to coarse SAND.		0.60	70.89		AA78675	B	0.80		
1.0									
Black sandy fine to coarse subounded to rounded GRAVEL with a low cobble content. Cobbles are subrounded.		1.50	69.99		AA78676	B	1.60		
2.0									
End of pit due to wall collapse. End of Trial Pit at 2.60m		2.60	68.89						
3.0									

Groundwater Conditions

Stability
Wall collapse from 1.5m

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP20**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,622.57 E 728,313.25 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	74.42
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.50	73.92		AA78677	B	0.70		
Brown silty fine to coarse subrounded to angular GRAVEL.		0.90	73.52		AA78678	B	1.00		
End of pit due to wall collapse. End of Trial Pit at 1.80m		1.80	72.62						

1.0
2.0
3.0

Groundwater Conditions

Stability
Wall collapse from 0.9m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP21**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,542.98 E 728,212.30 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	74.33
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.30	74.03		AA67758	B	0.50		
1.0 Grey slightly silty fine to coarse subangular to rounded GRAVEL with a medium cobble content. Cobbles are subrounded.		1.20	73.13		AA67759	B	1.30		
Grey sandy fine to coarse subrounded to rounded GRAVEL with a high cobble content. Cobbles are subrounded.		1.80	72.53		AA67760	B	2.00		
2.0 End of pit due to wall collapse. End of Trial Pit at 2.50m		2.50	71.83		AA67761	B	2.50		
3.0									

Groundwater Conditions

Stability
Wall collapse from 1.8m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	TRIAL PIT NO.	TP22
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	CO-ORDINATES	687,595.01 E 728,187.92 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	GROUND LEVEL (m)	75.36
ENGINEER	DBFL	EXCAVATION METHOD	3.5 Ton Excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL.									
	Firm brown slightly gravelly SILT/CLAY with tree rootlets. Gravel is fine to medium subangular to subrounded.		0.30	75.06						
	Stiff brown very gravelly SILT. Gravel is fine to coarse subangular to subrounded.		0.60	74.76		AA67762	B	0.80		
1.0						AA67763	B	1.20		
2.0	Brown silty gravelly fine to medium SAND. Gravel is fine to medium subrounded.		2.00	73.36		AA67764	B	2.10		
	Black coarse slightly gravelly fine to medium SAND. Gravel is fine subangular.		2.50	72.86		AA67765	B	2.60		
3.0	End of Trial Pit at 3.00m		3.00	72.36						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP23**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,634.91 E 728,214.75 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	73.91
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.		0.30	73.61						
Light brown slightly silty gravelly fine to medium SAND. Gravel is fine to medium subrounded.					AA67755	B	0.50		
1.0 Firm brown slightly gravelly sandy SILT.		1.20	72.71						
Dark grey to black very sandy fine to medium subrounded GRAVEL. Sand is medium to coarse.		1.60	72.31		AA67756	B	1.60		
2.0					AA67757	B	2.80		
3.0 End of Trial Pit at 3.00m		3.00	70.91						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP24**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,695.94 E 728,217.70 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	72.38
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.30	72.08						
Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		0.60	71.78		AA67752	B	0.80		
1.0									
Black slightly gravelly coarse SAND. Gravel is fine subangular.		1.70	70.68		AA67753	B	1.70		
2.0									
End of pit due to wall collapse. End of Trial Pit at 2.60m		2.60	69.78		AA67754	B	2.60		
3.0									

Groundwater Conditions

Stability
Minor wall collapse from 1.7m

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

TRIAL PIT RECORD

REPORT NUMBER 20159

CONTRACT	Capdoo, Clane	**TRIAL PIT NO.**	**TP25**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	687,732.04 E 728,216.34 N
		DATE STARTED	16/06/2017
		DATE COMPLETED	16/06/2017
CLIENT	Ardstone	**GROUND LEVEL (m)**	70.94
ENGINEER	DBFL	**EXCAVATION METHOD**	3.5 Ton Excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL.									
	Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.40	70.54		AA78699	B	0.60		
1.0	Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.		0.80	70.14						
	Brown sandy fine to coarse subrounded GRAVEL.		1.20	69.74		AA78700	B	1.20		
2.0	Black slightly gravelly fine to medium SAND. Gravel is fine subangular.		1.60	69.34		AA67751	B	1.80		
3.0	End of Trial Pit at 3.00m		3.00	67.94						

Groundwater Conditions

Stability

General Remarks

IGSL TP LOG 20159.GPJ IGSL.GDT 3/7/17

Appendix III Plate Bearing Tests

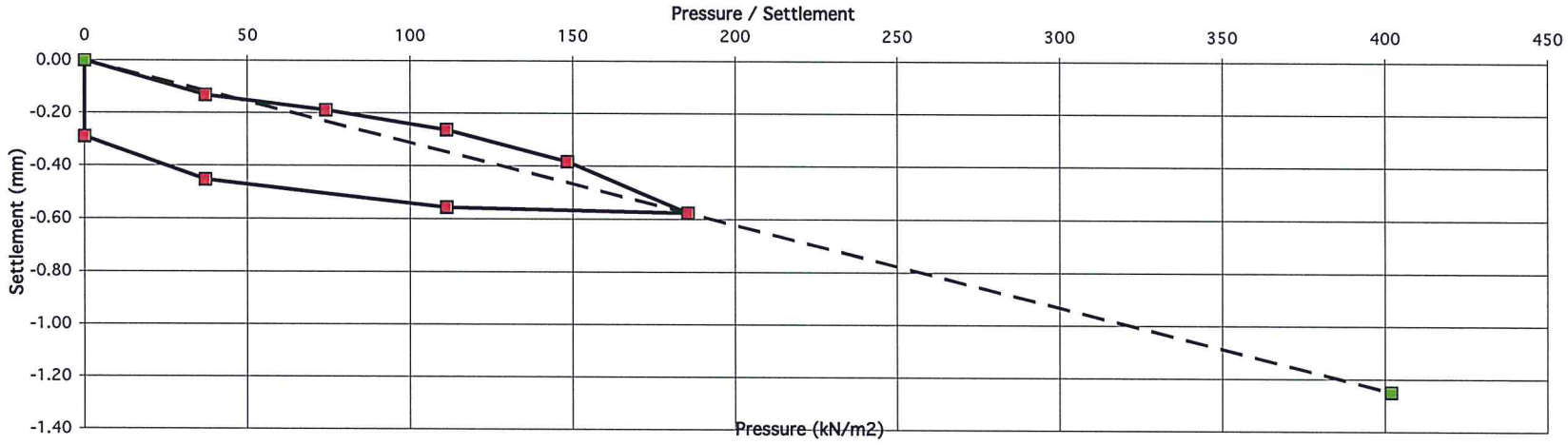
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80206
Contract	Capdoo Clane
Test No.	CBR05
Location	687675.325, 728552.346, 73.248
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 322
Modulus of subgrade reaction = 147 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 54.9 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

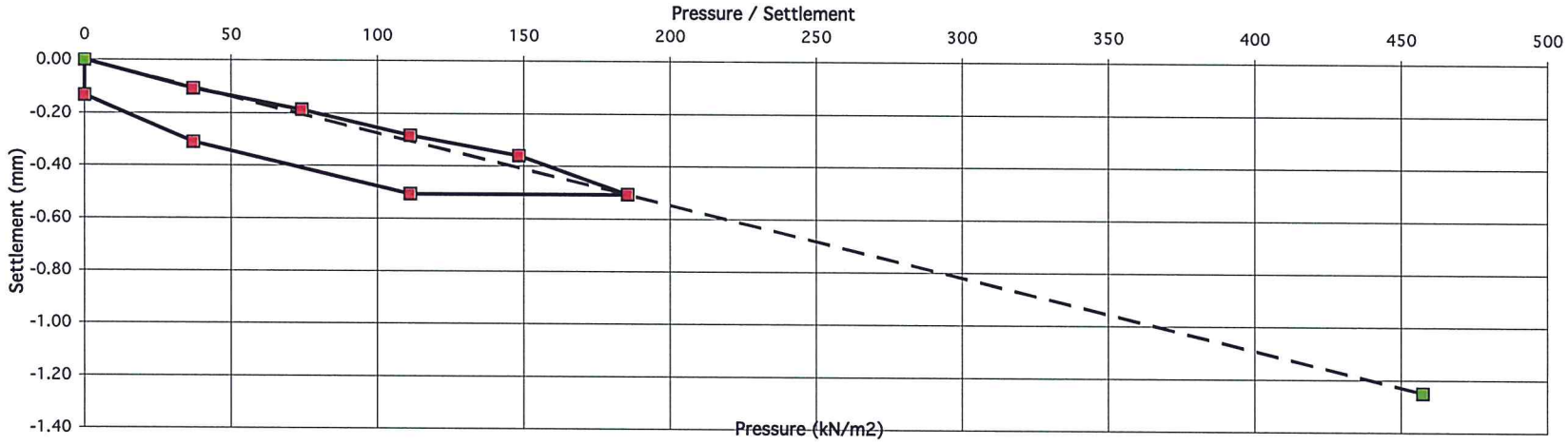
Reference No.	R80206
Contract	Capdoo Clane
Test No.	CBR05 reload
Location	687675.325, 728552.346, 73.248
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Silty GRAVEL

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 366

Modulus of subgrade reaction = 167 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 68.7 %

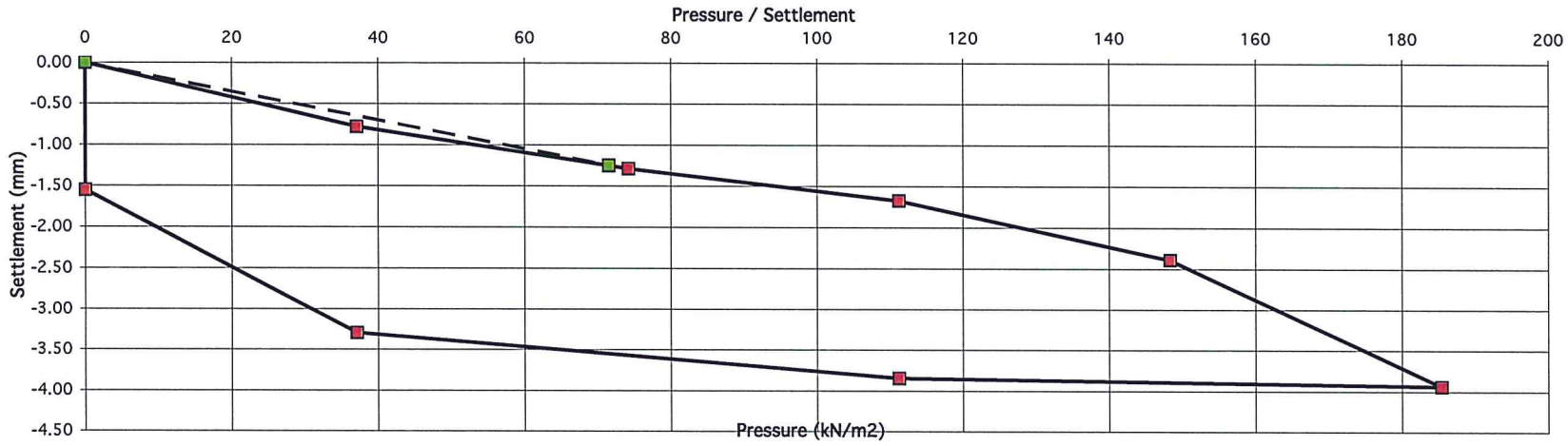
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80207
Contract	Capdoo Clane
Test No.	CBR06
Location	687672.781, 728492.900, 75.678
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 57
Modulus of subgrade reaction = 26 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.8 %

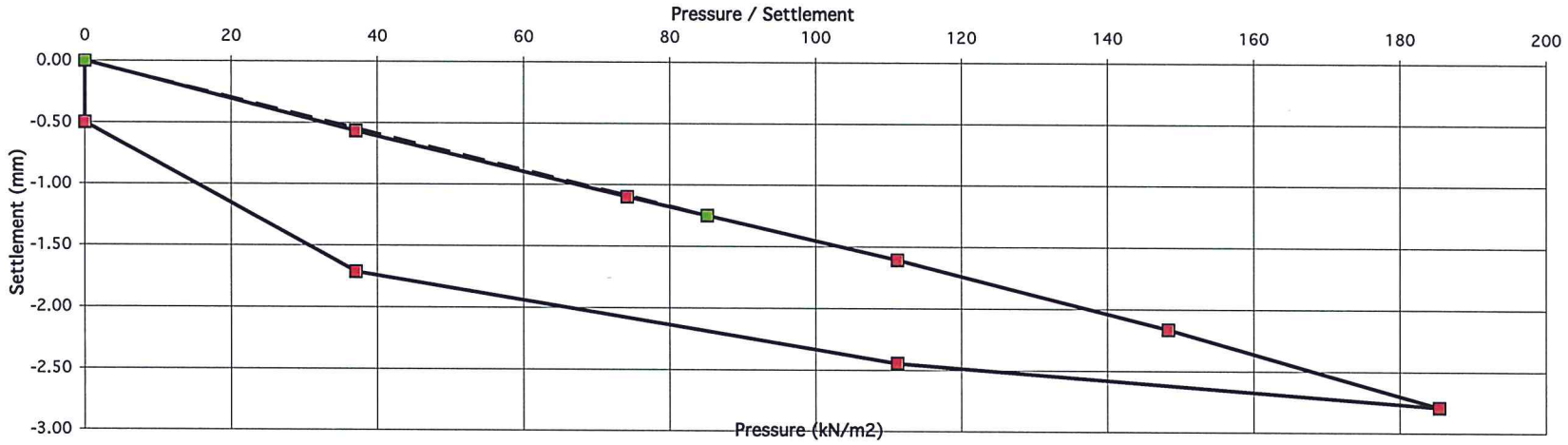
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80207
Contract	Capdoo Clane
Test No.	687672.781, 728492.900, 75.678
Location	See Map
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 68
Modulus of subgrade reaction = 31 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.7 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

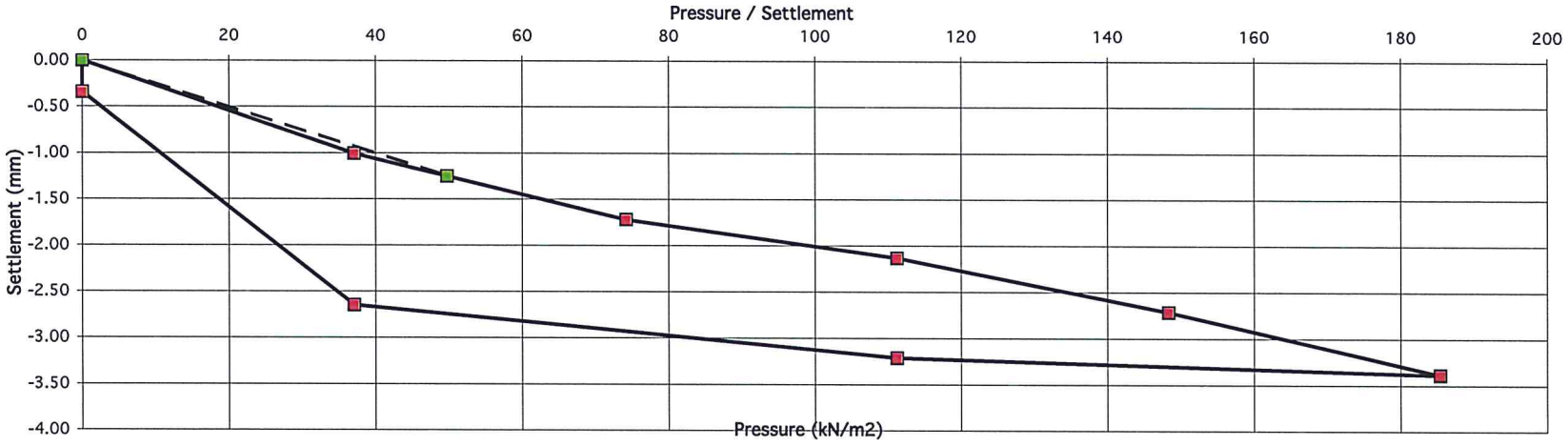
Reference No.	R80208
Contract	Capdoo Clane
Test No.	CBR07
Location	687749.245, 728470.424, 71.281
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 40

Modulus of subgrade reaction = 18 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.5 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

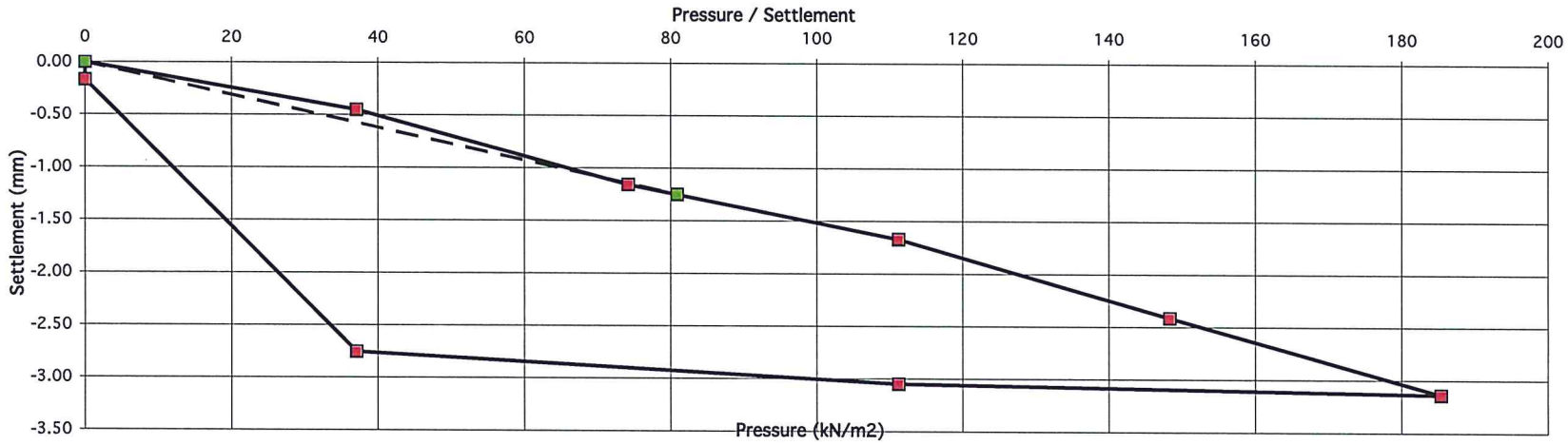
Reference No.	R80208
Contract	Capdoo Clane
Test No.	CBR07 reload
Location	687749.245, 728470.424, 71.281
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 65

Modulus of subgrade reaction = 30 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.4 %

PLATE TEST REPORT SHEET (F3.1)

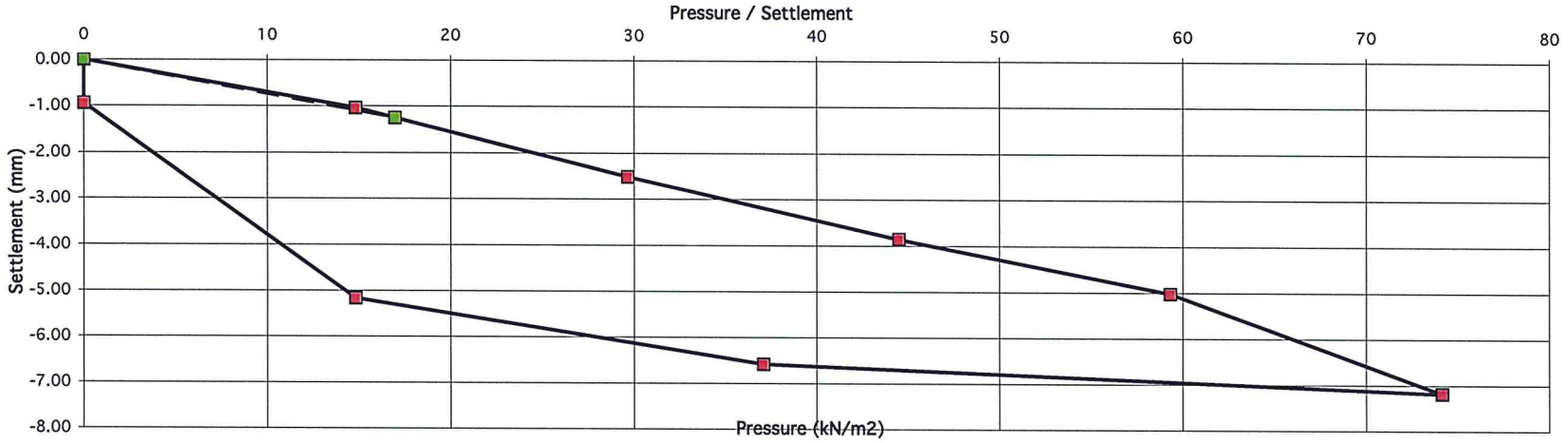
Applied Pressure/Settlement Curve

Reference No.	R80209
Contract	Capdoo Clane
Test No.	CBR08
Location	687797.840, 728530.324, 67.431
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Peaty SILT/CLAY

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 14
Modulus of subgrade reaction = 6 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

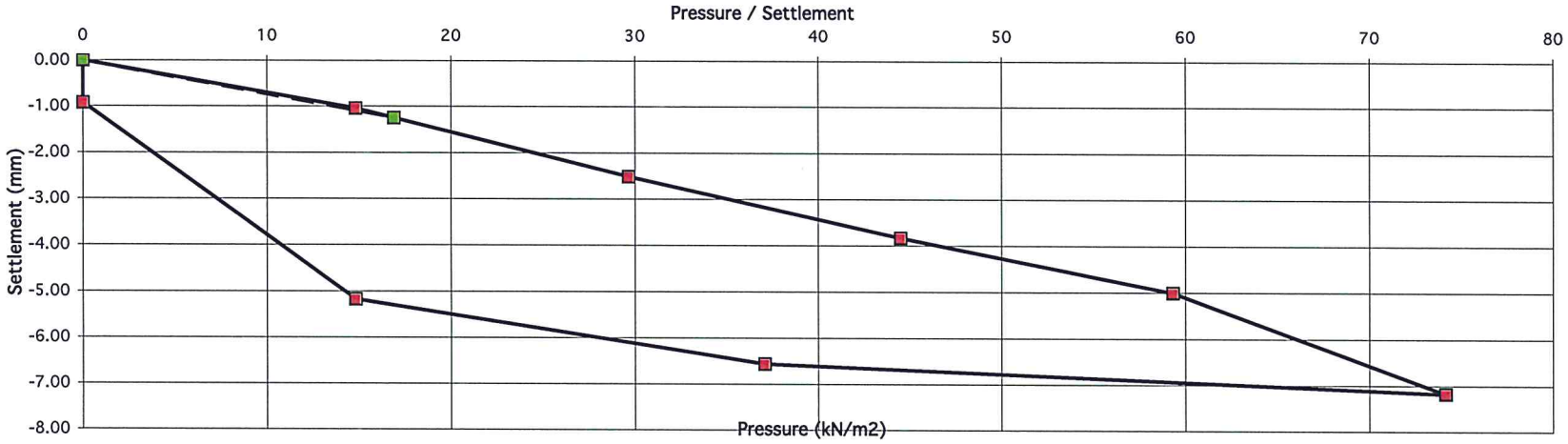
Reference No.	R80209
Contract	Capdoo Clane
Test No.	CBR08 reload
Location	687797.840, 728530.324, 67.431
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Peaty SILT/CLAY

