6. LAND AND SOILS

6.1 Introduction

This chapter of the EIAR comprised of an assessment of the likely impact of the proposed development on soils and the geological environment as well as identifying proposed mitigation measures to minimize any impacts.

In summary, the project comprises the development of 366 no. residential units consisting of the following mix of unit types:

- 28 no. 1 bed apartments
- 118 no. 2 bed apartments
- 36 no. 3 bed duplex units
- 20 no. 2 bedroom house
- 75 no. 3 bedroom house
- 77 no. 4 bedroom house
- 12 no. 5 bedroom house

In addition, the development will also include ancillary public open space, ancillary residential parking spaces and a childcare facility with associated parking spaces.

The Capdoo Link Road which will transverse the site is listed as a "Priority Road Scheme" in the Kildare County Council Development Plan 2017 – 2023 and will be constructed as part of the development. This link road along with a roundabout/junction upgrades will facilitate the primary access points to development. A separate independent access point is provided off a rural road north of the site.

The surface water drainage system accords with SUDs principles with the main body of the site divided into three drainage catchments with two additional catchments for the link road. Attenuation will be provided in each catchment utilising Stormtech Underground Chamber systems, with a controlled greenfield run-off rate of 2.00l/sec/ha. A surface water outfall will be constructed along the rural roads to the east of the site and will discharge to the Gollymochy Stream.

The majority of the foul drainage will connect to an existing foul sewer south east of the site with a small isolated section connecting north west of the site. The proposed foul drainage discharge point south east of the site is slightly elevated above the eastern side of the site. As such, a foul pumping station, rising main and associated rising main discharge (header) manhole will be required to service a large section of the development (185 out of 366 units). The north western and southern portions of the site will discharge by gravity into the appropriate discharge manholes.

Infill Material will be imported on-site. This material will be either quarried product from quarries that have planning permission; greenfield/inert soil imported under a Waste Permit issued by the local authority; or materials that have been approved as by-products by the EPA in accordance with the EPA's criteria for determining a material is a by-product, per the provisions of article 27(1) of the European Communities (Waste Directive) Regulations, 2011.

6.2 Methodology

Assessment of the likely impact of the proposed development on soils and the geological environment includes the following activities:

- Preliminary Ground Investigation Study
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service

Preliminary Ground Investigations for the proposed development were carried out by IGSL on July 2017 and included the following scope of work:

- 3 No. Boreholes
- 23 No. Trial Pits
- 20 No. Plate Bearing Tests
- 50 No. Dynamic Probes
- 8 No. Infiltration Tests

Refer to Appendix 6.A Ground Investigation Report (IGSL, Issue Date July 2017, report no. 20159).

6.3 Receiving Environment

6.3.1 Soils

Review of information available on the GSI's online mapping service ("Quaternary Sediments") indicate that the site is underlain predominantly by a sediment type described as "TLs – Till derived from limestones". Refer to Figure 6.1 below.

Ground conditions at the site, as observed during Preliminary Ground Investigations, are summarised as follows:

- 0.3m to 0.6m thick topsoil layer overlying;
- 0.7m to 1.0/2.0m thin stratum of firm gravelly silt/clay
- Gravelly sand or sandy gravel (to target trial pit depth of 3.0m)
- 3 No. boreholes were undertaken as part of the site investigation works and generally observed silty / sandy gravels from 3.0m (trial pit target depth) to 8.8m below existing ground level

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

Infiltration tests were carried out at eight locations. Tests results indicated infiltration rates (f) ranged from 0.00000 m/min to 0.00238 m/min. Refer to Figure 6.2 below.

There is a variation in soil type across the site with low percolation noted in clay-based soils and test failures where high water table is present. Infiltration tests in the granular soils indicate that it should be suitable for dispersion of surface water.

6.3.2 Geology

Review of GSI's online mapping service ("Bedrock Geology") describes geology in the vicinity of the site as "Tournaisian Limestone".

GSI have classified the site's groundwater vulnerability as "high" for the majority of the site with "extreme" and "Rock at or near surface or Karst" in a small portion of the site. GSI also classified underlying gravel aquifers as "locally important".

Refer to Chapter 7.0 (Hydrology) of this EIAR for further comment regarding Hydrogeology.

Figure 6.1 Extract from Quaternary Sediments Map (source GSI Online Mapping Service)

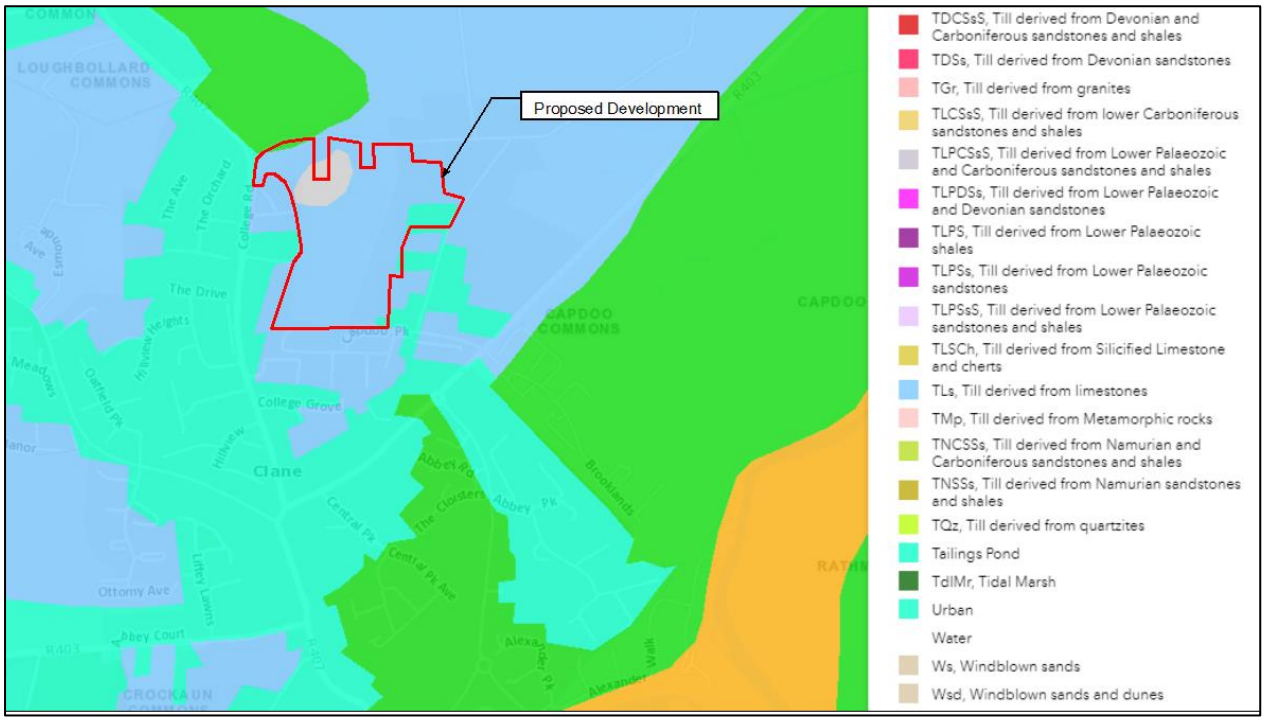


Figure 6.2 Extract from IGSL Site Investigation Report – Infiltration Test Results

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

6.4 Characteristics of the Proposed Development

Site development works will include stripping of the 0.3m to 0.6m thick topsoil layer. It is expected that all stripped topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces).