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 14

Modulus of subgrade reaction = 6 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 0.2 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

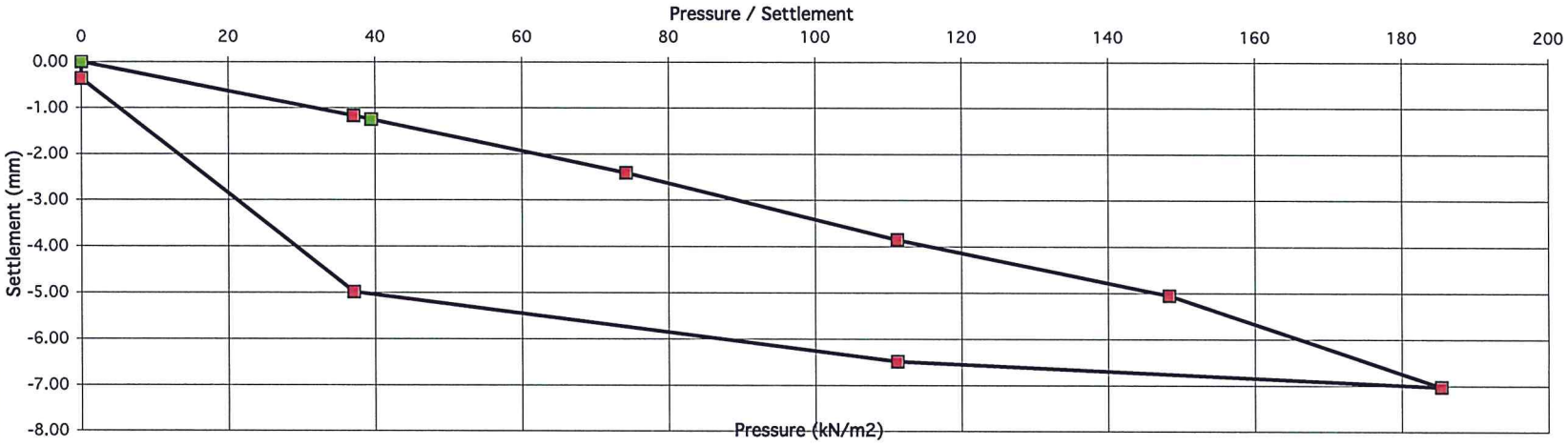
Reference No.	R80210
Contract	Capdoo Clane
Test No.	CBR09
Location	687803.717, 728468.047, 67.833
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 32

Modulus of subgrade reaction = 14 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.0 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

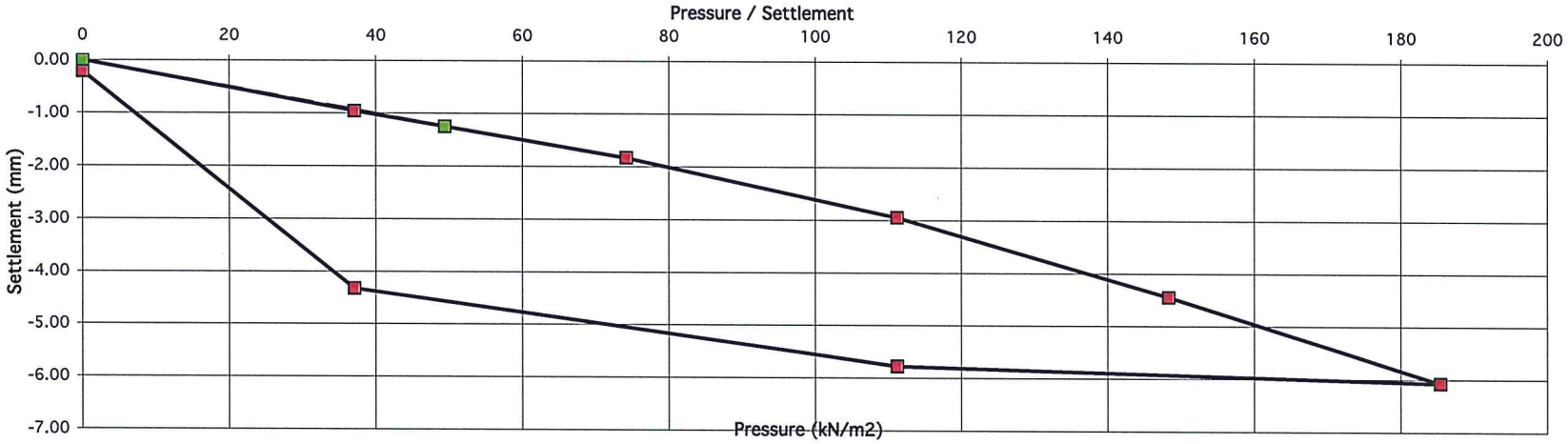
Reference No.	R80208
Contract	Capdoo Clane
Test No.	CBR09 reload
Location	687803.717, 728468.047, 67.833
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 40

Modulus of subgrade reaction = 18 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.5 %

PLATE TEST REPORT SHEET (F3.1)

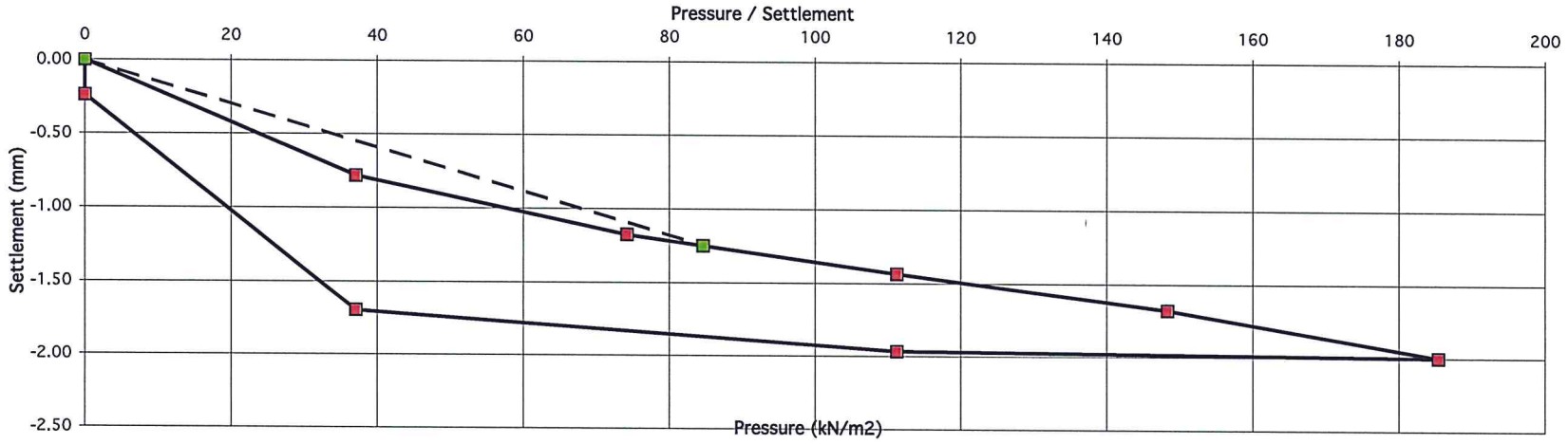
Applied Pressure/Settlement Curve

Reference No.	R80211
Contract	Capdoo Clane
Test No.	CBR10
Location	687877.151, 728463.847, 67.959
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 68
Modulus of subgrade reaction = 31 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.7 %

PLATE TEST REPORT SHEET (F3.1)

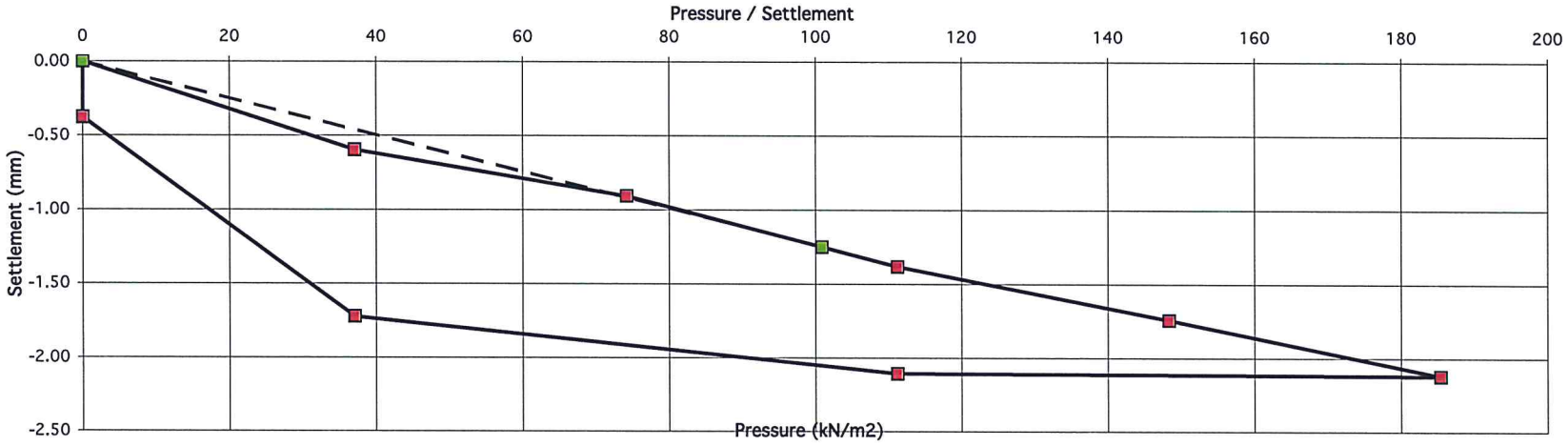
Applied Pressure/Settlement Curve

Reference No.	R80211
Contract	Capdoo Clane
Test No.	CBR10 reload
Location	687877.151, 728463.847, 67.959
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 81
Modulus of subgrade reaction = 37 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 5.0 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

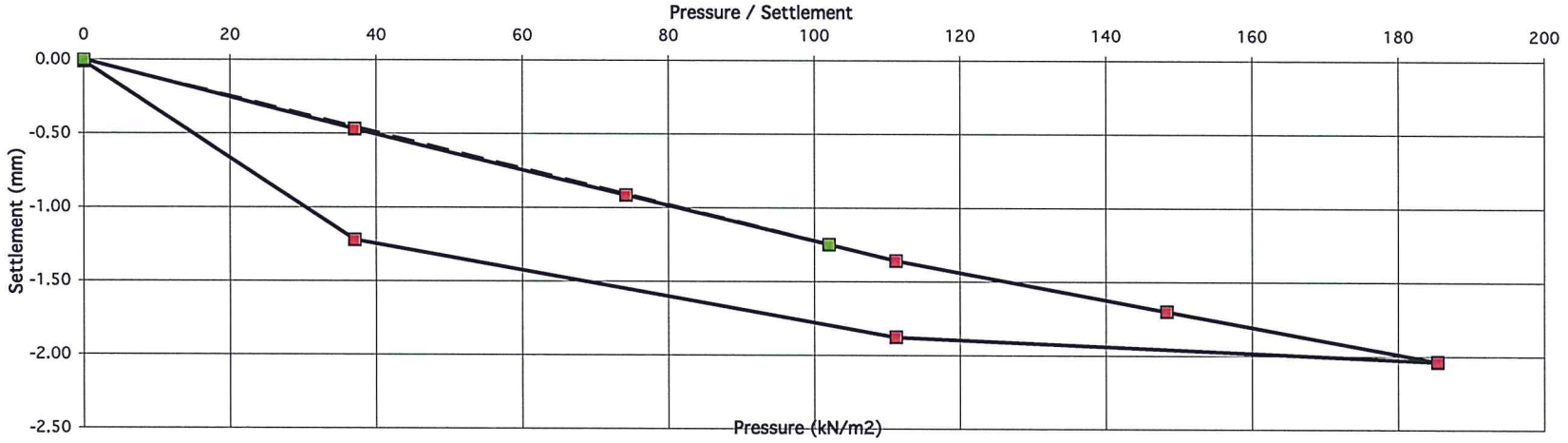
Reference No.	R80212
Contract	Capdoo Clane
Test No.	CBR11
Location	687789.531, 728406.658, 68.844
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 82

Modulus of subgrade reaction = 37 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 5.1 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

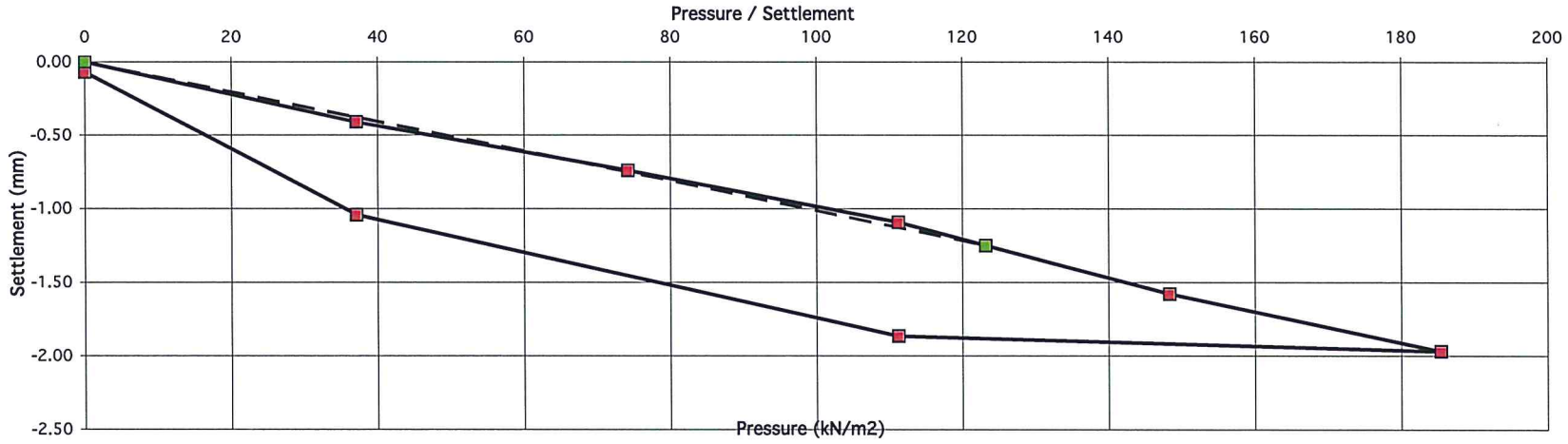
Reference No.	R80208
Contract	Capdoo Clane
Test No.	CBR11 reload
Location	687789.531, 728406.658, 68.844
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 99

Modulus of subgrade reaction = 45 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 7.1 %

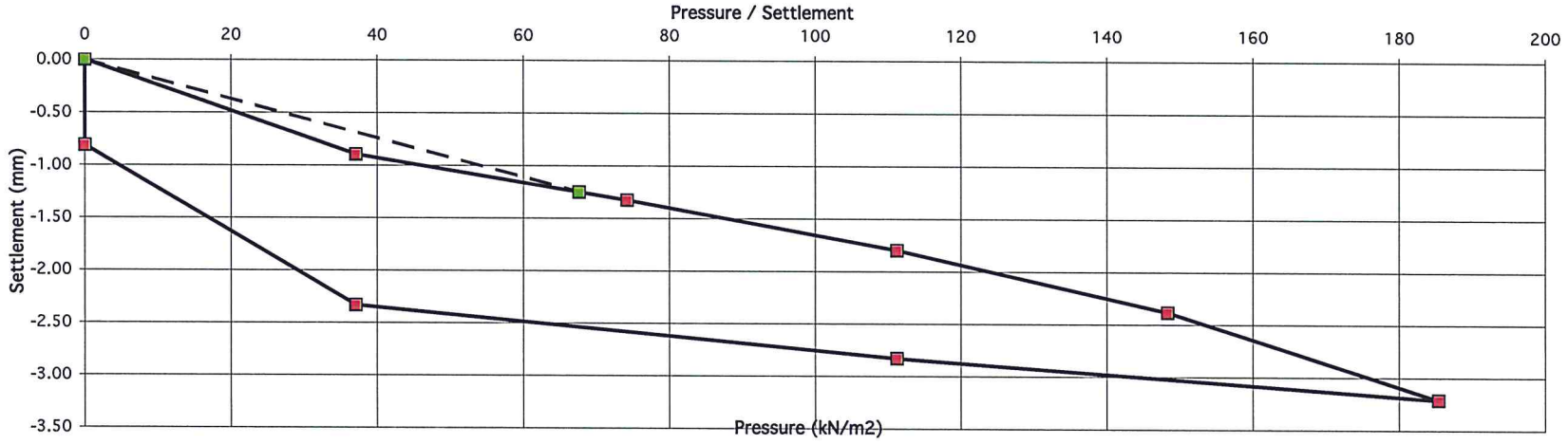
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80213
Contract	Capdoo Clane
Test No.	CBR12
Location	687730.464, 728407.565, 72.162
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 54
Modulus of subgrade reaction = 25 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.5 %

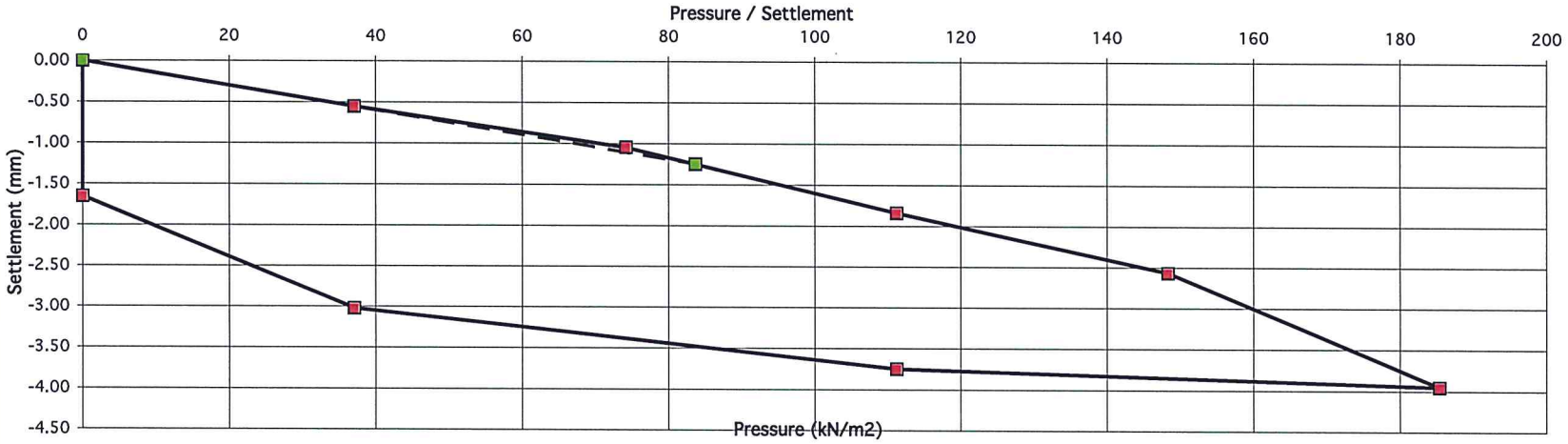
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80213
Contract	Capdoo Clane
Test No.	CBR12 reload
Location	687730.464, 728407.565, 72.162
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 67
Modulus of subgrade reaction = 31 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.6 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

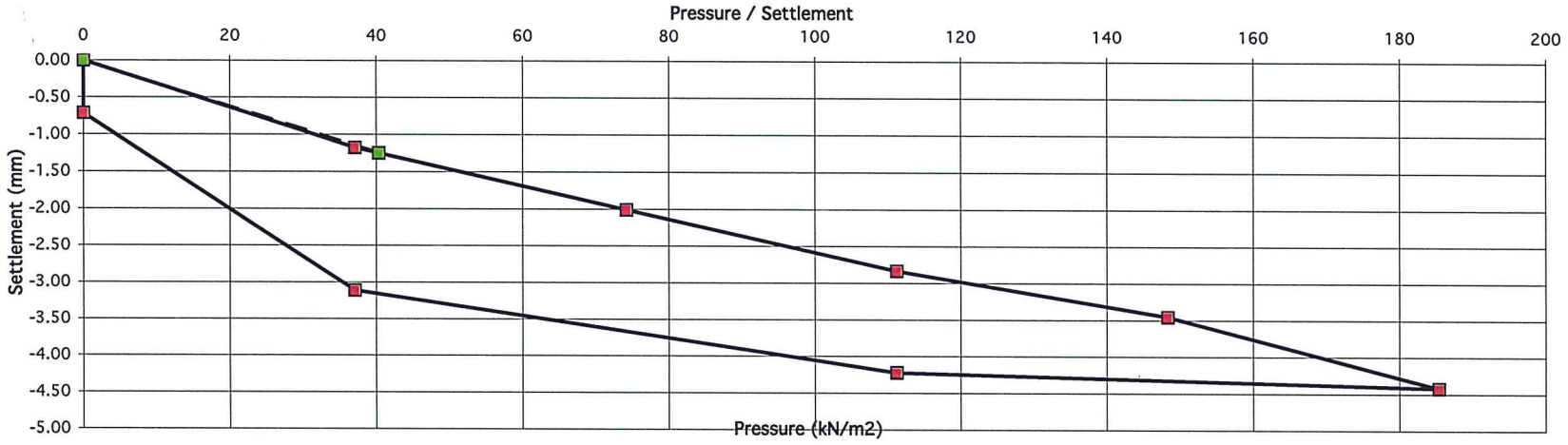
Reference No.	R80214
Contract	Capdoo Clane
Test No.	CBR13
Location	687654.908, 728465.015, 77.296
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 32
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.0 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

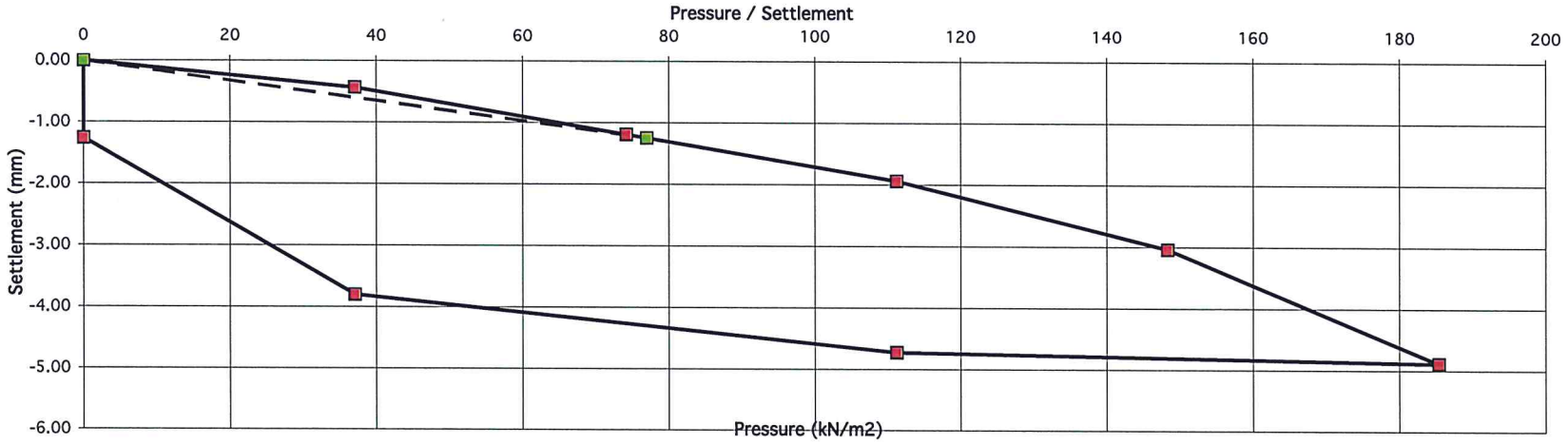
Reference No.	R80214
Contract	Capdoo Clane
Test No.	CBR13 reload
Location	687654.908, 728465.015, 77.296
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 62
Modulus of subgrade reaction = 28 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.1 %

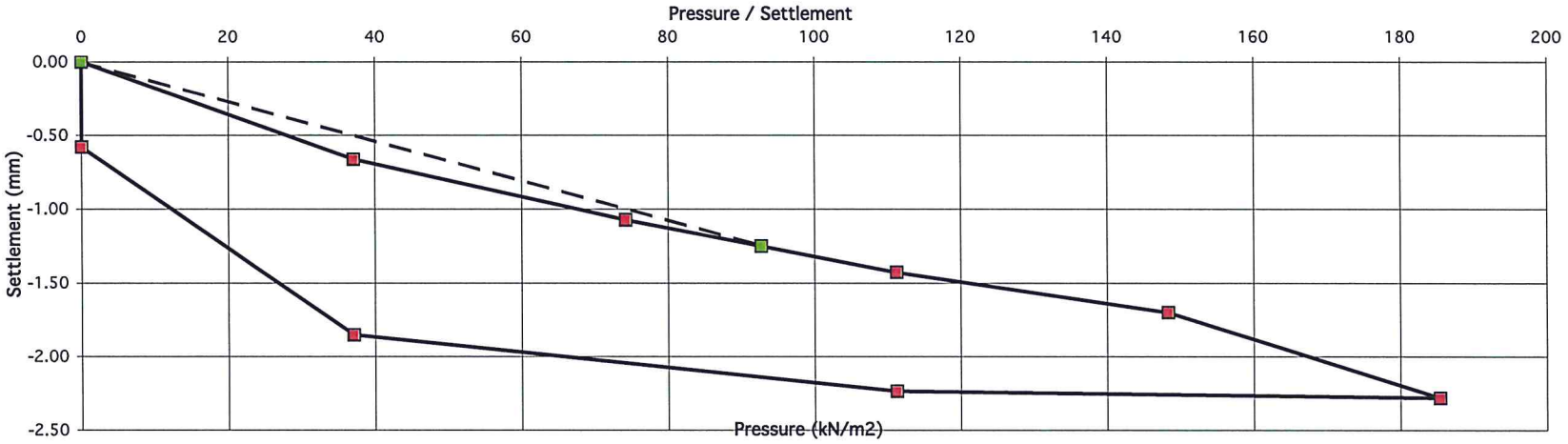
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R80215
Contract	Capdoo Clane
Test No.	CBR15
Location	687603.611, 728372.394, 78.113
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 74
Modulus of subgrade reaction = 34 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

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

PLATE TEST REPORT SHEET (F3.1)

Reference No.	R80215
Contract	Capdoo Clane
Test No.	CBR15 reload
Location	687603.611, 728372.394, 78.113
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

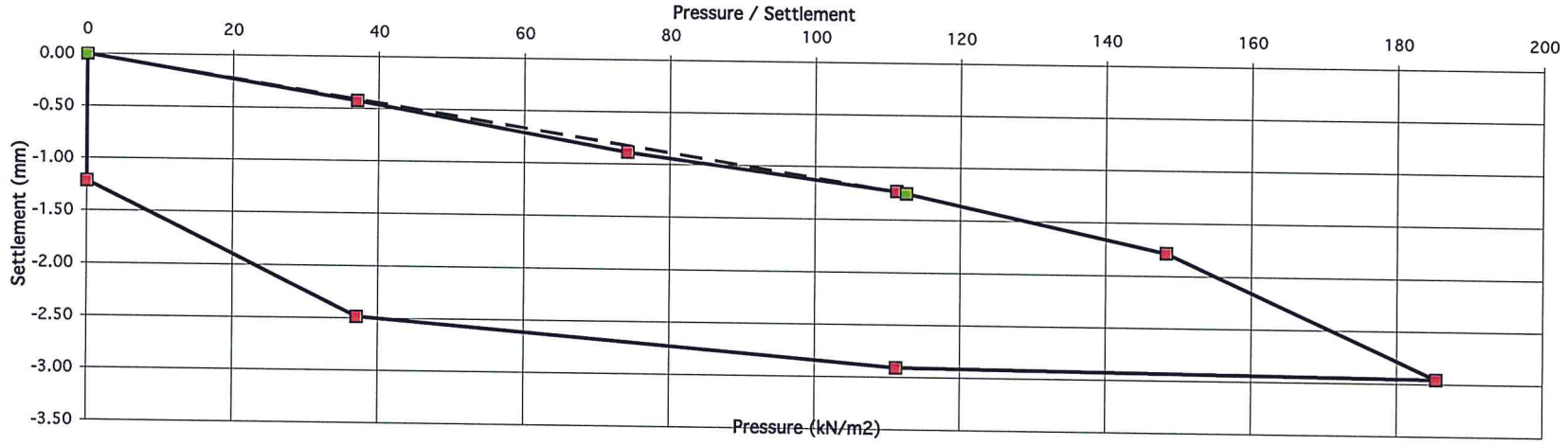
Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 90

Modulus of subgrade reaction = 41 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

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

PLATE TEST REPORT SHEET (F3.1)

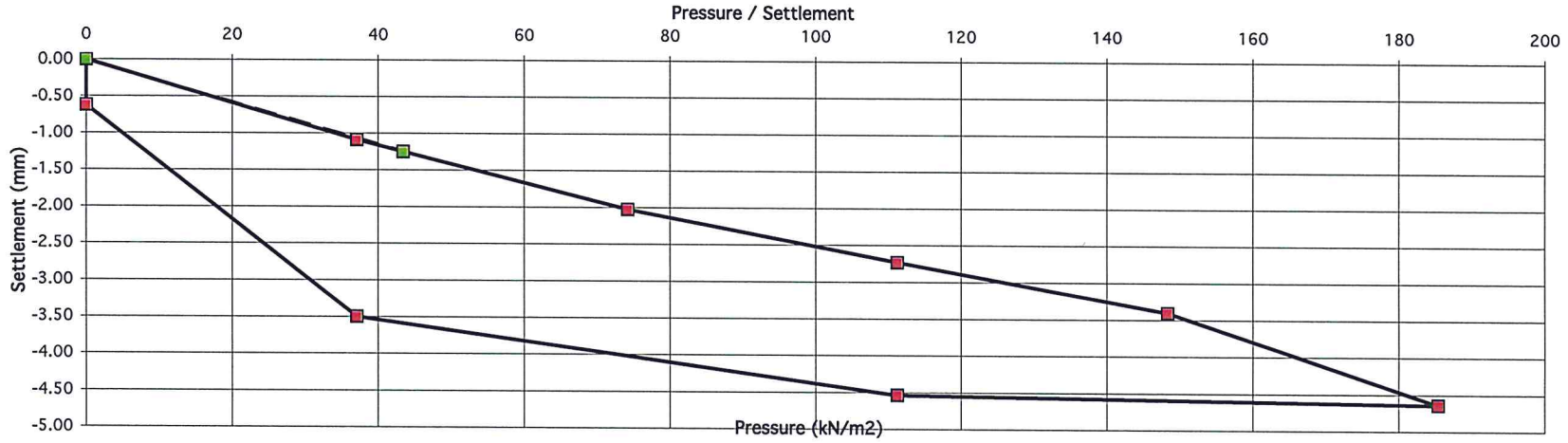
Applied Pressure/Settlement Curve

Reference No.	R80216
Contract	Capdoo Clane
Test No.	CBR16
Location	687648.389, 728374.574, 75.477
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 35
Modulus of subgrade reaction = 16 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

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

PLATE TEST REPORT SHEET (F3.1)

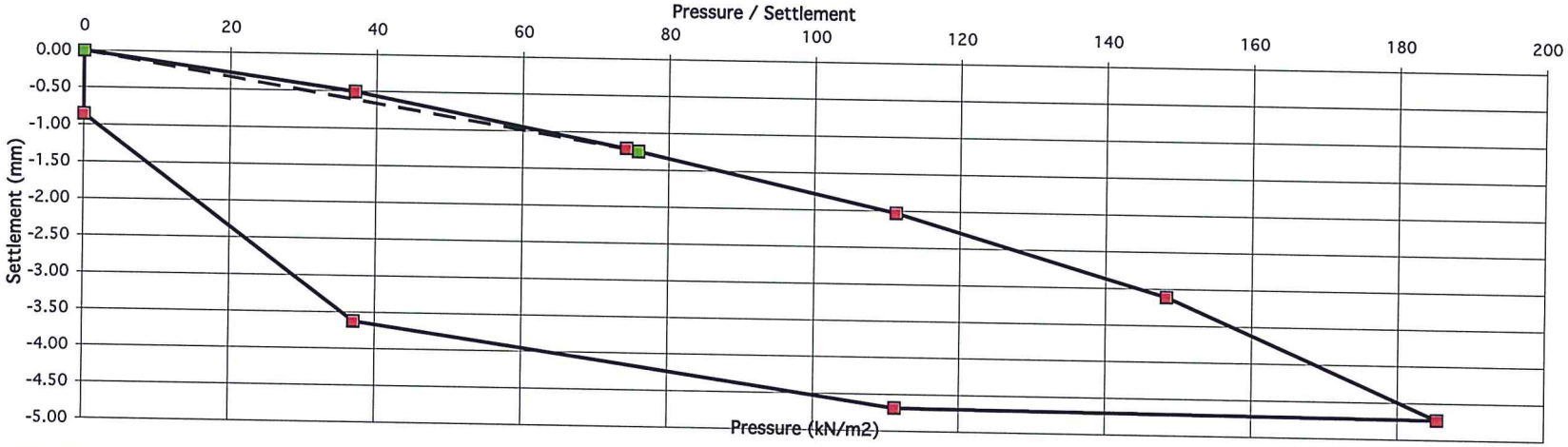
Reference No.	R80216
Contract	Capdoo Clane
Test No.	CBR16 reload
Location	687648.389, 728374.574, 75.477
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl

Applied Pressure/Settlement Curve



Gradient at 1.25 mm settlement intersection = 61
Modulus of subgrade reaction = 28 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.1 %

PLATE TEST REPORT SHEET (F3.1)

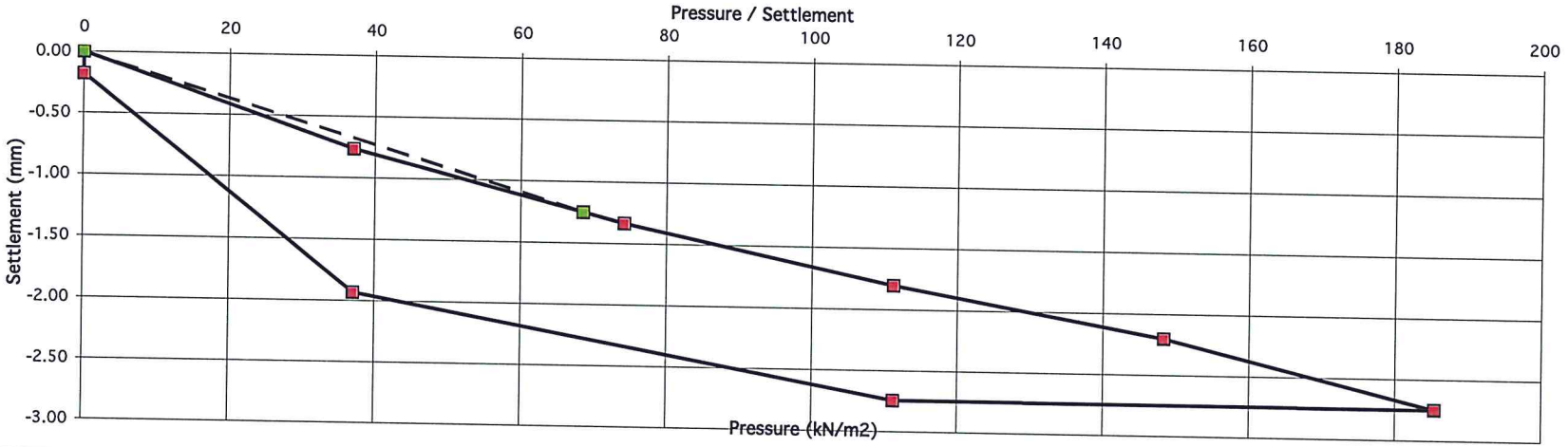
Reference No.	R80217
Contract	Capdoo Clane
Test No.	CBR17
Location	687599.217, 728320.626, 75.167
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 55
Modulus of subgrade reaction = 25 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.6 %

PLATE TEST REPORT SHEET (F3.1)

Reference No.	R80217
Contract	Capdoo Clane
Test No.	CBR17 reload
Location	687599.217, 728320.626, 75.167
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

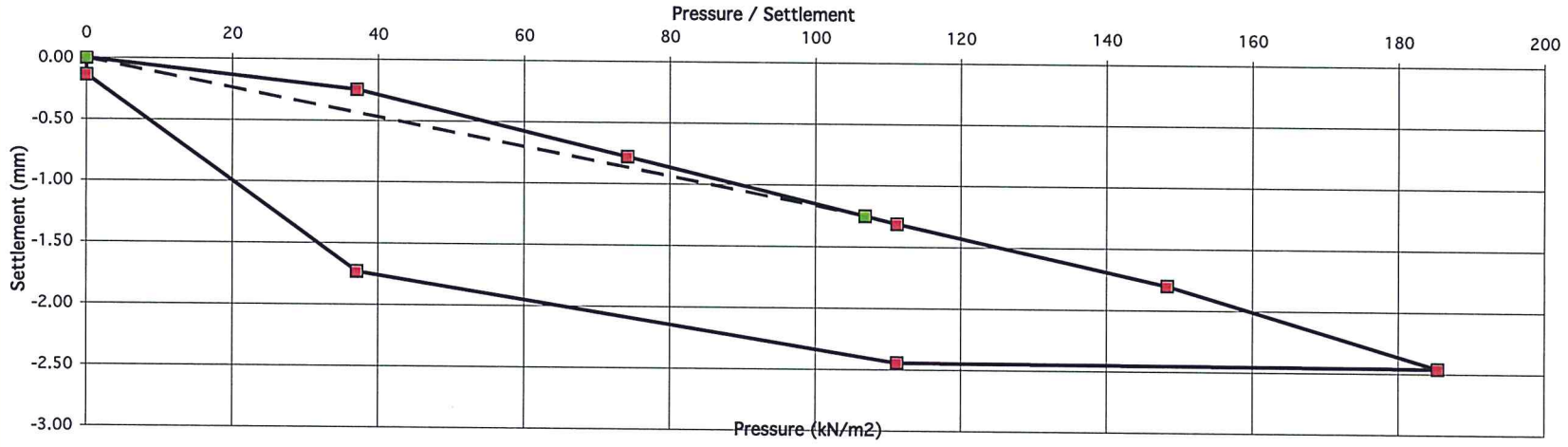
Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 85
Modulus of subgrade reaction = 39 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 5.5 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

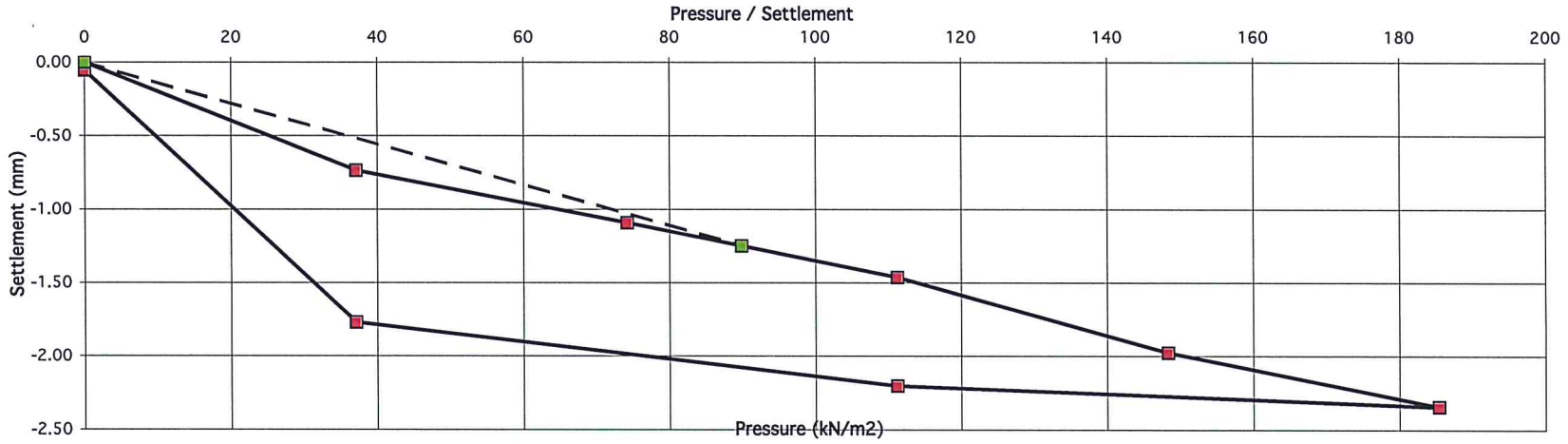
Reference No.	R80218
Contract	Capdoo Clane
Test No.	CBR18
Location	687662.505, 728326.399, 73.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 72

Modulus of subgrade reaction = 33 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 4.1 %

PLATE TEST REPORT SHEET (F3.1)

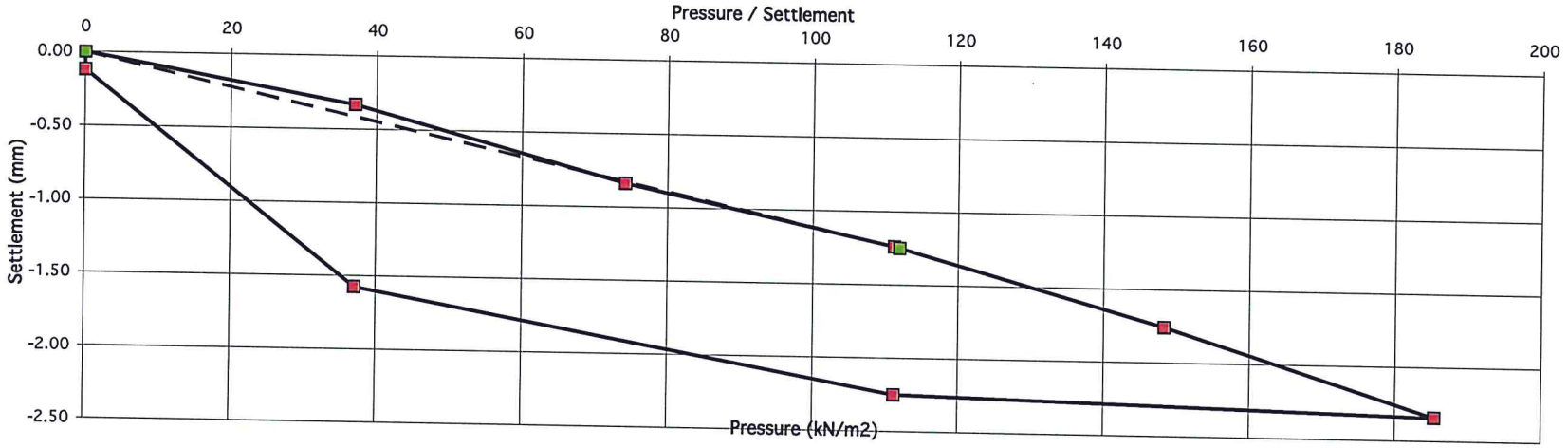
Reference No.	R80218
Contract	Capdoo Clane
Test No.	CBR18 reload
Location	687662.505, 728326.399, 73.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 90
Modulus of subgrade reaction = 41 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 6.0 %

PLATE TEST REPORT SHEET (F3.1)

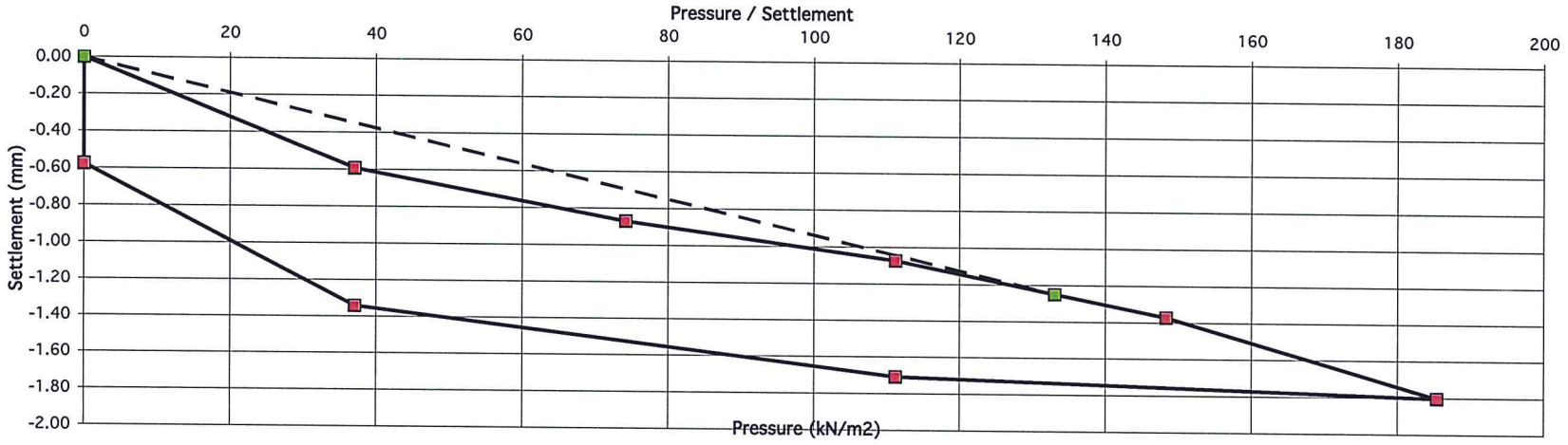
Reference No.	R80219
Contract	Capdoo Clane
Test No.	CBR19
Location	687726.137, 728330.736, 71.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 106
Modulus of subgrade reaction = 49 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 8.1 %

PLATE TEST REPORT SHEET (F3.1)