Excavation of subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of underground attenuation of surface water. In general, the gradients follow the natural topography of the site. However, a cut and fill operation will be necessary to re-grade certain parts of the site. For instance, grading the internal road network to tie in to the link road and raising ends of runs to achieve adequate falls in the drainage network. Underlying subsoil layers generally comprise of sandy silts or gravelly sands and are also expected to be suitable for reuse as non-structural fill (e.g. build-up of back gardens areas or build-up of open spaces).

Importation of fill will be required beneath houses, driveways and to roadways (structural fill). Further information regarding importation of fill is included in Section 6.5.1.3 of this Chapter (quantity, type of material etc.)

6.5 Identification of Likely Significant Impacts

6.5.1 Construction Phase

6.5.1.1 Stripping of Topsoil

Removal of the existing topsoil layer will be required. As noted previously, it is expected that all stripped topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces).

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff.

Table 6.1 Preliminary Estimated Topsoil Volumes (+/- 10%)

	Volume (m^3)
Topsoil Strip (300mm to 600mm thick layer)	45,000
Topsoil Reuse (landscaping of open spaces etc.)	45,000

6.5.1.2 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of underground attenuation of surface water.

Underlying subsoil layers generally comprise of sandy gravels or gravelly sands and are expected to be generally suitable for reuse as non-structural fill (e.g. build-up of back gardens areas or build-up of open spaces).

Table 6.2 Excavation of Subsoil / Reuse of Excavated Material (+/- 10%)

	Volume (m^3)
Cut (excavation of subsoil layers as described in 6.5.1.2 above)	47,000
Reuse of Excavated Material as Non Structural Fill	47,000

6.5.1.3 Imported Fill

In the context of materials imported to site, these will be natural stones sourced from locally available quarries, greenfield / inert soil imported under a Waste Permit issued by the local authority; or materials that have been approved as by-products by the EPA in accordance with the EPA's criteria for determining a material is a by-product, per the provisions of article 27(1) of the European Communities (Waste Directive) Regulations, 2011.

The majority of imported soil replacement materials will be granular in nature and used in the construction of road pavement foundations, drainage and utility bedding and surrounds. Materials will be brought to site and placed in their final position in the shortest possible time. Any imported material will be kept separate from the indigenous arisings from the site. All excavation to accommodate imported material will be precisely co-ordinated to ensure no surplus material is brought to site beyond the engineering requirement.

Table 6.3 Imported Fill (+/- 10%)

	Volume (m^3)
Fill (Total)	89,000
Reuse of Excavated Material (Non Structural Fill)	47,000
Imported Fill	42,000

6.5.1.4 Construction Traffic

Earthworks plant (e.g. dump trucks) and vehicles delivering construction materials to site (e.g. road aggregates, concrete deliveries etc.) have potential to cause rutting and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff. This issue can be particularly noticeable at site access points (resulting in deposition of mud and soil on the surrounding road network). Dust generation can also occur during extended dry weather periods as a result of construction traffic.

6.5.1.5 Accidental Spills and Leaks

During the construction phase there is a risk of accidental pollution from the sources noted below. Accidental spills and leaks may result in contamination of the soils underlying the site.

- Storage of oils and fuels on site
- Oils and fuels leaking from construction machinery
- Spillage during refuelling and maintenance of construction machinery
- Use of cement and concrete during construction works

6.5.1.6 Geological Environment

Any excavations associated with development of the site are expected to be relatively shallow (e.g. no basement construction is proposed) and are not expected to impact on the underlying geology.

6.5.2 Operational Phase

On completion of the construction phase, there will be no further impact on soils and the geological environment.

6.5.3 'Do Nothing' Scenario

There will be no impact on soils and the geological environment if the development does not proceed.

6.6 Ameliorative, Remedial or Reductive Measures

6.6.1 Construction Phase

6.6.1.1 Stripping of Topsoil

Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas.

Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains.

Topsoil stockpiles will also be located so as not to necessitate double handling.

Surface water runoff from areas stripped of topsoil will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

On-site settlement ponds will include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.