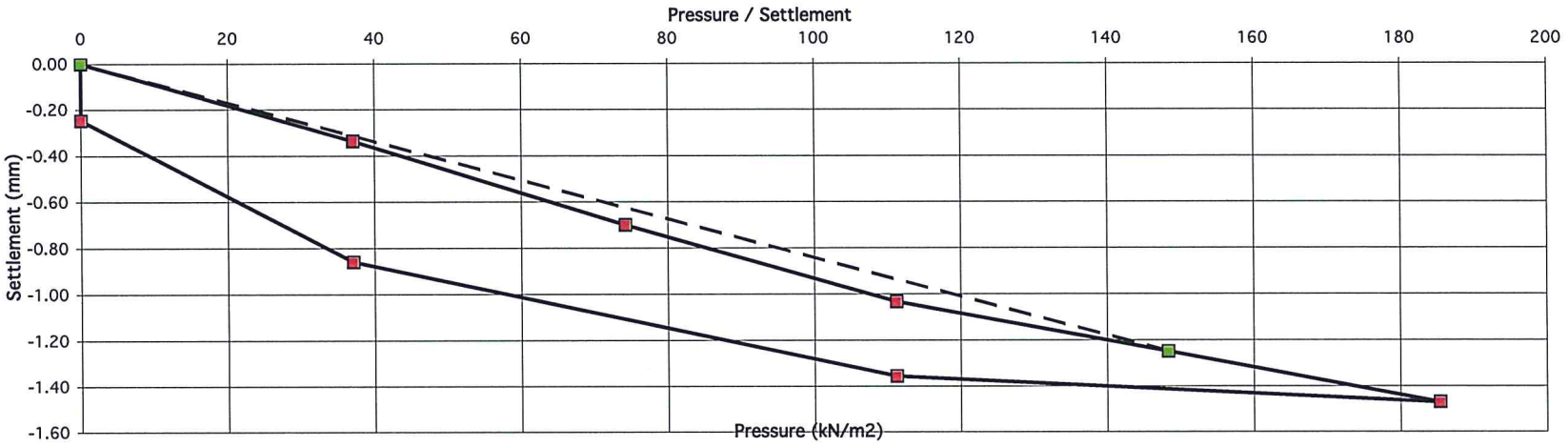
Applied Pressure/Settlement Curve

Reference No.	R80219
Contract	Capdoo Clane
Test No.	CBR19 reload
Location	687726.137, 728330.736, 71.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 119
Modulus of subgrade reaction = 54 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 9.8 %

PLATE TEST REPORT SHEET (F3.1)

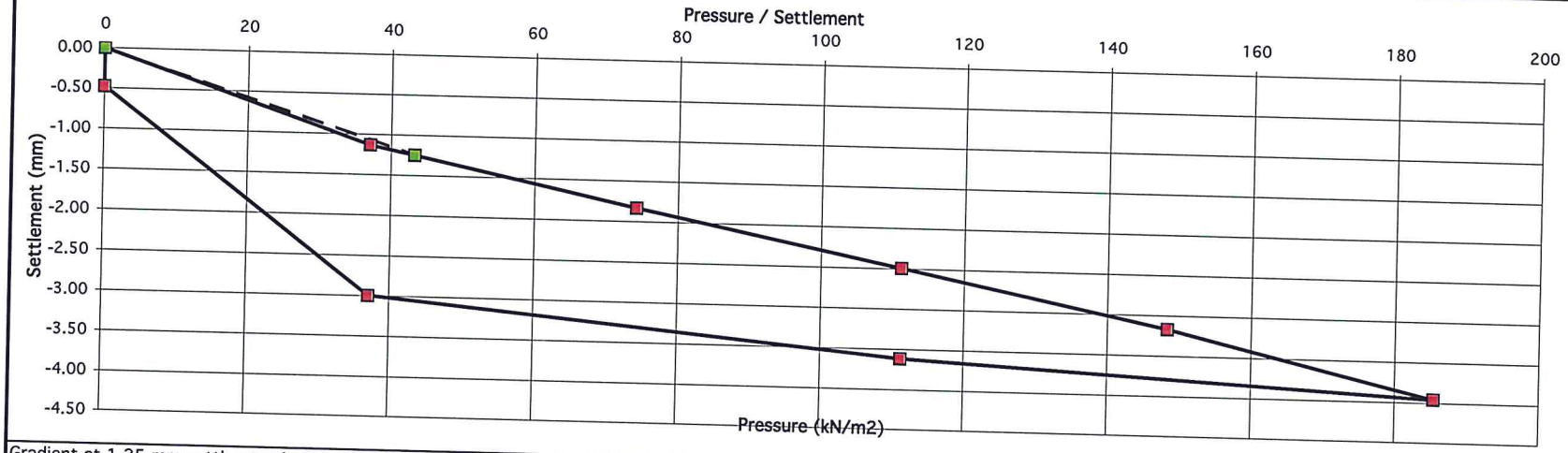
Reference No.	R80220
Contract	Capdoo Clane
Test No.	CBR20
Location	687776.122, 728319.541, 69.608
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 35
Modulus of subgrade reaction = 16 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

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

PLATE TEST REPORT SHEET (F3.1)

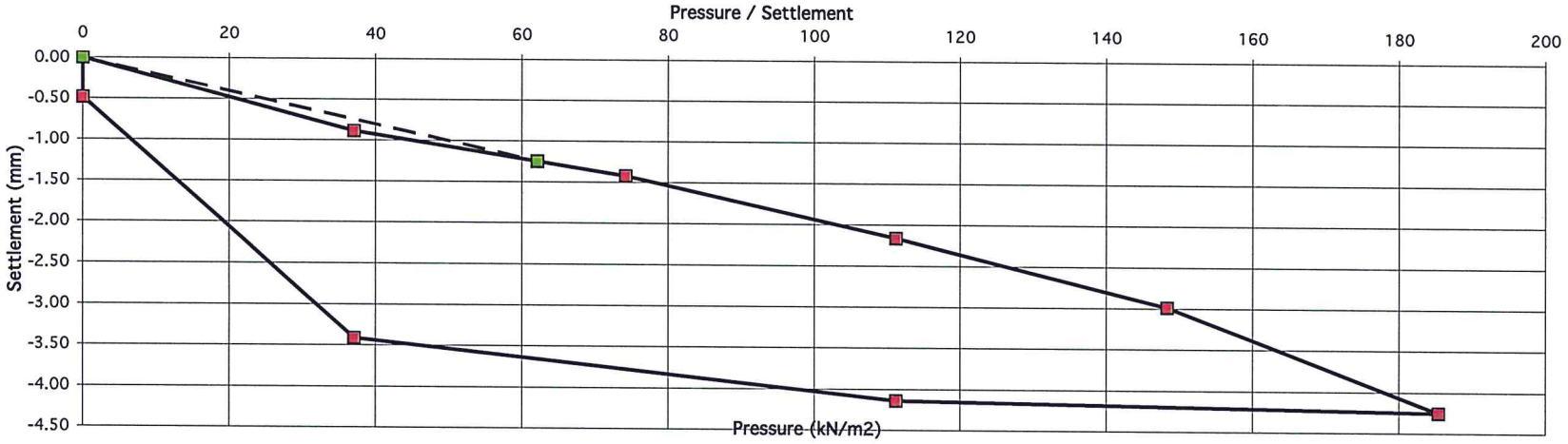
Reference No.	R80220
Contract	Capdoo Clane
Test No.	CBR20 reload
Location	687776.122, 728319.541, 69.608
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 50
Modulus of subgrade reaction = 23 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.2 %

PLATE TEST REPORT SHEET (F3.1)

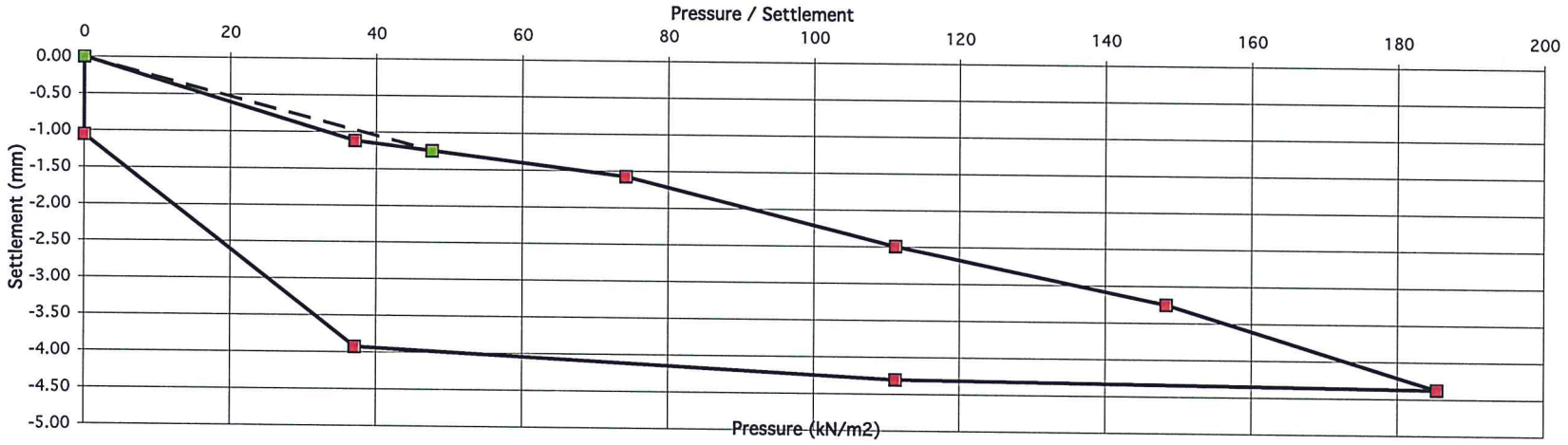
Reference No.	R80221
Contract	Capdoo Clane
Test No.	CBR21
Location	687588.623, 728231.419, 73.716
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 38
Modulus of subgrade reaction = 17 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

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

PLATE TEST REPORT SHEET (F3.1)

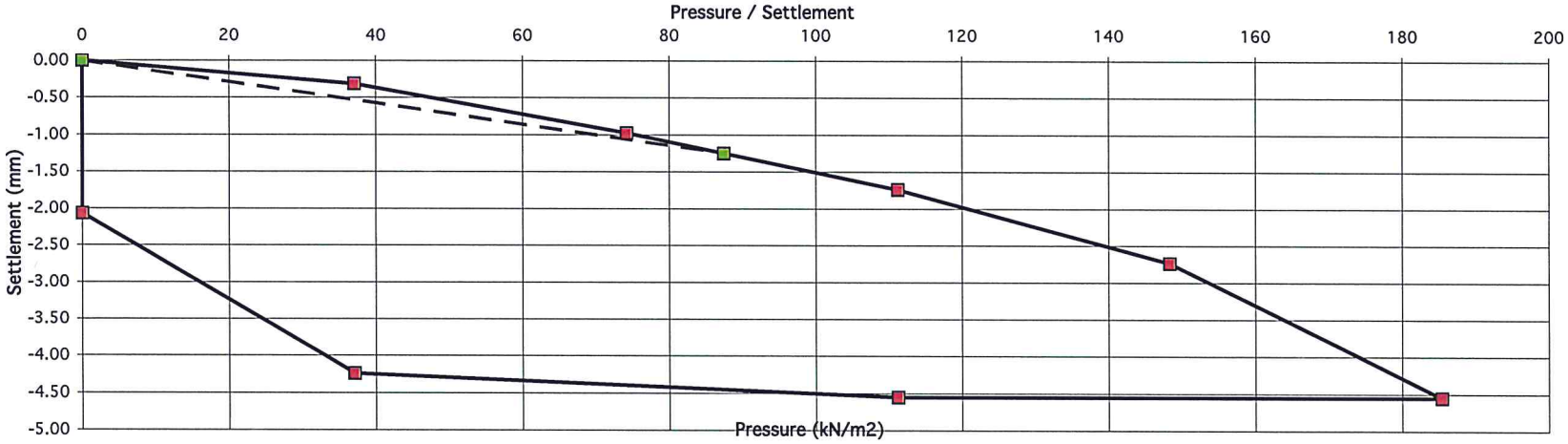
Applied Pressure/Settlement Curve

Reference No.	R80221
Contract	Capdoo Clane
Test No.	CBR21 reload
Location	687588.623, 728231.419, 73.716
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 70
Modulus of subgrade reaction = 32 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.9 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

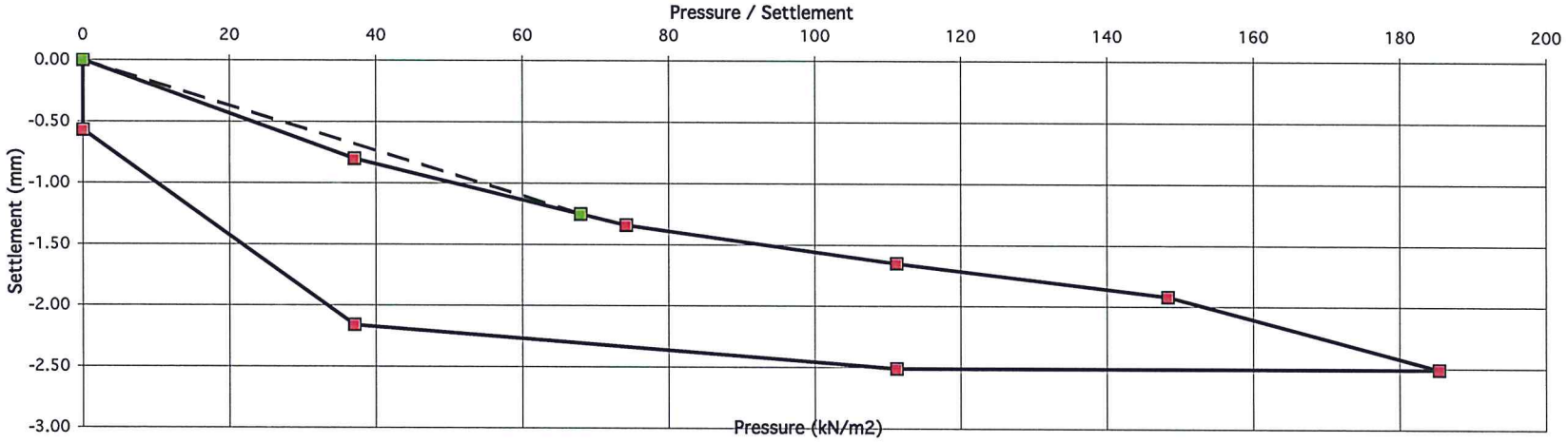
Reference No.	R80222
Contract	Capdoo Clane
Test No.	CBR22
Location	687577.681, 728212.567, 74.216
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 54

Modulus of subgrade reaction = 25 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.5 %

PLATE TEST REPORT SHEET (F3.1)

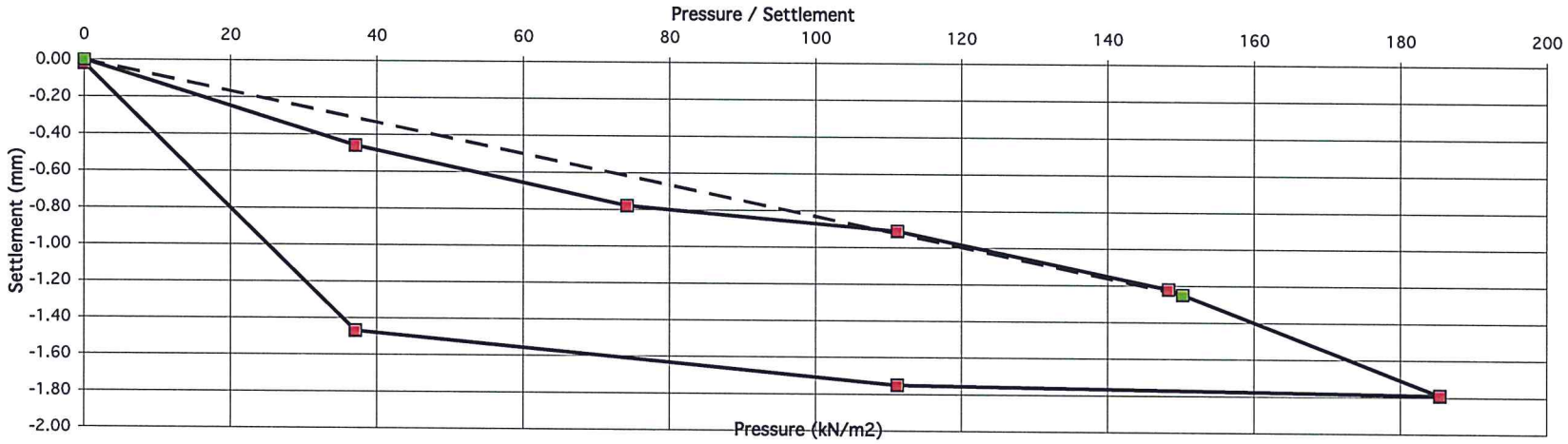
Applied Pressure/Settlement Curve

Reference No.	R80222
Contract	Capdoo Clane
Test No.	CBR22 reload
Location	687577.681, 728212.567, 74.216
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 120
Modulus of subgrade reaction = 55 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 10.0 %

PLATE TEST REPORT SHEET (F3.1)

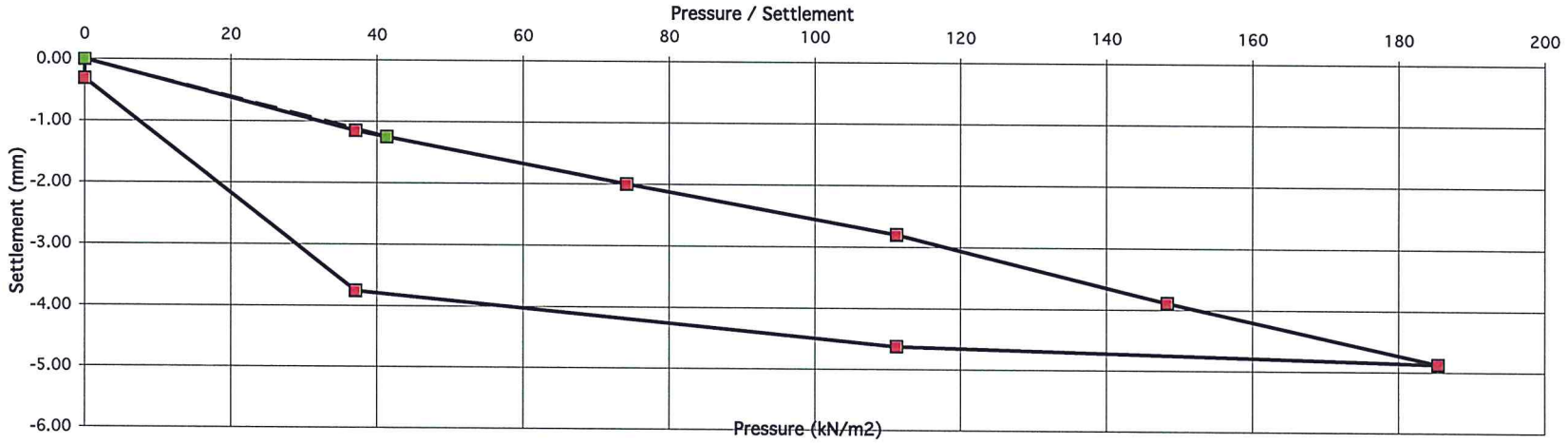
Applied Pressure/Settlement Curve

Reference No.	R80223
Contract	Capdoo Clane
Test No.	CBR23
Location	687718.138, 728235.801, 71.321
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 33
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

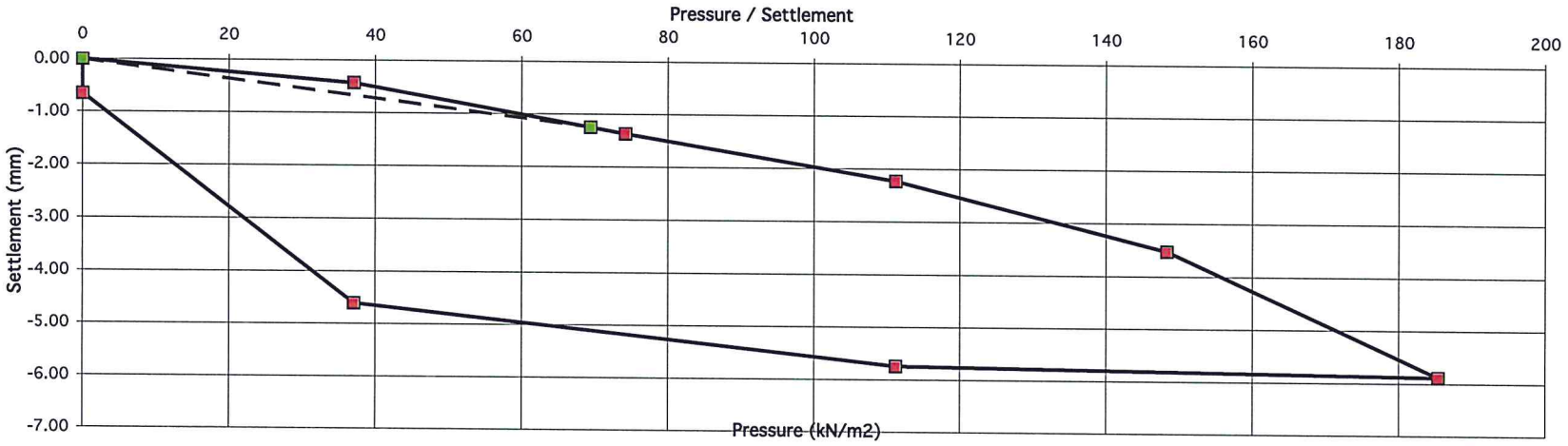
Reference No.	R80223
Contract	Capdoo Clane
Test No.	CBR23 reload
Location	687718.138, 728235.801, 71.321
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 56

Modulus of subgrade reaction = 25 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.6 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

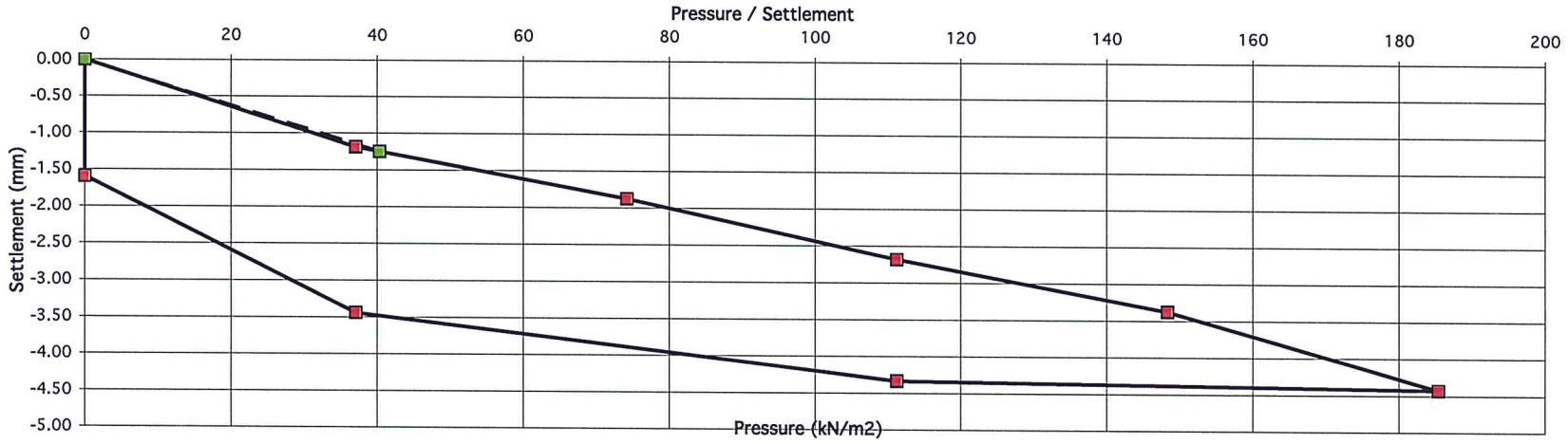
Reference No.	R80224
Contract	Capdoo Clane
Test No.	CBR24
Location	687676.704, 728195.476, 73.912
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 32

Modulus of subgrade reaction = 15 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.0 %

PLATE TEST REPORT SHEET (F3.1)