6.6.1.2 Excavation of Subsoil Layers

Excavation of existing subsoil layers has been minimised. Cut type earthworks operations will not be required to achieve designed site levels.

Disturbed subsoil layers will be stabilised as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). The duration that subsoil layers are exposed will be minimised in order to mitigate against weather effects.

Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles.

Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).

6.6.1.3 Imported Fill

As noted in section 6.5.1.3 above, importation of fill to site will be required.

No large or long-term stockpiles of fill material will be held on the site. At any time, the extent of fill material held on site will be limited to that needed in the immediate vicinity of the active work area.

Smaller stockpiles of fill, where required, will be suitably protected to ensure no sediment laden runoff enters existing surface water drains. Such stockpiles are to be located in order to avoid double handling.

6.6.1.4 Construction Traffic

Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.

Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.

Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods.

6.6.1.5 Accidental Spills and Leaks

In order to mitigate against spillages contaminating underlying soils, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.

Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (when not possible to carry out such activities off site).

6.6.1.6 Geological Environment

No mitigation measures are proposed in relation to the geological environment.

6.6.2 Operational Phase

On completion of the construction phase no further mitigation measures are proposed as there will be no further impact on soils and the geological environment.

6.6.3 'Do Nothing' Scenario

No mitigation measures are proposed in relation to soils and the geological environment if the development does not proceed.

6.7 Predicted Impact of the Proposed Development

6.7.1 Construction Phase

Implementation of the measures outlined in Section 6.6.1 will ensure that the potential impacts of the proposed development on soils and the geological environment do not occur during the construction phase and that any residual impacts will be short term.

6.7.2 Operational Phase

There are no predicted impacts arising from the operational phase.

6.7.3 'Do Nothing' Scenario

There are no predicted impacts should the proposed development not proceed.

6.8 Monitoring

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to Outline Construction Management Plan
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)

No ongoing monitoring is proposed on completion of the construction phase.

6.9 Reinstatement

All temporary construction compounds and site entrances are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

All construction waste and / or scrapped building materials are to be removed from site on completion of the construction phase.

Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility.

All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

6.10 Interactions and Potential Cumulative Impacts

6.10.1 Interactions

Traffic and Transportation

Delivery of materials to site (e.g. aggregates for road construction, concrete for foundations, delivery of construction plant to site) will lead to potential impact on the surrounding road network.

Water and Hydrology

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result subsoil erosion and generation of sediment laden surface water runoff.

Waste Management

Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility.

Noise and Vibration

Development of the site will result in a level of construction related noise and vibration

Air Quality

Dust generation can also occur during extended dry weather periods as a result of construction traffic.

Flora and Fauna

Removal of the existing topsoil layer will be required across the site as well as removal of some trees, hedgerows etc.

6.10.2 Potential Cumulative Impacts

Other developments currently under construction and other committed development in the vicinity of the site have been considered and are likely to have similar impacts during the construction phase in relation to soils and geology.

Should the construction phase of any developments coincide with development of the site, potential cumulative impacts are not anticipated once similar ameliorative, remedial and reductive measures are implemented.

6.10.3 Unplanned Events

The following accidents & disasters involving soils during construction could potentially give rise to a serious incident putting people at risk:

- Collapse of trench during excavation works
- Accidental spills and leaks may result in contamination of the soils underlying the site.

With the implementation of the aforementioned mitigation measures, the likelihood of such events occurring would be local and not significant.

On completion of the construction phase, there will be no further unplanned events anticipated on soils and the geological environment.

6.10.4 Risks to Human Health

The following risk to human health from soils and the geological environment can occur during construction:

- Dust generation can also occur during extended dry weather periods as a result of construction traffic.

With the implementation of the aforementioned mitigation measures, the likelihood of such events occurring would be local and not significant

APPENDIX 6.A Ground Investigation Report

Ground Investigations Ireland Ltd., July 2017

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

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

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.		0.30	67.44						
Firm brown slightly gravelly sandy SILT/CLAY. Sand is fine to medium. Gravel is fine to medium subangular to subrounded.					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

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.									
		0.30	74.97						
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.					AA78696	B	0.50		
		0.60	74.67						
Brown silty fine to coarse subangular to subrounded GRAVEL with a medium cobble content and a low boulder content. Cobbles are subangular to rounded.					AA78697	B	1.20		
1.0									
2.0									
		2.50	72.77						
Black sandy fine to coarse subounded to rounded GRAVEL.					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

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.									
Firm brown slightly gravelly SILT/CLAY. Gravel is fine to medium subangular to subrounded.		0.40	76.21		AA78679	B	0.60		
Black gravelly coarse SAND. Gravel is fine to medium.		1.40	75.21		AA78680	B	1.60		
End of pit due to wall collapse. End of Trial Pit at 2.80m		2.80	73.81		AA78681	B	2.80		

1.0
2.0
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		
					AA78684	B	2.50		
End of pit due to boulder. End of Trial Pit at 2.70m		2.70	71.36						

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.**	**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		
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		
End of pit due to wall collapse. End of Trial Pit at 2.60m		2.60	68.89						

Groundwater Conditions

Stability
Wall collapse from 1.5m

General Remarks

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

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

Appendix III Plate Bearing Tests

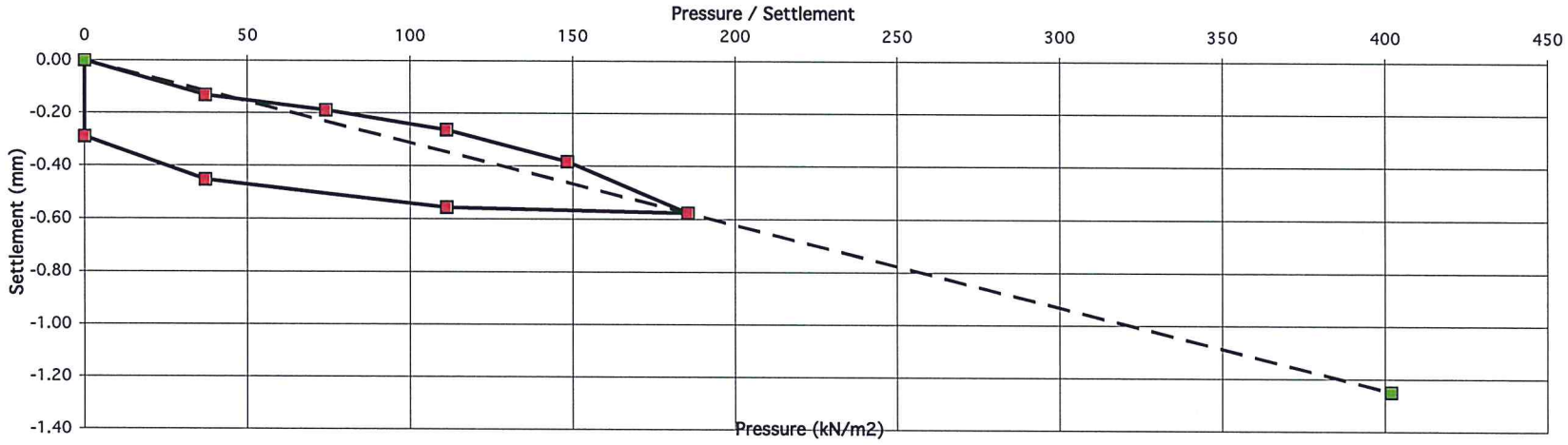
PLATE TEST REPORT SHEET (F3.1)