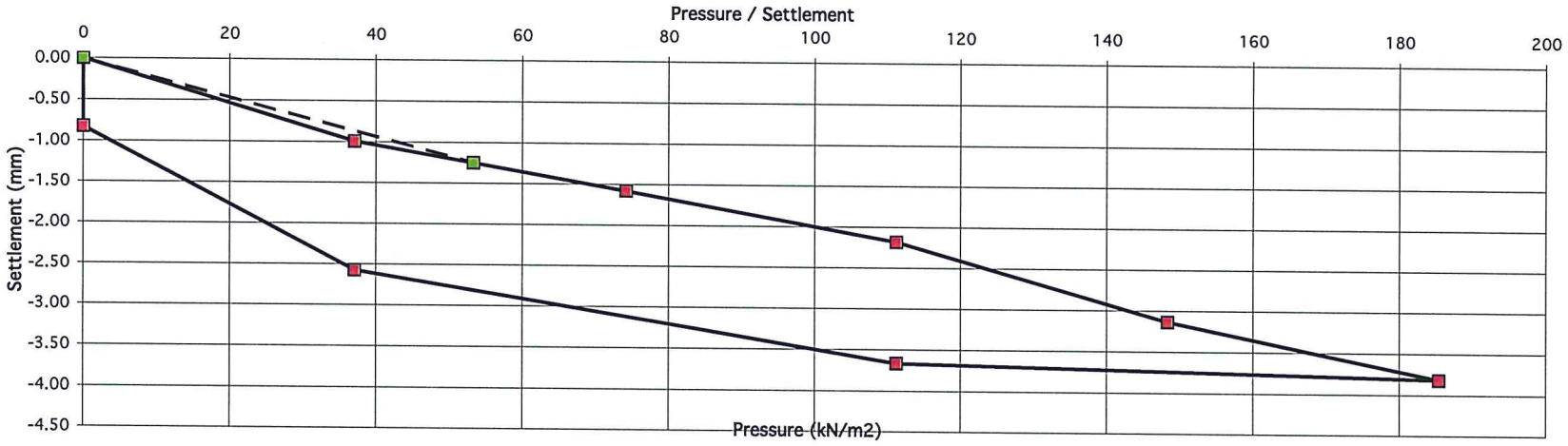
Reference No.	R80224
Contract	Capdoo Clane
Test No.	CBR24 reload
Location	687676.704, 728195.476, 73.912
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

Applied Pressure/Settlement Curve

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

Gravelly SILT

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 43
Modulus of subgrade reaction = 19 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.7 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

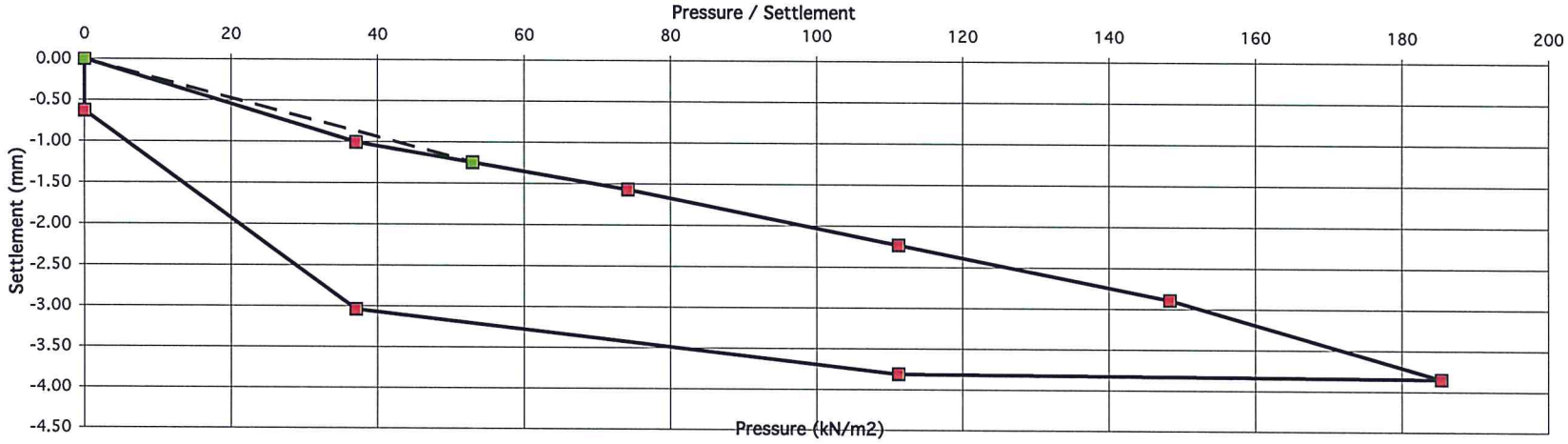
Reference No.	R80225
Contract	Capdoo Clane
Test No.	CBR25
Location	See map
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 42

Modulus of subgrade reaction = 19 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.6 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

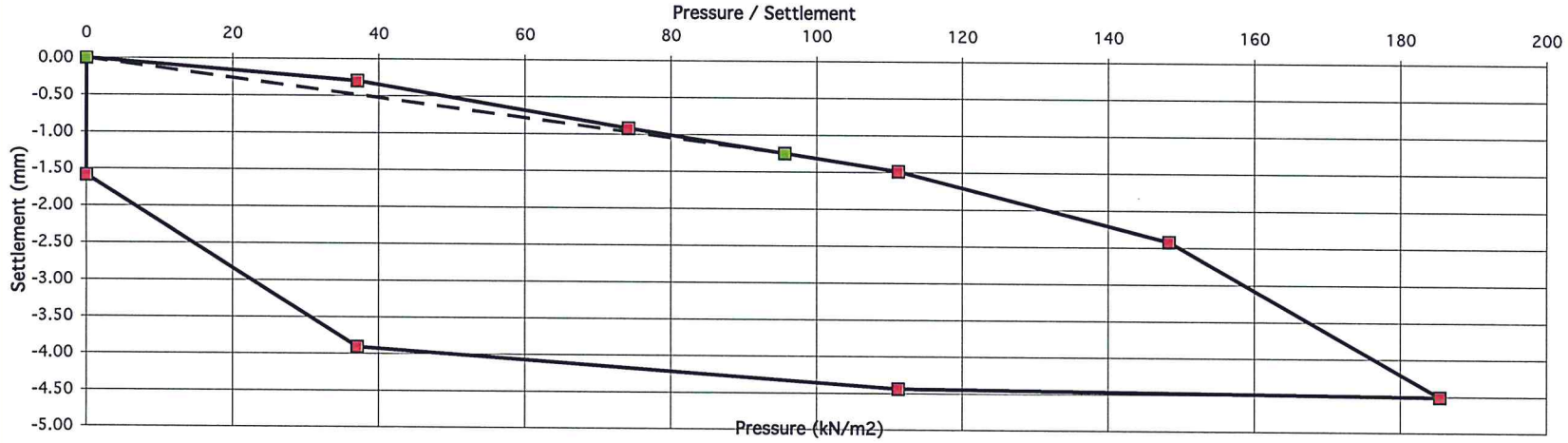
Reference No.	R80225
Contract	Capdoo Clane
Test No.	CBR25 reload
Location	687631.745, 728185.586, 75.104
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

Gravelly SILT

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 77

Modulus of subgrade reaction = 35 MPa/m

Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 4.6 %

Appendix V BRE Digest 365 Tests

Soakaway

IGSL

Contract: Capdoo, Clane
Contract No. 20159
Test No. IT01
Client Ardstone/DBFL
Date: 22/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL	
0.50	2.30	Brown gravelly SILT. Gravel fine to coarse subangular.	

Notes: Location: 687650.505, 728377.037, 75.419

Field Data

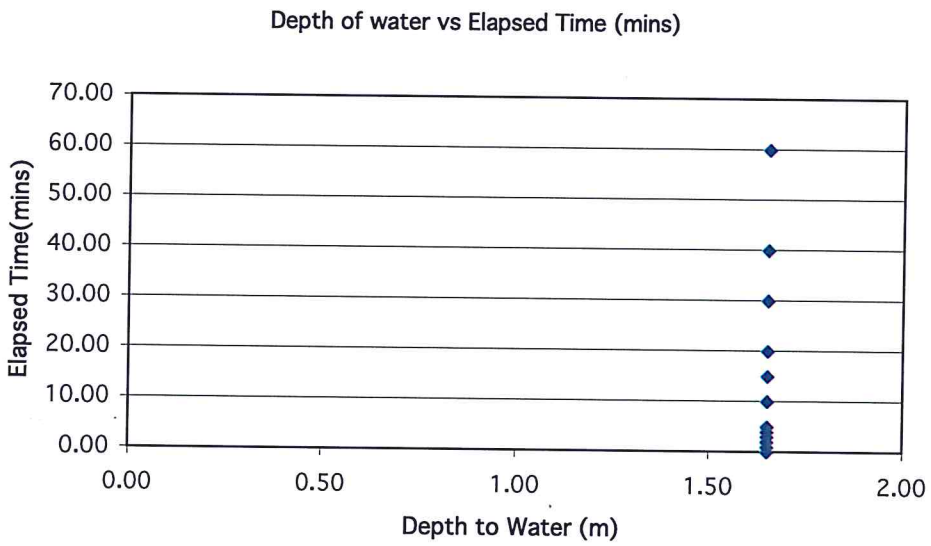
Depth to Water (m)	Elapsed Time (min)
1.65	0.00
1.65	1.00
1.65	2.00
1.65	3.00
1.65	4.00
1.65	5.00
1.65	10.00
1.65	15.00
1.65	20.00
1.65	30.00
1.65	40.00
1.65	60.00

Field Test

Depth of Pit (D)	2.30	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.40	m
Initial depth to Water =	1.65	m
Final depth to water =	1.65	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.96	m2
*Av. side area of permeable stratum over test perio	3.64	m2
Total Exposed area =	4.6	m2

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

f= 0 m/min or 0 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane
Test No. IT02
Client Ardstone/DBFL
Date: 22/06/2017

Contract No. 20159

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL	
0.50	2.50	Black gravelly medium to coarse gritty SAND	

Notes: Location: 687758.740, 728337.281, 69.924

Field Data

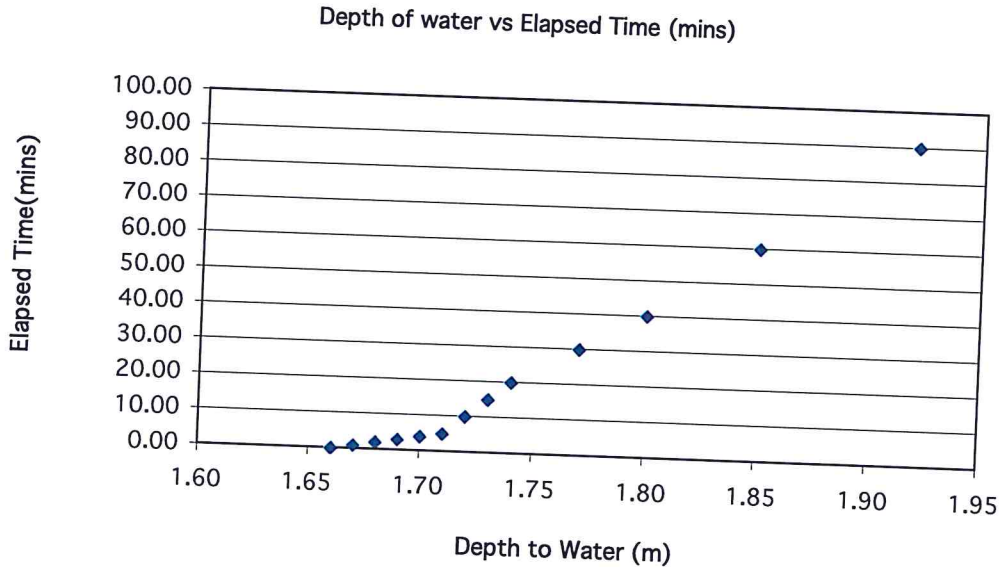
Depth to Water (m)	Elapsed Time (min)
1.66	0.00
1.67	1.00
1.68	2.00
1.69	3.00
1.70	4.00
1.71	5.00
1.72	10.00
1.73	15.00
1.74	20.00
1.77	30.00
1.80	40.00
1.85	60.00
1.92	90.00

Field Test

Depth of Pit (D)	2.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.70	m
Initial depth to Water =	1.66	m
Final depth to water =	1.92	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.68	m2
*Av. side area of permeable stratum over test perio	2.982	m2
Total Exposed area =	3.662	m2

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

f= 0.00054 m/min or 8.941E-06 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane
Test No. IT03
Client Ardstone/DBFL
Date: 21/06/2017

Contract No. 20159

Summary of ground conditions

from	to	Description	Ground water
0.00	0.60	TOPSOIL	
0.60	1.60	Grey silty fine to coarse SAND	
1.60	2.50	Grey silty gravelly fine to coarse SAND	

Notes: Location: 687729.310, 728440.316, 72.962

Field Data

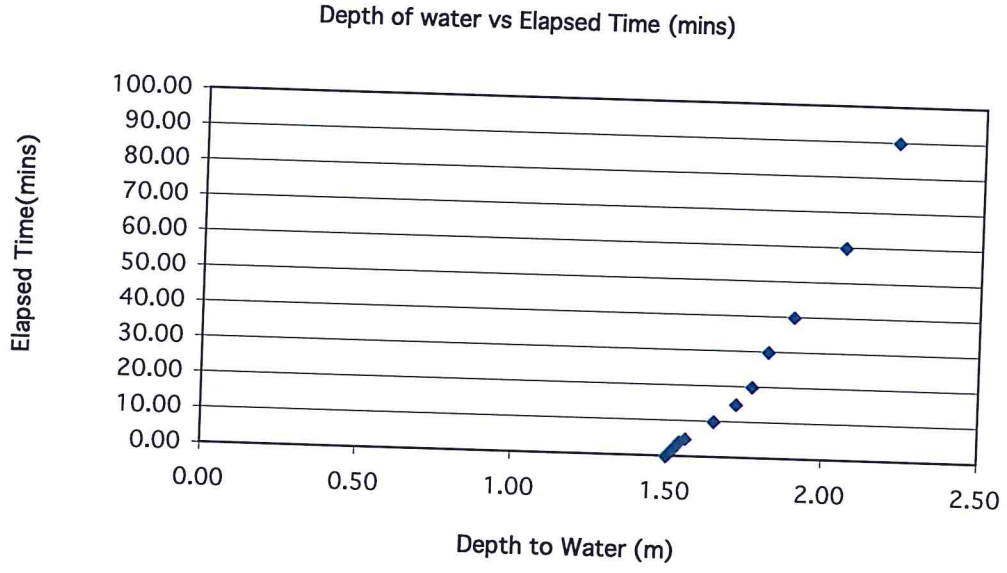
Depth to Water (m)	Elapsed Time (min)
1.50	0.00
1.51	1.00
1.52	2.00
1.53	3.00
1.54	4.00
1.56	5.00
1.65	10.00
1.72	15.00
1.77	20.00
1.82	30.00
1.90	40.00
2.06	60.00
2.22	90.00

Field Test

Depth of Pit (D)	2.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.80	m
Initial depth to Water =	1.50	m
Final depth to water =	2.22	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test perio	2.816	m2
Total Exposed area =	3.536	m2

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

f= 0.00163 m/min or 2.715E-05 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane
Contract No. 20159
Test No. IT04
Client Ardstone/DBFL
Date: 21/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL	
0.50	1.90	Grey slightly silty fine to coarse SAND	
1.90	2.50	Grey gravelly moderately cobbly fine to coarse SAND	

Notes: Location: 687749.826, 728441.334, 71.325

Field Data

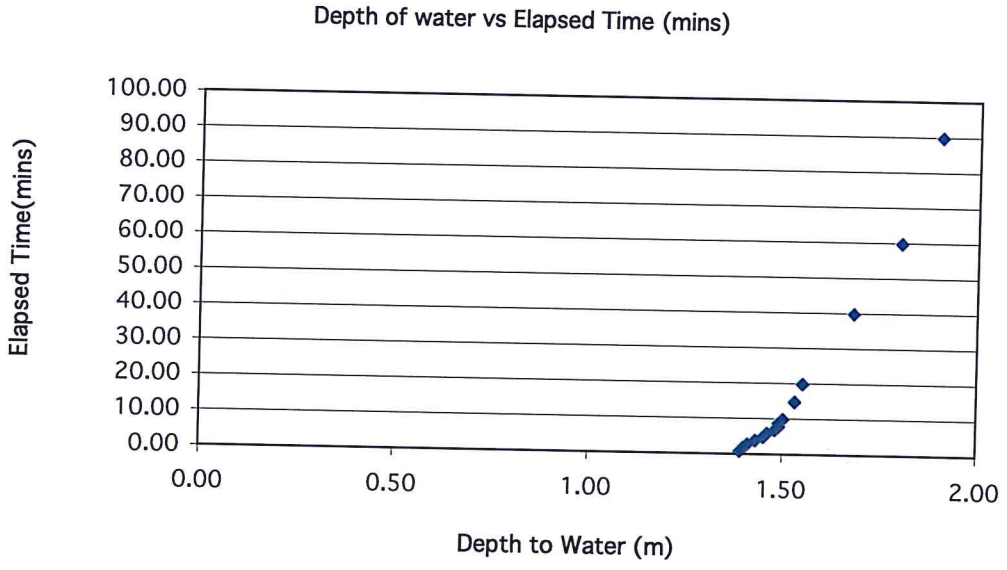
Depth to Water (m)	Elapsed Time (min)
1.38	0.00
1.39	1.00
1.40	2.00
1.41	3.00
1.43	4.00
1.45	5.00
1.46	6.00
1.48	7.00
1.49	8.00
1.49	9.00
1.50	10.00
1.53	15.00
1.55	20.00
1.68	40.00
1.80	60.00
1.90	90.00

Field Test

Depth of Pit (D)	2.50	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.10	m
Initial depth to Water =	1.38	m
Final depth to water =	1.90	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.84	m2
*Av. side area of permeable stratum over test perio	4.3	m2
Total Exposed area =	5.14	m2

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

f= 0.00094 m/min or 1.574E-05 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane — Contract No. 20159
Test No. IT05
Client Ardstone/DBFL
Date: 21/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL	1.30m
0.30	1.60	Grey silty fine to coarse subangular to subrounded GRAVEL	

Notes: Location: 687850.393, 728469.376 ,68.013
Moderate seepage at 1.50m. Groundwater settled at 1.30m after a period of 30 minutes.

Field Data

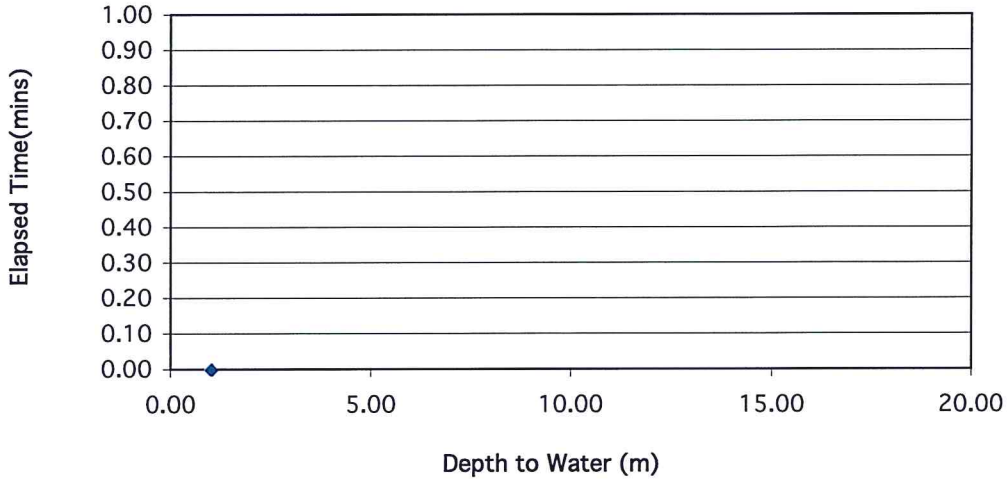
Depth to Water (m)	Elapsed Time (min)
NA	NA

Field Test

Depth of Pit (D)	1.60	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.80	m
Initial depth to Water =	NA	
Final depth to water =	NA	m
Elapsed time (mins)=	NA	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.72	m2
*Av. side area of permeable stratum over test perio	#VALUE!	m2
Total Exposed area =	#VALUE!	m2

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

f= #VALUE! m/min or #VALUE! m/sec



Soakaway

IGSL

Contract: Capdoo, Clane — Contract No. 20159
Test No. IT06
Client Ardstone/DBFL
Date: 21/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	0.90m
0.30	1.20	Grey silty fine to coarse subangular to subrounded GRAVEL	

Notes: Location: 687855.724, 728492.341, 67.366
Moderate seepage at 1.20m. Groundwater settled at 0.90m after a period of 30 minutes.

Field Data

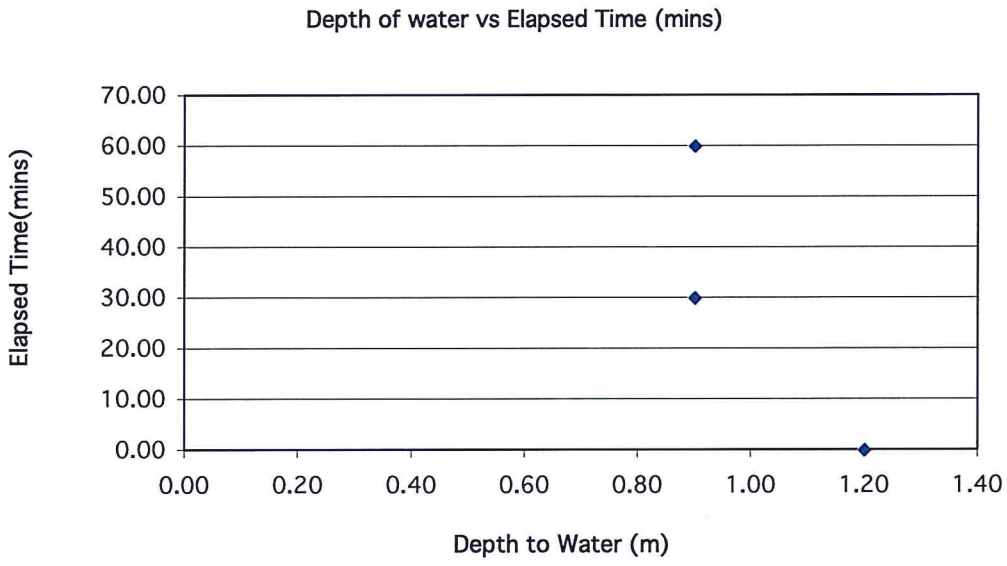
Depth to Water (m)	Elapsed Time (min)
1.20	0.00
0.90	30.00
0.90	60.00

Field Test

Depth of Pit (D)	1.20	m
Width of Pit (B)	0.40	m
Length of Pit (L)	1.50	m
Initial depth to Water =	1.20	m
Final depth to water =	0.90	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.6	m2
*Av. side area of permeable stratum over test perio	0.57	m2
Total Exposed area =	1.17	m2

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

f= -0.0026 m/min or -4.274E-05 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane — Contract No. 20159
Test No. IT07
Client Ardstone/DBFL
Date: 22/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.70	TOPSOIL	
0.70	1.30	Brown slightly sandy gravelly SILT	
1.30	1.80	Grey slightly silty sandy fine to coarse gritty GRAVEL	
1.80	2.30	Brown gravelly fine to medium SAND	

Notes:

Field Data

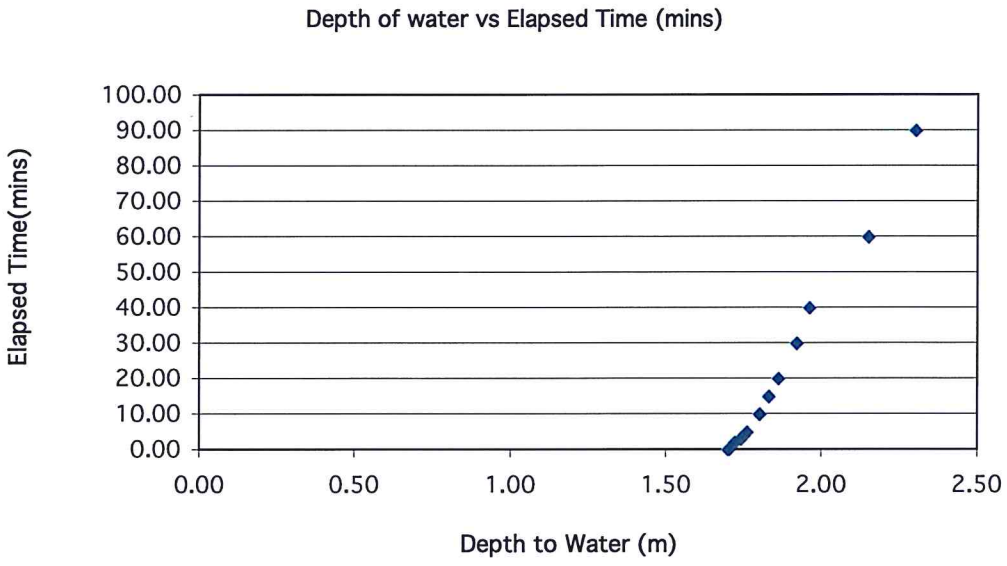
Depth to Water (m)	Elapsed Time (min)
1.70	0.00
1.71	1.00
1.72	2.00
1.74	3.00
1.75	4.00
1.76	5.00
1.80	10.00
1.83	15.00
1.86	20.00
1.92	30.00
1.96	40.00
2.15	60.00
2.30	90.00

Field Test

Depth of Pit (D)	2.30	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.00	m
Initial depth to Water =	1.70	m
Final depth to water =	2.30	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	1.44	m2
Total Exposed area =	2.24	m2

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

f= 0.00238 m/min or 3.968E-05 m/sec



Soakaway

IGSL

Contract: Capdoo, Clane — Contract No. 20159
Test No. IT08
Client Ardstone/DBFL
Date: 22/06/2017

Summary of ground conditions

from	to	Description	Ground water
0.00	0.50	TOPSOIL	
0.50	1.90	Brown gravelly SILT. Gravel fine to coarse subangular.	
1.90	2.40	Black gravelly coarse SAND.	

Notes: Location: IT08,687748.117,728233.974,70.390,,

Field Data

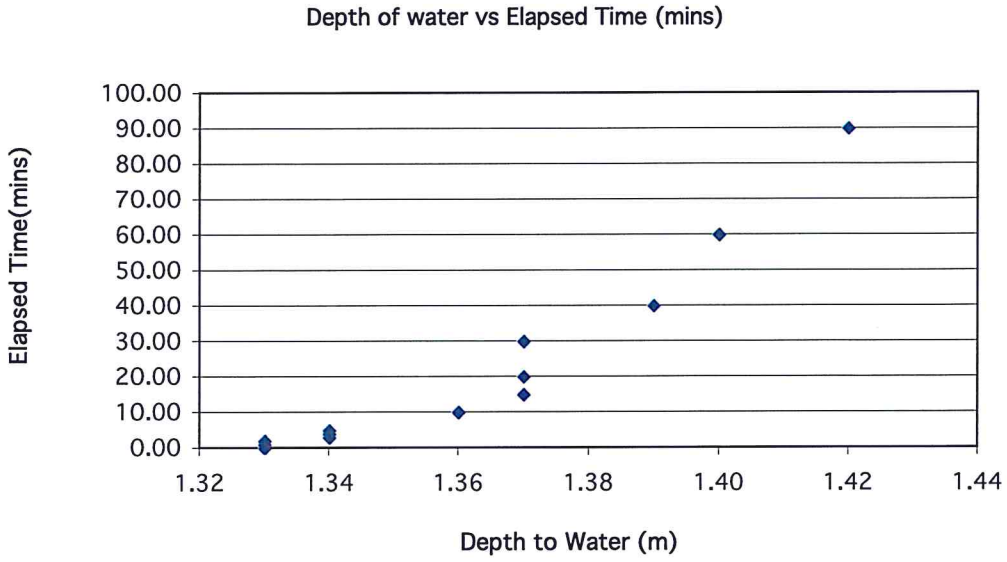
Depth to Water (m)	Elapsed Time (min)
1.33	0.00
1.33	1.00
1.33	2.00
1.34	3.00
1.34	4.00
1.34	5.00
1.36	10.00
1.37	15.00
1.37	20.00
1.37	30.00
1.39	40.00
1.40	60.00
1.42	90.00

Field Test

Depth of Pit (D)	2.40	m
Width of Pit (B)	0.40	m
Length of Pit (L)	2.00	m
Initial depth to Water =	1.33	m
Final depth to water =	1.42	m
Elapsed time (mins)=	90.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.8	m2
*Av. side area of permeable stratum over test perio	4.92	m2
Total Exposed area =	5.72	m2

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

f= 0.00014 m/min or 2.331E-06 m/sec



Appendix VI Laboratory Data

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO.1331

Report No. **R80600** Contract No. 20159 Contract Name: Capdoo , Clane

Customer DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Samples Received: 04-07-17 Date Tested: 05-07-17

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
BH01	AA56212	7.0	A17/3239	B	2.6		NP	NP					Grey/brown slightly silty, slightly sandy, GRAVEL with many cobbles
BH02	AA56214	1.0	A17/3240	B	12	30	17	13	57	WS	4.4	C L	Dark brown slightly sandy, gravelly, CLAY
BH03	AA56217	1.0	A17/3241	B	12	28	18	10	58	WS	4.4	C L	Brown sandy gravelly CLAY with roothairs
TP09	AA78622	0.5	A17/3245	B	14	24	NP	NP	40	WS	4.4		Dark brown very sandy very gravelly SILT
TP11	AA78660	0.8	A17/3246	B	8.9	20	NP	NP	51	WS	4.4		Dark brown sandy, gravelly, SILT
TP22	AA67763	1.2	A17/3250	B	18	28	18	10	72	WS	4.4	C L	Brown sandy gravelly CLAY

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

H Byrne (Laboratory Manager)

Approved by	Date	Page
H Byrne	24-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	86	COBBLES
63	75	
50	65	GRAVEL
37.5	53	
28	44	
20	35	
14	29	
10	26	
6.3	22	
5	20	
3.35	17	
2	13	
1.18	10	SAND
0.6	8	
0.425	7	
0.3	6	
0.15	5	
0.063	4	SILT/CLAY

Contract No: 20159 Report No. R80628

Contract: Capdoo , Clane

BH/TP : BH01

Sample No. AA56207 Lab. Sample No. A17/3237

Sample Type: B

Depth (m) 2.00 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 05-07-17

Description: Grey/brown slightly clayey/silty, sandy, GRAVEL with many cobbles

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:
H Byrne	11-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	99	
10	99	
6.3	99	
5	98	
3.35	97	
2	95	
1.18	88	SAND
0.6	68	
0.425	61	
0.3	53	
0.15	31	
0.063	18	SILT/CLAY

Contract No: 20159 Report No. R80664

Contract: Capdoo , Clane

BH/TP : BH01

Sample No. AA56210 Lab. Sample No. A17/3238

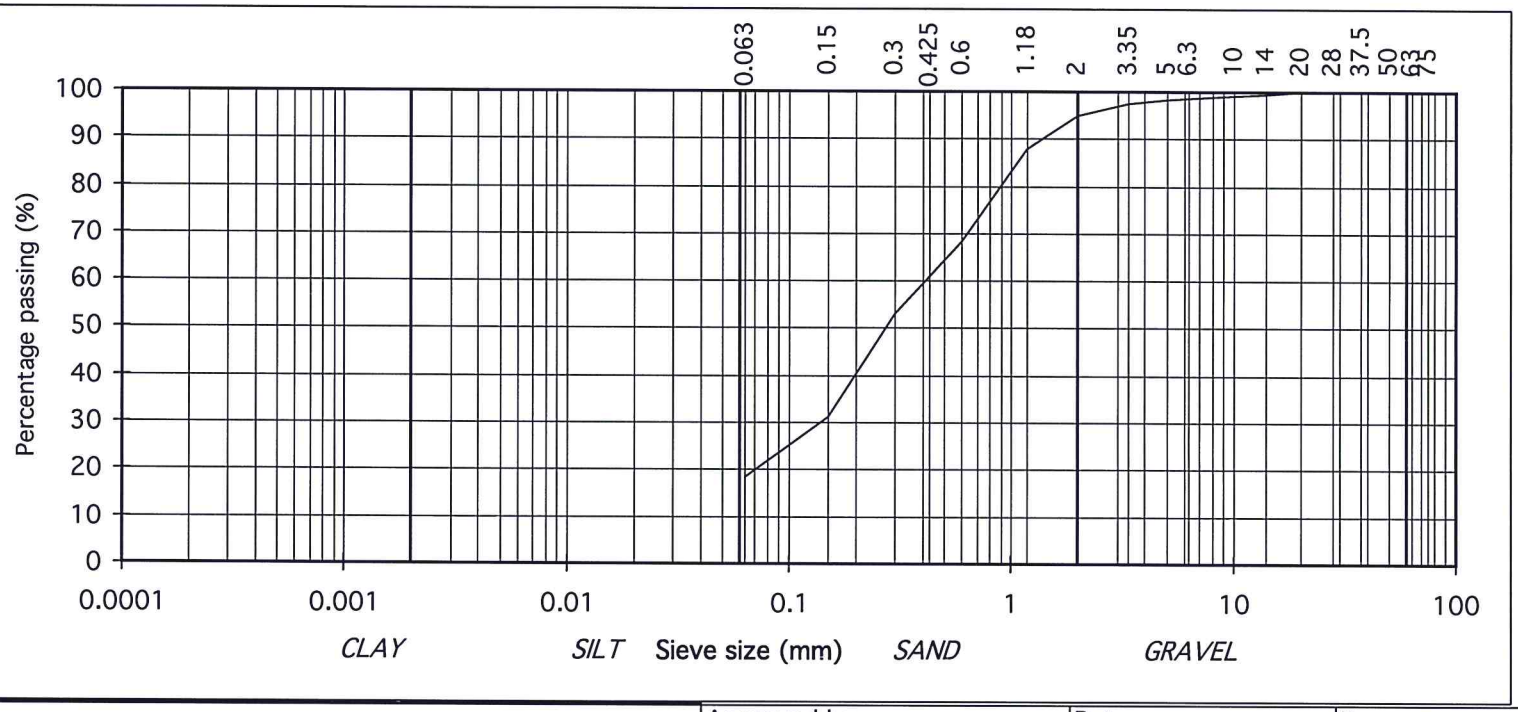
Sample Type: B

Depth (m) 5.00 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 05-07-17

Description: Dark brown clayey/silty, 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:
H Byrne	24-07-17	1 of 1

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

TEST REPORT

Determination of Particle Size Distribution

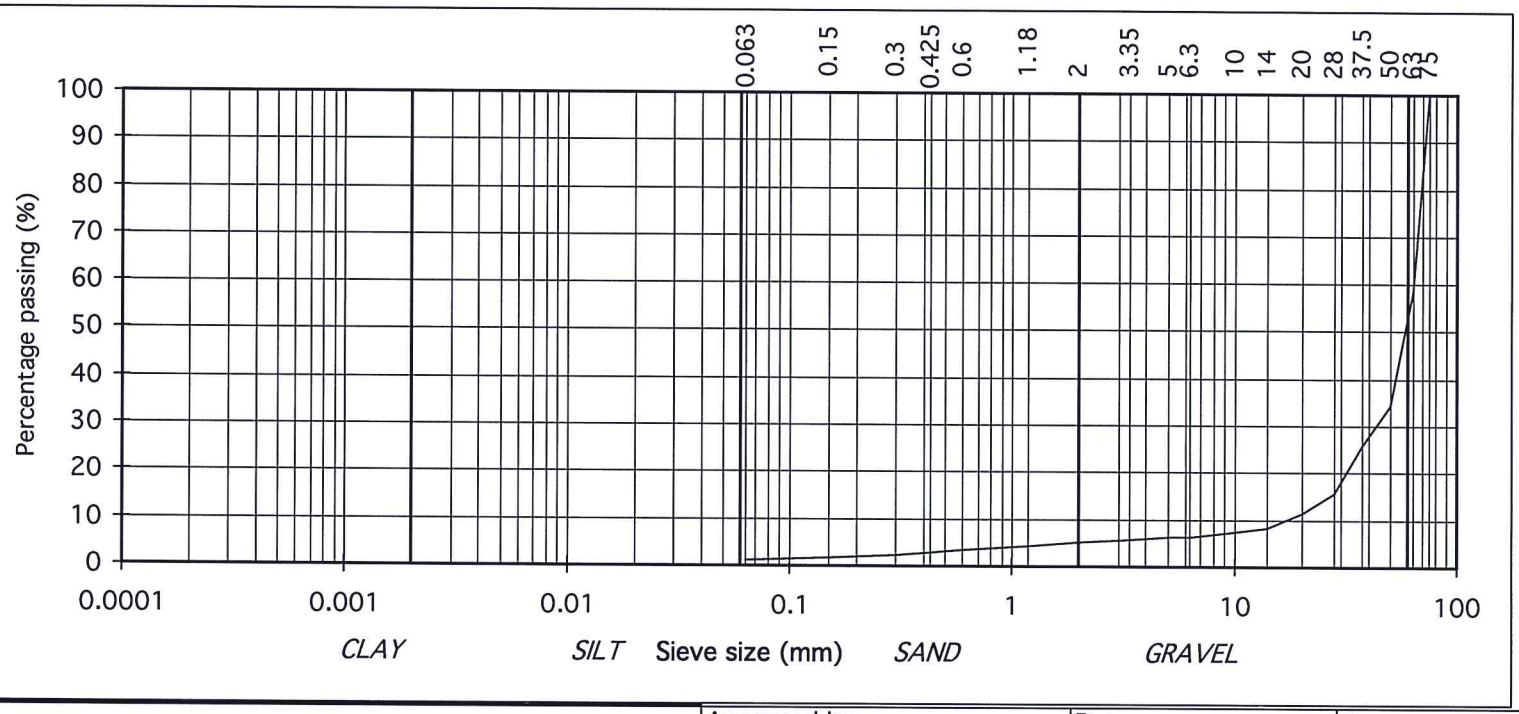
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	58	
50	34	GRAVEL
37.5	26	
28	16	
20	11	
14	8	
10	7	
6.3	6	
5	6	
3.35	6	
2	5	
1.18	4	SAND
0.6	3	
0.425	3	
0.3	2	
0.15	2	
0.063	1	SILT/CLAY

Contract No: 20159 Report No. R80838
Contract: Capdoo , Clane
BH/TP : BH01
Sample No. AA56212 Lab. Sample No. A17/3239
Sample Type: B
Depth (m) 7.00 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 05-07-17
Description: Grey/brown slightly silty, slightly sandy, GRAVEL with many cobbles

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:
H Byrne	24-07-17	1 of 1

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

TEST REPORT

Determination of Particle Size Distribution

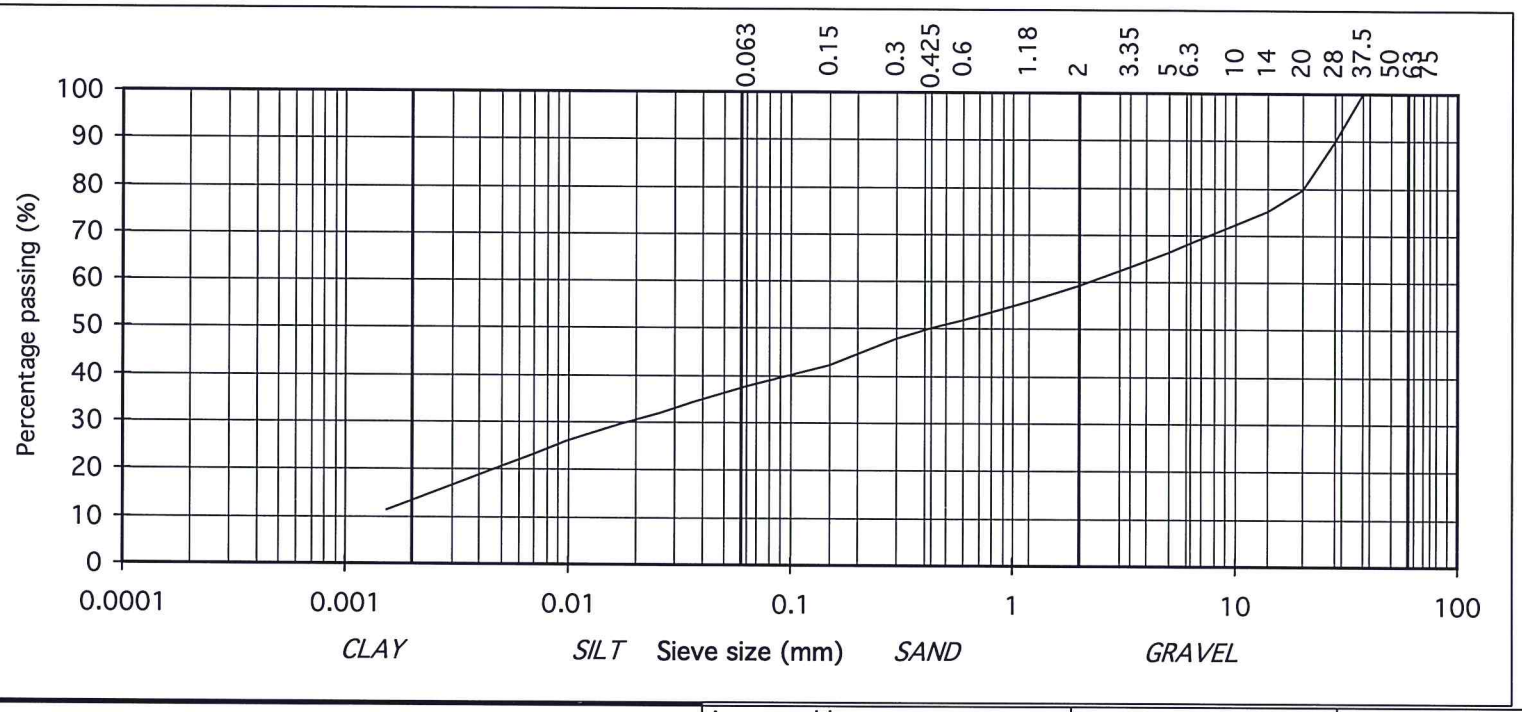
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 1337

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	90	
20	80	
14	75	
10	72	
6.3	68	
5	66	
3.35	63	
2	59	
1.18	56	SAND
0.6	52	
0.425	50	
0.3	48	
0.15	42	
0.063	38	SILT/CLAY
0.037	34	
0.026	32	
0.017	30	
0.010	26	
0.007	23	
0.005	21	
0.002	11	

Contract No: 20159 Report No. R80727
Contract: Capdoo , Clane
BH/TP : BH2
Sample No. AA56214 Lab. Sample No. A17/3240
Sample Type: B
Depth (m) 1.00 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 07-07-17
Description: Dark 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



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	24-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	88	
50	77	GRAVEL
37.5	69	
28	62	
20	57	
14	51	
10	46	
6.3	40	
5	38	
3.35	34	
2	29	
1.18	26	SAND
0.6	23	
0.425	22	
0.3	21	
0.15	17	
0.063	14	SILT/CLAY

Contract No: 20159 Report No. R80630

Contract: Capdoo , Clane

BH/TP : TP07

Sample No. AA78667 Lab. Sample No. A17/3244

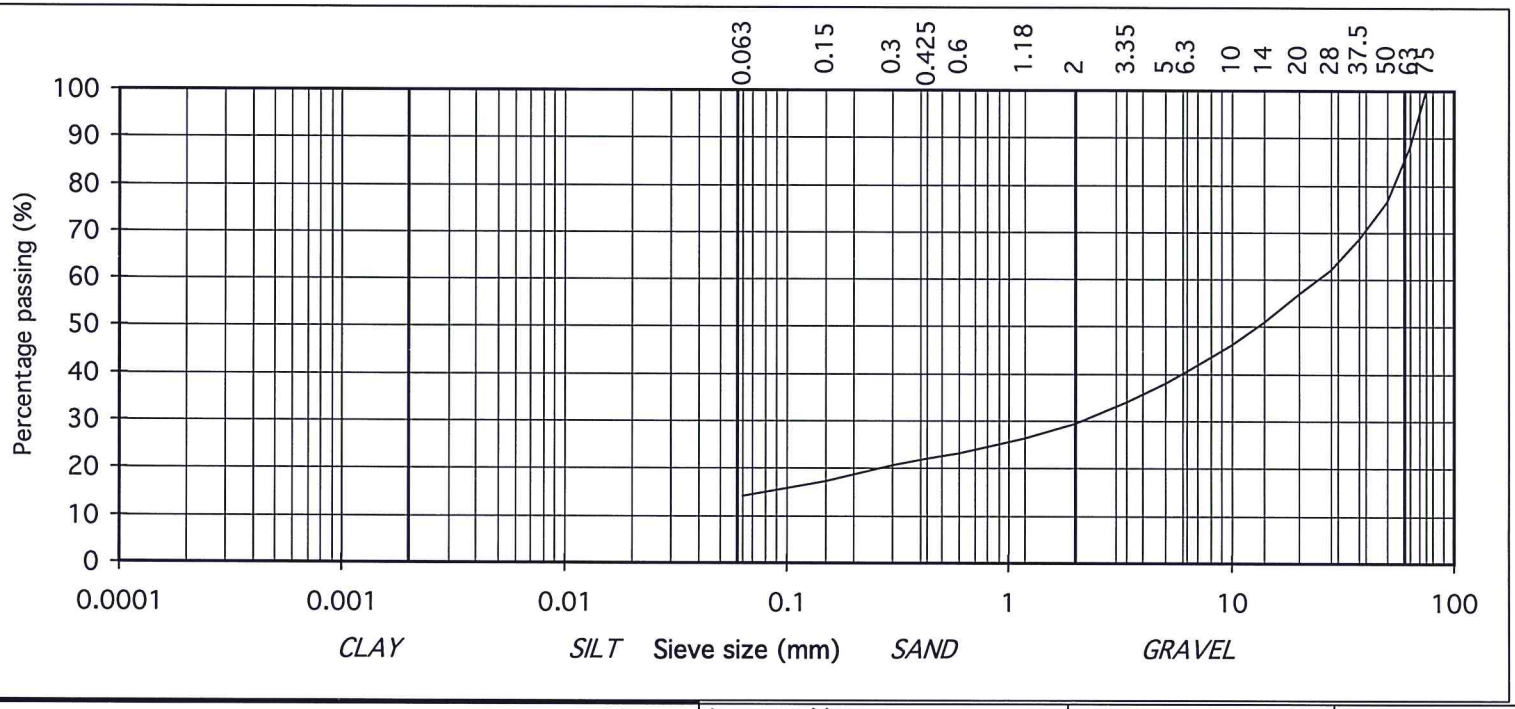
Sample Type: B

Depth (m) 0.50 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 05-07-17

Description: Brown clayey/silty, sandy, GRAVEL with some cobbles

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:
H Byrne	12-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	92	
28	85	
20	78	
14	67	
10	61	
6.3	54	
5	51	
3.35	46	
2	41	
1.18	33	SAND
0.6	17	
0.425	11	
0.3	8	
0.15	5	
0.063	4	SILT/CLAY