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

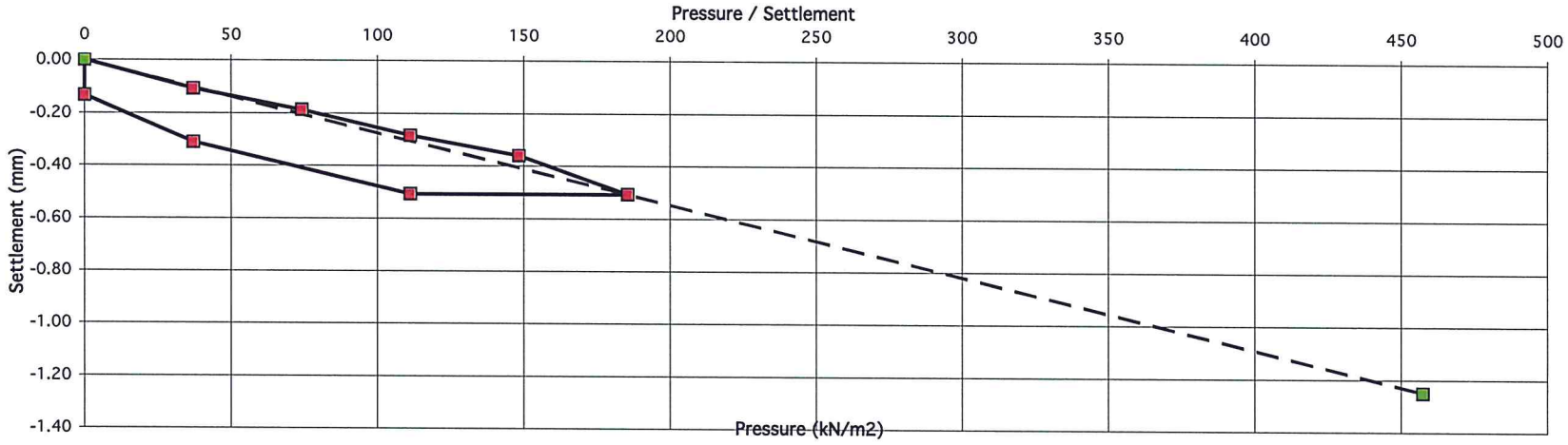
Reference No.	R80206
Contract	Capdoo Clane
Test No.	CBR05 reload
Location	687675.325, 728552.346, 73.248
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	20-06-17

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 %

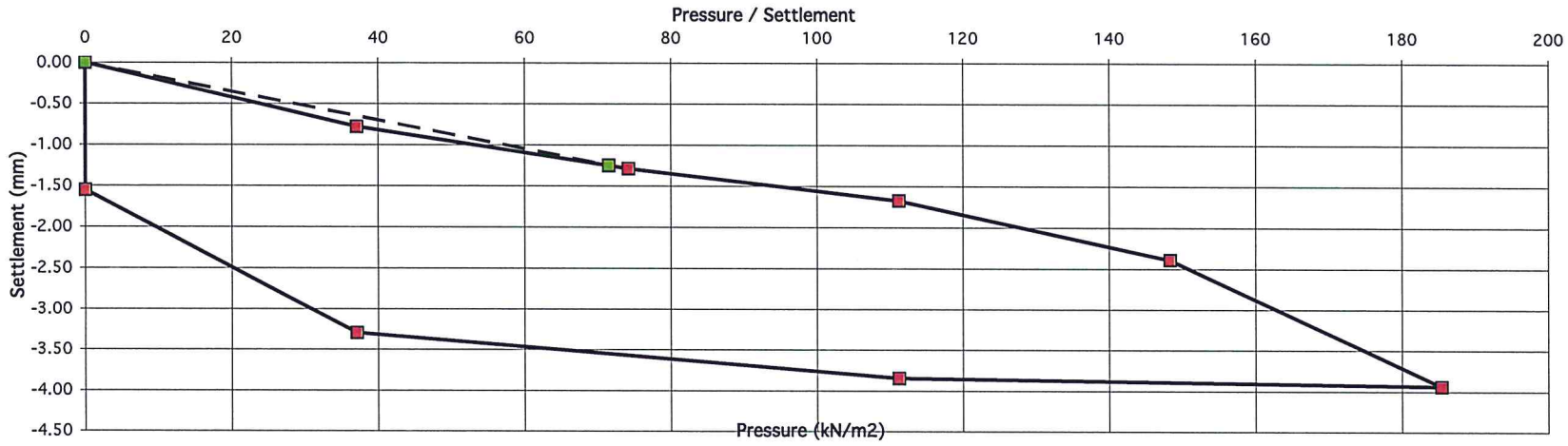
PLATE TEST REPORT SHEET (F3.1)