Contract No: 20159 Report No. R80839

Contract: Capdoo , Clane

BH/TP : TP05

Sample No. AA67770 Lab. Sample No. A17/3243

Sample Type: B

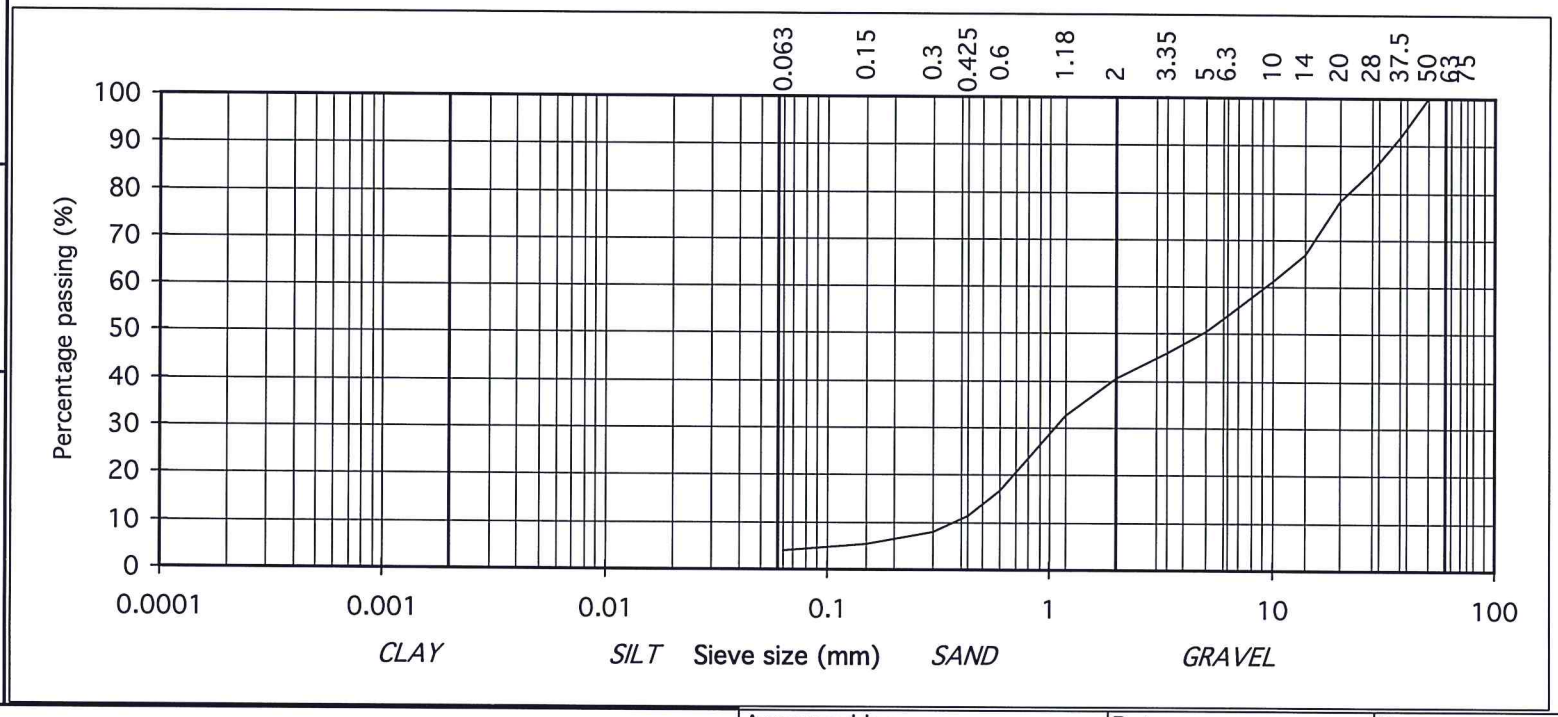
Depth (m) 1.60 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 07-07-17

Description: Dark brown slightly clayey/silty, very sandy, GRAVEL

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	19-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	88	
50	77	GRAVEL
37.5	69	
28	62	
20	57	
14	51	
10	46	
6.3	40	
5	38	
3.35	34	
2	29	
1.18	26	SAND
0.6	23	
0.425	22	
0.3	21	
0.15	17	
0.063	14	SILT/CLAY

Contract No: 20159 Report No. R80630

Contract: Capdoo , Clane

BH/TP : TP07

Sample No. AA78667 Lab. Sample No. A17/3244

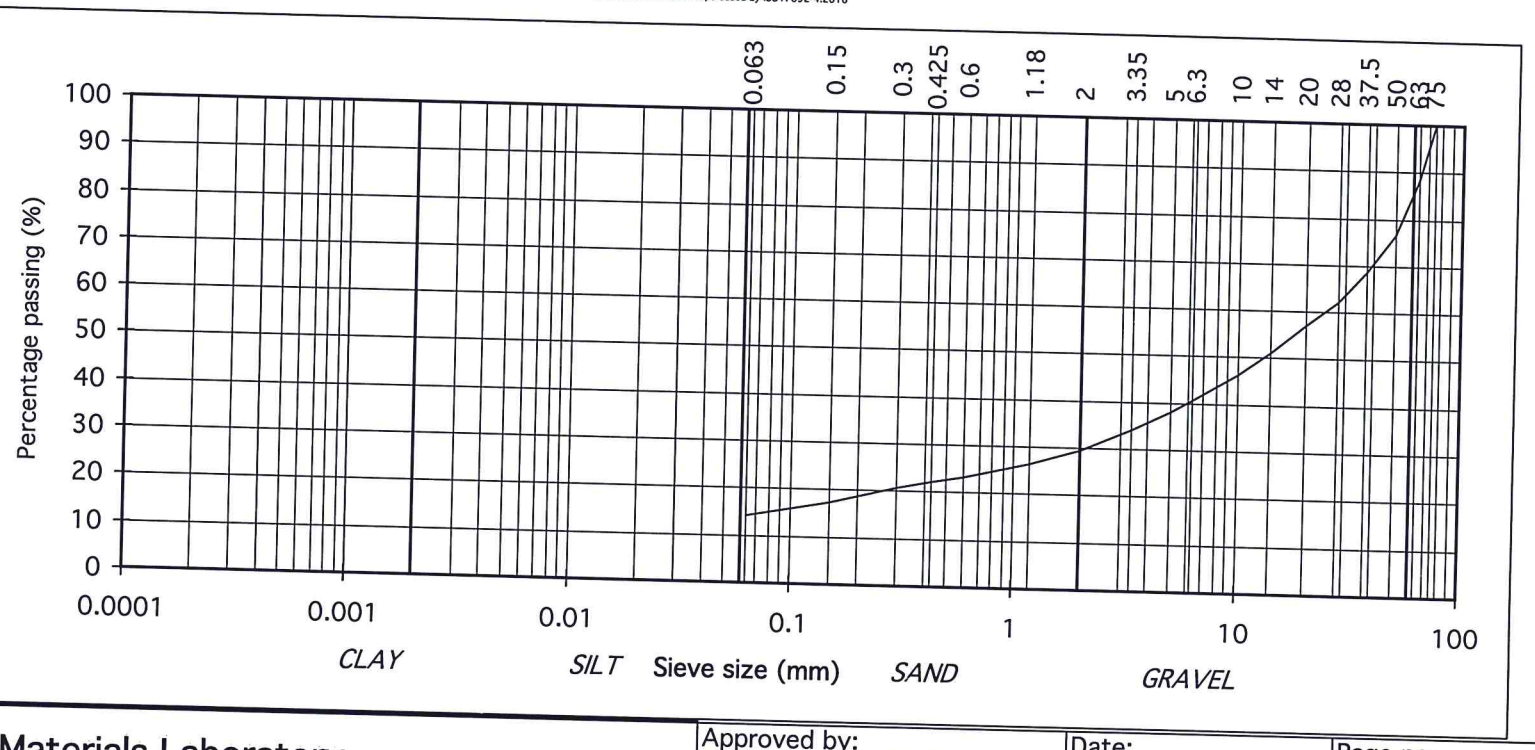
Sample Type: B

Depth (m) 0.50 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 05-07-17

Description: Brown clayey/silty, sandy, GRAVEL with some cobbles

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	24-07-17	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 INAB TESTING DETAILED IN SCOPE REG NO. 1331

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	84	
28	81	
20	77	
14	75	
10	72	
6.3	71	
5	70	
3.35	67	
2	63	
1.18	57	SAND
0.6	52	
0.425	49	
0.3	44	
0.15	35	
0.063	27	SILT/CLAY
0.037	24	
0.026	22	
0.017	20	
0.010	17	
0.007	15	
0.005	13	
0.002	7	

Contract No: 20159 Report No. R80631

Contract: Capdoo , Clane

BH/TP : TP11

Sample No. AA78666 Lab. Sample No. A17/3246

Sample Type: B

Depth (m) 0.80 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

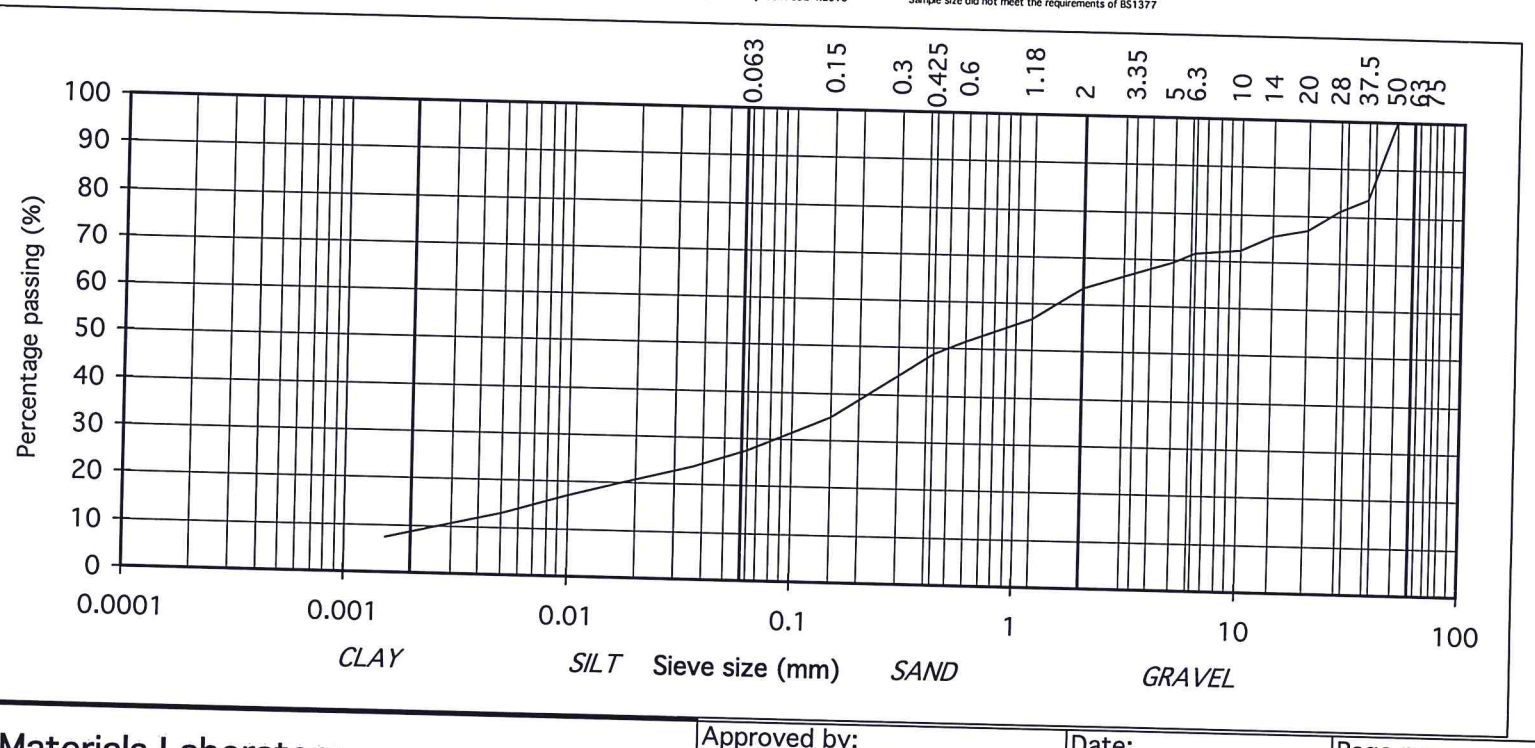
Date Received 04-07-17 Date Testing started 05-07-17

Description: Dark brown sandy, gravelly, SILT/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:
H Byrne	24-07-17	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

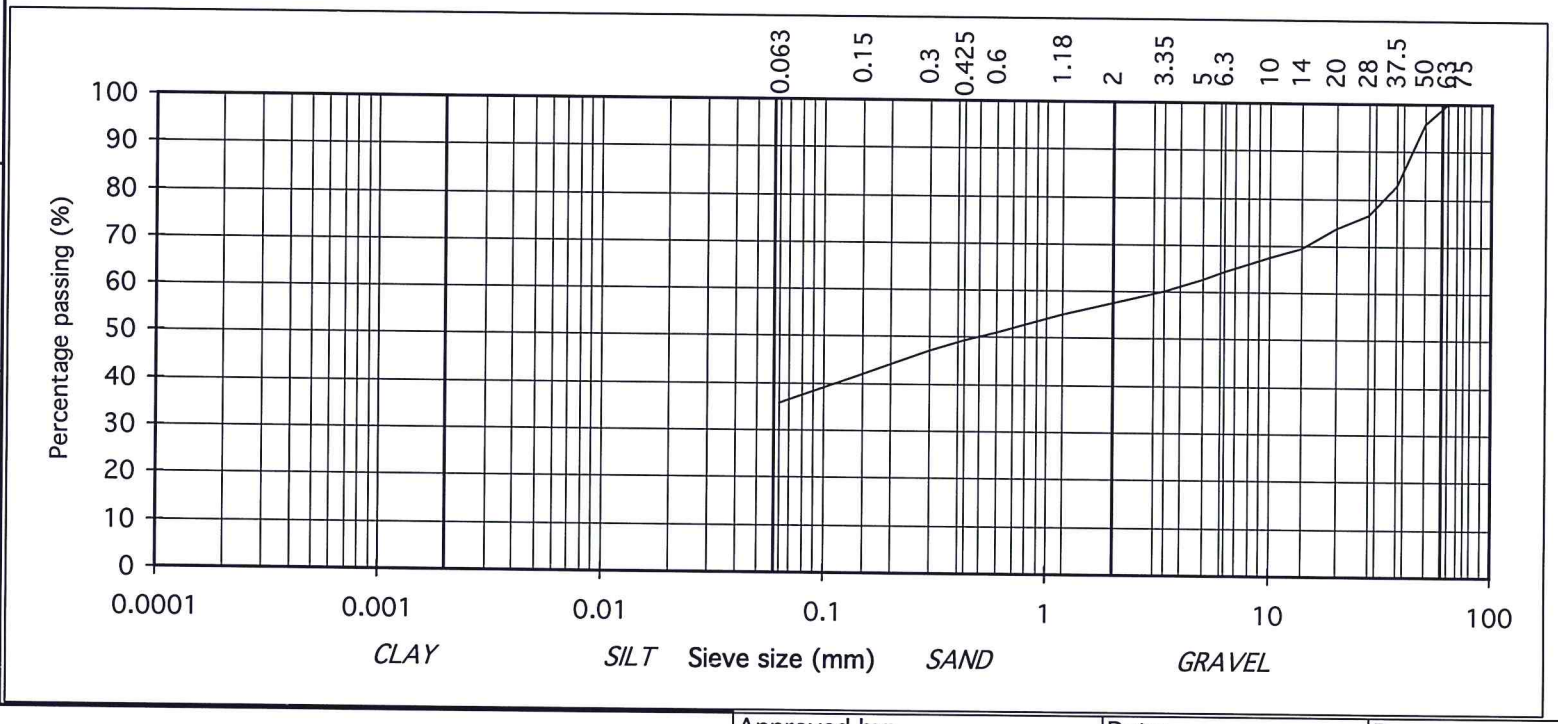
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	96	GRAVEL
37.5	83	
28	77	
20	74	
14	69	
10	67	
6.3	64	
5	63	
3.35	60	
2	58	
1.18	55	SAND
0.6	51	
0.425	49	
0.3	47	
0.15	42	
0.063	36	SILT/CLAY

Contract No: 20159 Report No. R80665
Contract: Capdoo , Clane
BH/TP : TP14
Sample No. AA78687 Lab. Sample No. A17/3247
Sample Type: B
Depth (m) 1.20 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 05-07-17
Description: Brown slightly sandy, gravelly, SILT/CLAY

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

TEST REPORT

Determination of Particle Size Distribution

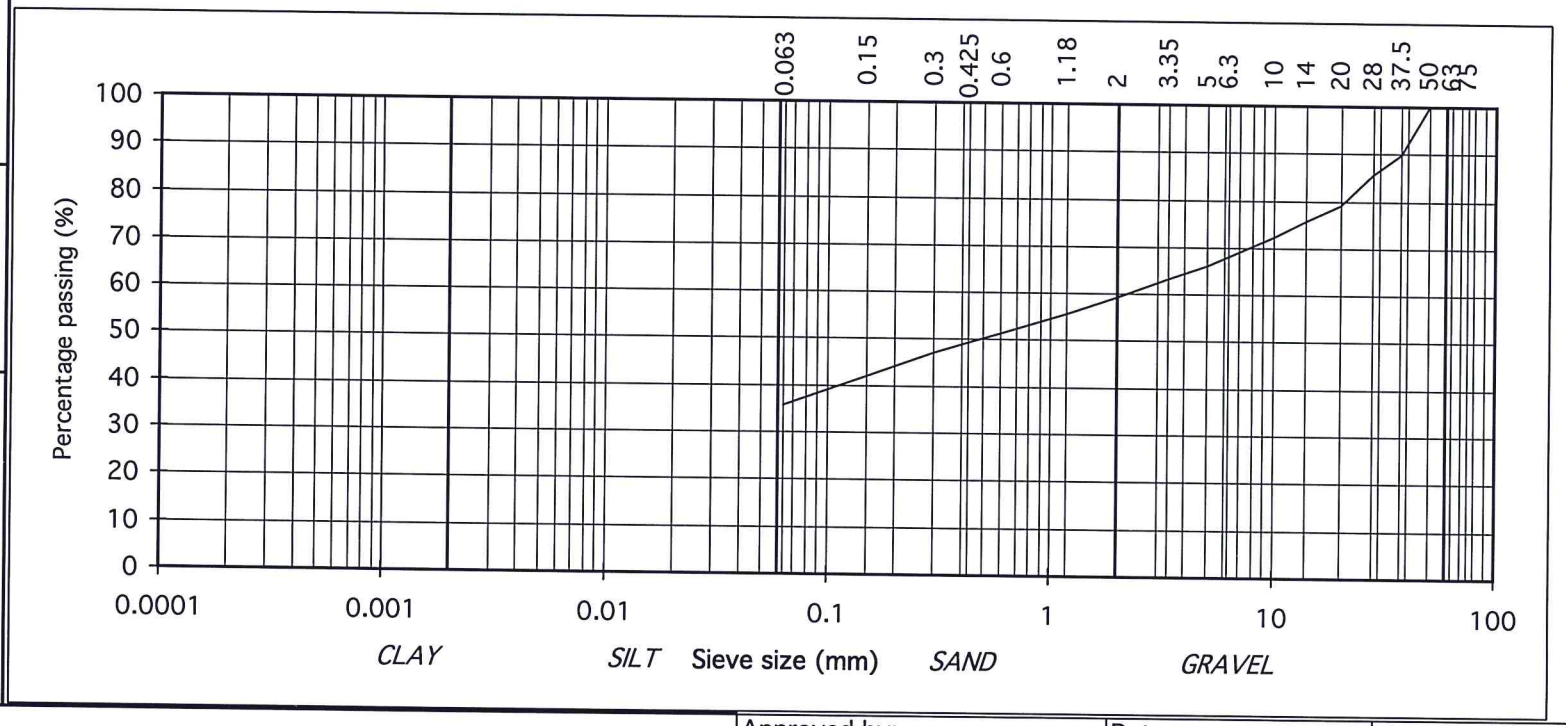
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	90	
28	85	
20	79	
14	76	
10	72	
6.3	68	
5	66	
3.35	63	
2	59	
1.18	56	SAND
0.6	51	
0.425	49	
0.3	47	
0.15	42	
0.063	36	SILT/CLAY

Contract No: 20159 Report No. R80666
Contract: Capdoo , Clane
BH/TP : TP18
Sample No. AA78671 Lab. Sample No. A17/3248
Sample Type: B
Depth (m) 1.10 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 05-07-17
Description: Mottled brown slightly sandy, gravelly, SILT/CLAY

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

TEST REPORT
Determination of Particle Size Distribution

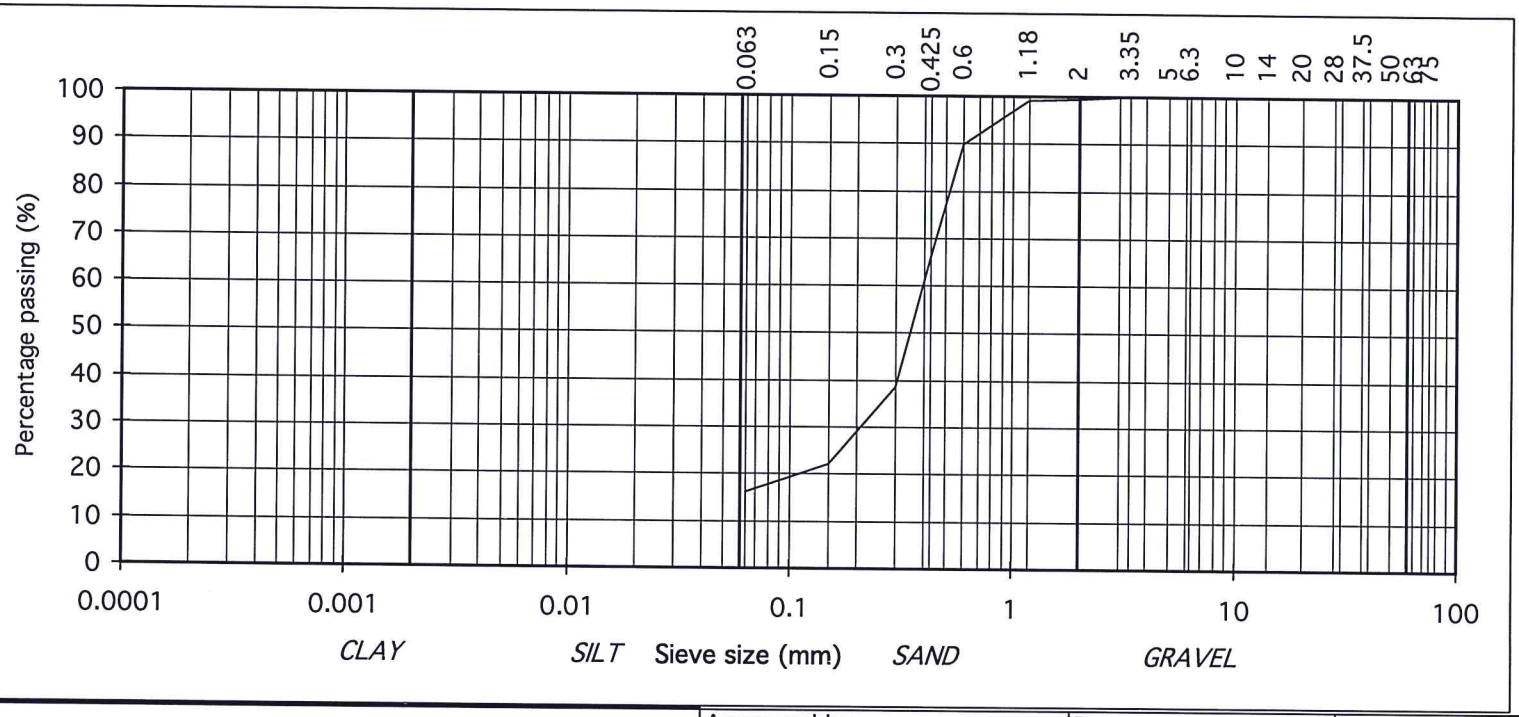
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	100	
10	100	
6.3	100	
5	100	
3.35	100	
2	100	
1.18	99	SAND
0.6	90	
0.425	66	
0.3	39	
0.15	22	
0.063	16	SILT/CLAY