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 %

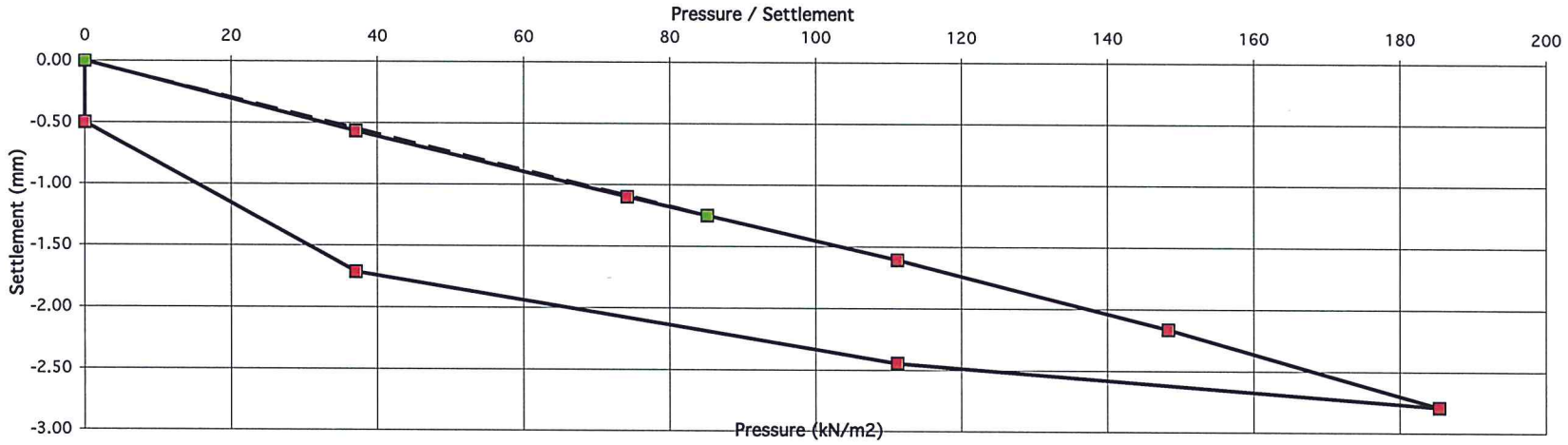
PLATE TEST REPORT SHEET (F3.1)