Contract No: 20159 Report No. R80667
Contract: Capdoo , Clane
BH/TP : TP19
Sample No. AA78765 Lab. Sample No. A17/3249
Sample Type: B
Depth (m) 0.80 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 05-07-17
Description: Dark brown clayey/silty, 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:
H Byrne	24-07-17	1 of 1

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

TEST REPORT

Determination of Particle Size Distribution

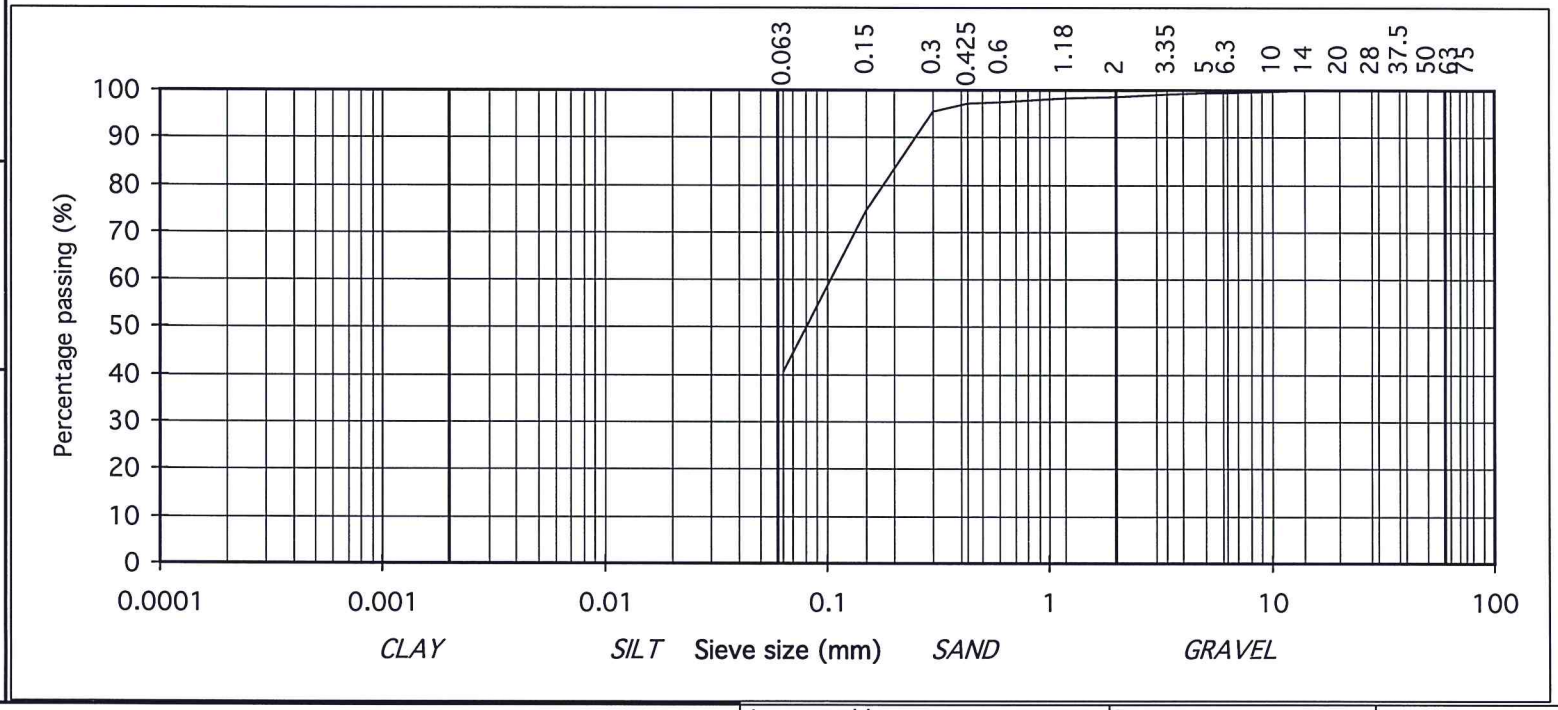
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 13-37

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	100	
14	100	
10	100	
6.3	99	
5	99	
3.35	99	
2	99	
1.18	98	SAND
0.6	97	
0.425	97	
0.3	95	
0.15	74	
0.063	41	SILT/CLAY

Contract No: 20159 Report No. R80632
Contract: Capdoo , Clane
BH/TP : TP23
Sample No. AA67755 Lab. Sample No. A17/3251
Sample Type: B
Depth (m) 0.50 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland
Date Received 04-07-17 Date Testing started 05-07-17
Description: Brown sandy, slightly gravelly, SILT/CLAY

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:
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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 INAB TESTING DETAILED IN SCOPE REG NO. 13/37

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	97	
14	95	
10	94	
6.3	93	
5	92	
3.35	90	
2	86	
1.18	71	SAND
0.6	44	
0.425	35	
0.3	27	
0.15	16	
0.063	11	SILT/CLAY

Contract No: 20159 Report No. R80633

Contract: Capdoo , Clane

BH/TP : TP25

Sample No. AA67751 Lab. Sample No. A17/3252

Sample Type: B

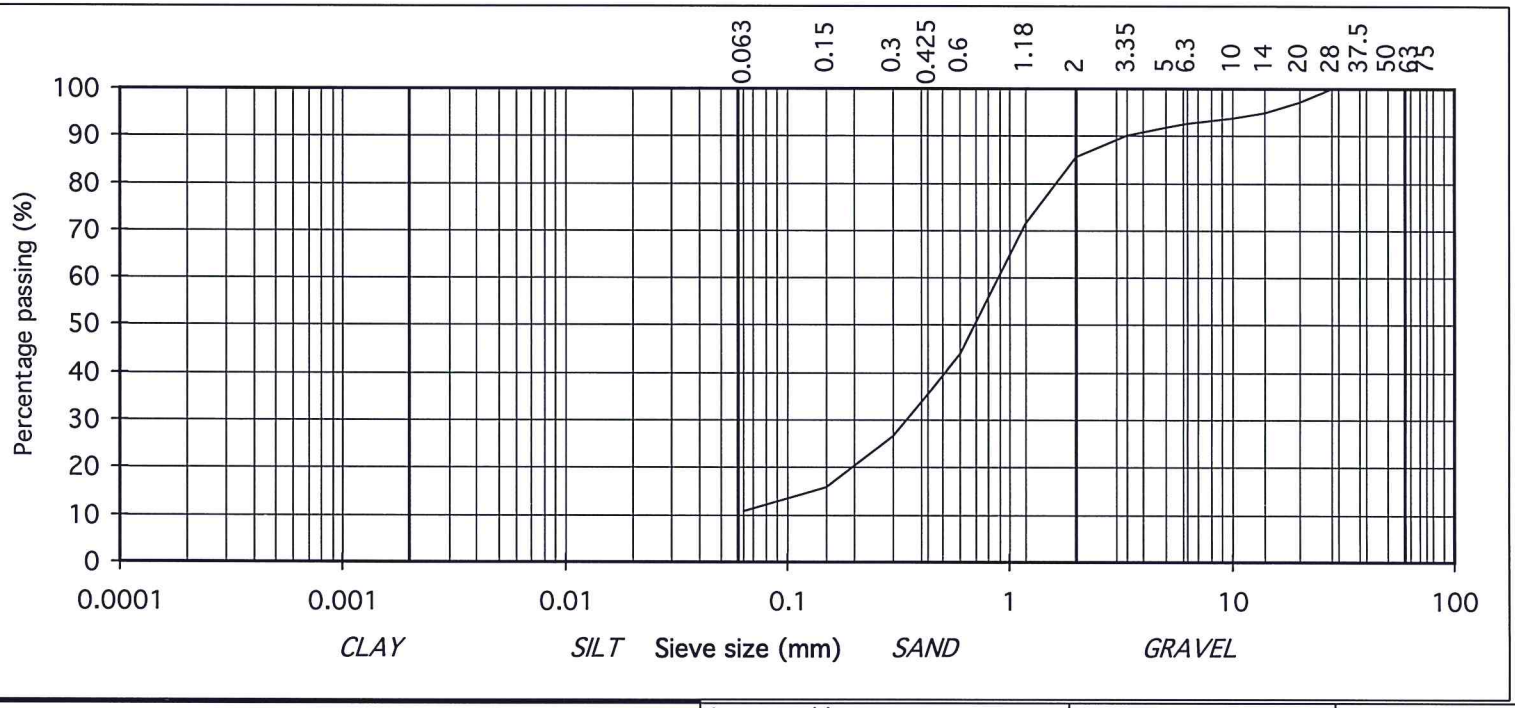
Depth (m) 1.80 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

Date Received 04-07-17 Date Testing started 05-07-17

Description: Dark brown clayey/silty, 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:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

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

UKAS TESTING 2183

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Final Report

Report No.:	17-17340-1
Initial Date of Issue:	13-Jul-2017
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	20159 - Capdoo Clane (DBFL)
Quotation No.:	Q17-08989
Order No.:	
No. of Samples:	5
Turnaround (Wkdays):	5
Date Approved:	13-Jul-2017
Approved By:	
Details:	Martin Dyer, Laboratory Manager

Date Received:	05-Jul-2017
Date Instructed:	06-Jul-2017
Results Due:	12-Jul-2017

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 20159 - Capdoo Clane (DBFL)

Client: IGSL					**Chemtest Job No.:**	17-17340	17-17340
Quotation No.: Q17-08989					**Chemtest Sample ID.:**	480025	480363
Order No.:					Client Sample Ref.:	78693	78679
					Client Sample ID.:	TP4	TP15
					Sample Type:	SOIL	SOIL
					Top Depth (m):	0.50	0.60
					Bottom Depth (m):	0.50	0.60
Determinand	**Accred.**	**SOP**	**Units**	**LOD**			
Ammonium	U	1220	mg/l	0.010		0.17	0.18
Ammonium	N	1220	mg/kg	0.10		1.7	1.8
Boron (Dissolved)	U	1450	µg/l	20		< 20	< 20
Boron (Dissolved)	N	1450	mg/kg	0.20		< 0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 20159 - Capdoo Clane (DBFL)

Client: IGSL				Chemtest Job No.:	17-17340	17-17340	17-17340	17-17340	17-17340
Quotation No.: Q17-08989				Chemtest Sample ID.:	480022	480023	480024	480025	480363
Order No.:				Client Sample Ref.:	56214	78662	67763	78693	78679
				Client Sample ID.:	BH2	TP9	TP22	TP4	TP15
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	0.50	1.20	0.50	0.60
				Bottom Depth (m):	1.00	0.50	1.20	0.50	0.60
				Asbestos Lab:				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
Moisture	N	2030	%	0.020	7.8	11	19	18	14
pH	M	2010		N/A	[A] 8.1	[A] 8.5	[A] 8.5		
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40				< 0.40	0.90
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	0.017	< 0.010		
Sulphur (Elemental)	M	2180	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Cyanide (Total)	M	2300	mg/kg	0.50				[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50				[A] 3.8	[A] 3.9
Sulphate (Acid Soluble)	M	2430	%	0.010				[A] 0.036	[A] 0.026
Arsenic	M	2450	mg/kg	1.0				22	11
Barium	M	2450	mg/kg	10				79	63
Cadmium	M	2450	mg/kg	0.10				3.9	1.7
Chromium	M	2450	mg/kg	1.0				32	19
Copper	M	2450	mg/kg	0.50				69	22
Mercury	M	2450	mg/kg	0.10				0.28	0.16
Molybdenum	M	2450	mg/kg	2.0				3.8	3.3
Nickel	M	2450	mg/kg	0.50				91	32
Lead	M	2450	mg/kg	0.50				51	27
Antimony	N	2450	mg/kg	2.0				3.3	< 2.0
Selenium	M	2450	mg/kg	0.20				1.5	0.91
Zinc	M	2450	mg/kg	0.50				300	110
Chromium (Trivalent)	N	2490	mg/kg	5.0				32	19
Chromium (Hexavalent)	N	2490	mg/kg	0.50				< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20				[A] 0.50	[A] 0.49
Mineral Oil	N	2670	mg/kg	10				< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0				[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 20159 - Capdoo Clane (DBFL)

Client: IGSL					Chemtest Job No.:	17-17340	17-17340	17-17340	17-17340	17-17340
Quotation No.: Q17-08989					Chemtest Sample ID.:	480022	480023	480024	480025	480363
Order No.:					Client Sample Ref.:	56214	78662	67763	78693	78679
					Client Sample ID.:	BH2	TP9	TP22	TP4	TP15
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	0.50	1.20	0.50	0.60
					Bottom Depth (m):	1.00	0.50	1.20	0.50	0.60
					Asbestos Lab:				COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0				[A] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				[A] < 10	[A] < 10	
Benzene	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Toluene	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Ethylbenzene	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
m & p-Xylene	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
o-Xylene	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0				[A] < 1.0	[A] < 1.0	
Naphthalene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10				< 0.10	< 0.10	
Acenaphthene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Fluorene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Phenanthrene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Anthracene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Fluoranthene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Pyrene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Benzo[a]anthracene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Chrysene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Benzo[b]fluoranthene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Benzo[k]fluoranthene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Benzo[a]pyrene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10				< 0.10	< 0.10	
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10				< 0.10	< 0.10	
Coronene	N	2800	mg/kg	0.10				< 0.10	< 0.10	
Total Of 17 PAH's	N	2800	mg/kg	2.0				< 2.0	< 2.0	
PCB 28	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
PCB 52	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
PCB 90+101	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
PCB 118	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
PCB 153	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	
PCB 138	M	2815	mg/kg	0.010				[A] < 0.010	[A] < 0.010	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 20159 - Capdoo Clane (DBFL)

Client: IGSL					**Chemtest Job No.:**	17-17340	17-17340	17-17340	17-17340
Quotation No.: Q17-08989					**Chemtest Sample ID.:**	480022	480023	480024	480025	480363
Order No.:					Client Sample Ref.:	56214	78662	67763	78693	78679
					Client Sample ID.:	BH2	TP9	TP22	TP4	TP15
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.00	0.50	1.20	0.50	0.60
					Bottom Depth (m):	1.00	0.50	1.20	0.50	0.60
					Asbestos Lab:				COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
PCB 180	M	2815	mg/kg	0.010					[A] < 0.010	[A] < 0.010
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10					[A] < 0.10	[A] < 0.10
Total Phenols	M	2920	mg/kg	0.30					< 0.30	< 0.30

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 20159 - Capdoo Clane (DBFL)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-17340				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Chemtest Sample ID:	480025						
Sample Ref:	78693						
Sample ID:	TP4						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.50	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.031	--	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 12457-3 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	0.0023	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0031	< 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	0.0022	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.38	3.8	10	150	500
Sulphate	1220	U	15	150	1000	20000	50000
Total Dissolved Solids	1020	N	66	660	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.2	92	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	18

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.

Results - Single Stage WAC

Project: 20159 - Capdoo Clane (DBFL)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-17340				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Chemtest Sample ID:	480363						
Sample Ref:	78679						
Sample ID:	TP15						
Top Depth(m):	0.60						
Bottom Depth(m):	0.60						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.49	3	5	6
Loss On Ignition	2610	M	%	1.5	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.049	--	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 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0031	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0011	< 0.050	0.5	10	70
Copper	1450	U	0.0012	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0068	0.068	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	0.0020	< 0.50	4	50	200
Chloride	1220	U	1.7	17	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	6.4	64	1000	20000	50000
Total Dissolved Solids	1020	N	71	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	9.2	92	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

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 ID:	Sample Ref:	Sample ID:	Sampled Date:	Deviation Code(s):	Containers Received:
480022	56214	BH2		A	Amber Glass 250ml
480023	78662	TP9		A	Amber Glass 250ml
480024	67763	TP22		A	Amber Glass 250ml
480025	78693	TP4		A	Amber Glass 250ml
480025	78693	TP4		A	Amber Glass 60ml
480025	78693	TP4		A	Plastic Tub 500g
480363	78679	TP15		A	Amber Glass 250ml
480363	78679	TP15		A	Amber Glass 60ml
480363	78679	TP15		A	Plastic Tub 500g

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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.

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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

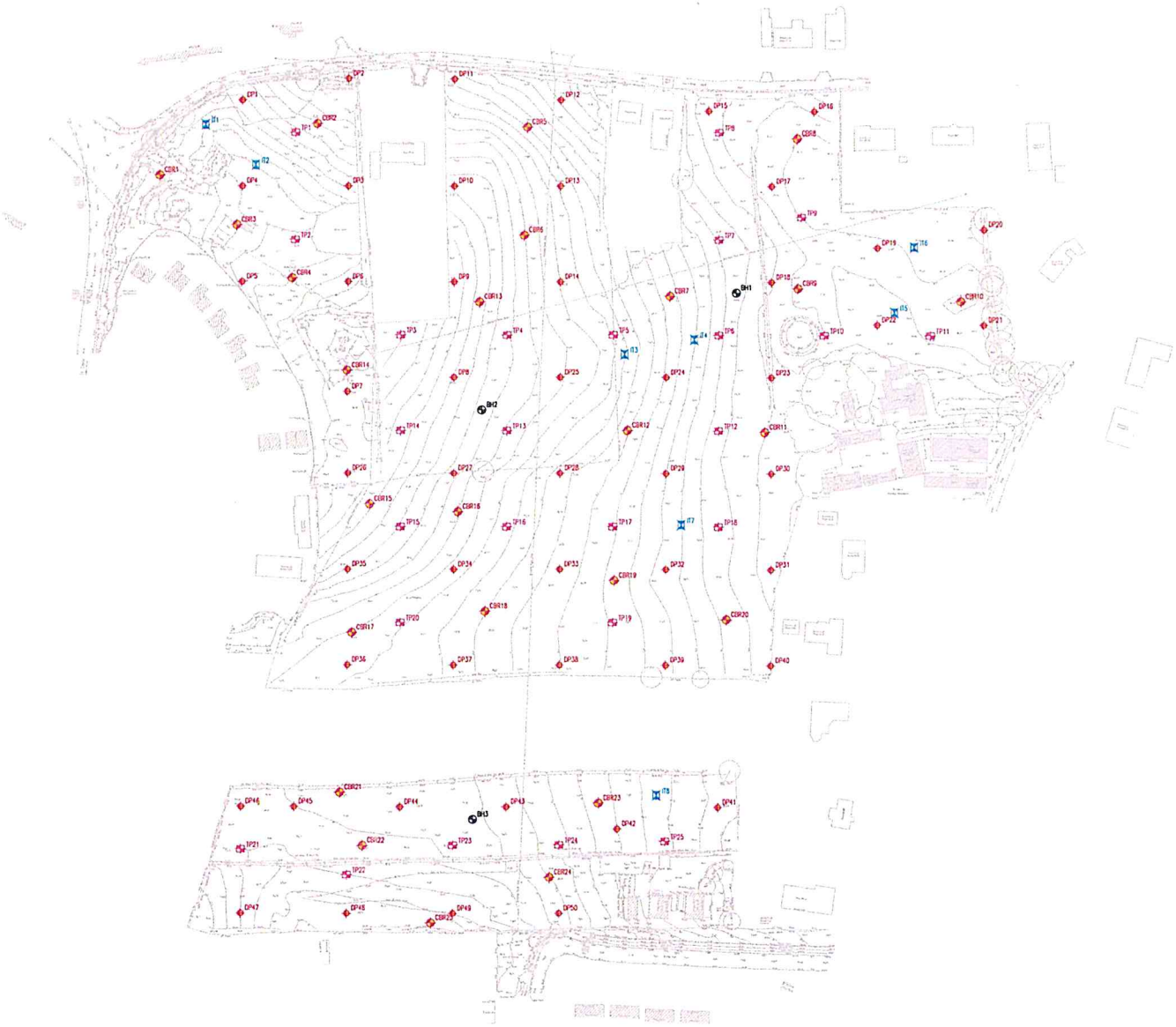
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample

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.co.uk

Appendix VII Site Plan



NOTES

1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPANCIES BEFORE WORK COMMENCES.
2. ALL DIMENSIONS AND LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.
3. ALL LEVELS ARE IN METRES AND ARE RELATED TO ORDNANCE DATUM. (ALL ORDNANCE DATUM TO BE CONFIRMED)
4. CONTRACTOR TO UNDERTAKE INVESTIGATIONS IN THE VICINITY OF PROPOSED NEW LOCATIONS TO MINIMISE THE POTENTIAL FOR ENCOUNTERING EXISTING SERVICES DURING EXCAVATION (INCLUDING BUT NOT LIMITED TO USE OF CAT TYPE CABLE DETECTION DEVICES) AND LIAISING AND REVIEW RELEVANT UTILITY SERVICES RECORD DRAWINGS.
5. CBRs TO BE PLATE BEARING TESTS UNDERTAKEN AT SUBGRADE LEVEL (i.e. TOPSOIL REMOVED FROM SURFACE.)
6. TRIAL PITS UP TO 3m DEPTH.
7. CONTRACTOR TO BACKFILL ALL EXCAVATIONS ON COMPLETION OF INVESTIGATIONS.
8. THIS DRAWING IS BASED ON TOPO SURVEY BY LAND SURVEYS DATED 06/06/2017

SITE INVESTIGATION LEGEND

CBR	CBR PLATE BEARING TEST (26 No.)
DP	DYNAMIC PROBE LOCATION SURVEY DEPTH 4.0m TO 5.0m BELOW GROUND LEVEL (50 No.)
TP	TRIAL PIT (25 No.) TARGET DEPTH 2.5m BELOW GROUND LEVEL
IT	INFILTRATION TRENCH (8 No.)
BH	BOREHOLE TARGET DEPTH 6.0m BELOW GROUND LEVEL (3 No.)

FOR INFORMATION

REV	DATE	DESCRIPTION	BY	CHKD

PLANNING

BY SCALE	BY	INSTRUCT	DWG
DATE	MAY 2017	CHECKED	BA

DBFL

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Report No. 20159 | July 2017

PROJECT
LANDS AT CAPDOO, CLANE, CO. KILDARE

DWG TITLE
SITE INVESTIGATION PLAN

CLIENT
ARDSTONE RESIDENTIAL FUND

SCALE 1:750 @ A0 | PAGE SIZE A0

DWG NO 162074-1000