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 %

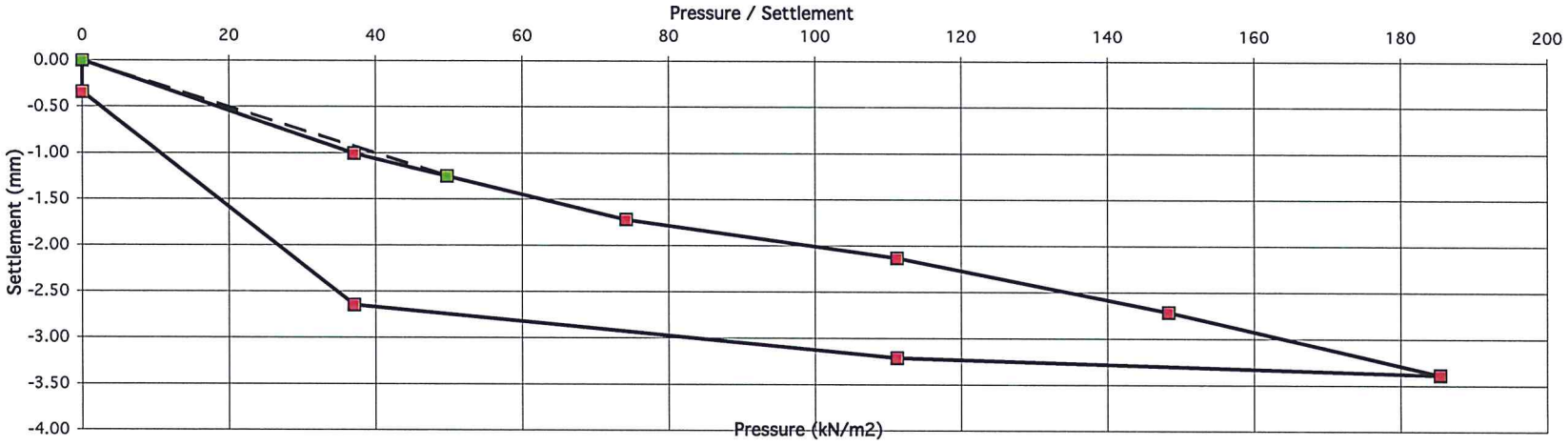
PLATE TEST REPORT SHEET (F3.1)

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 %

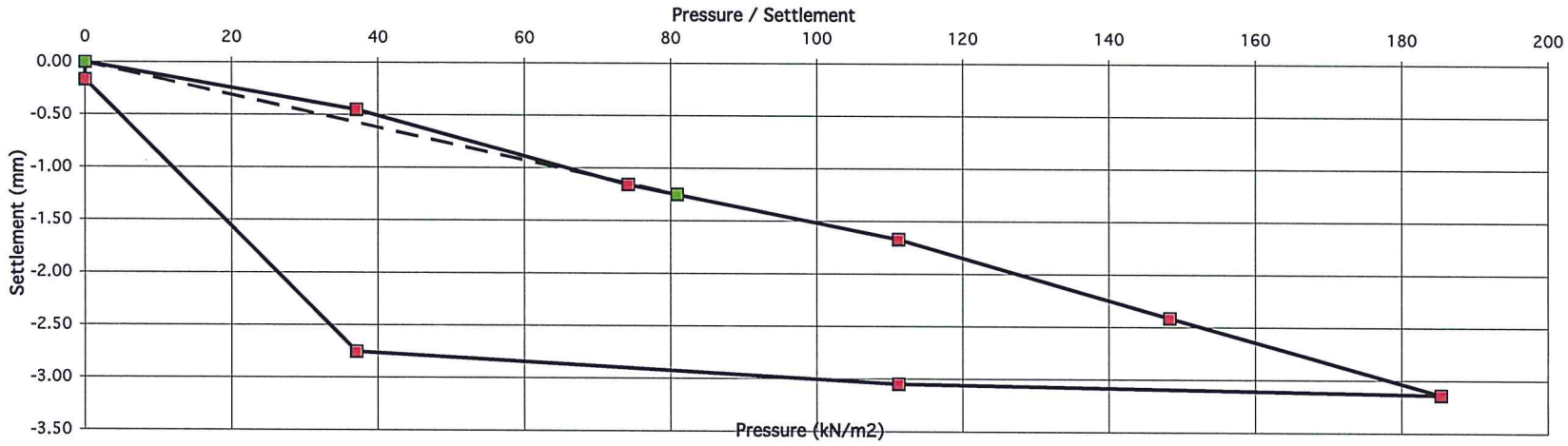
PLATE TEST REPORT SHEET (F3.1)

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)

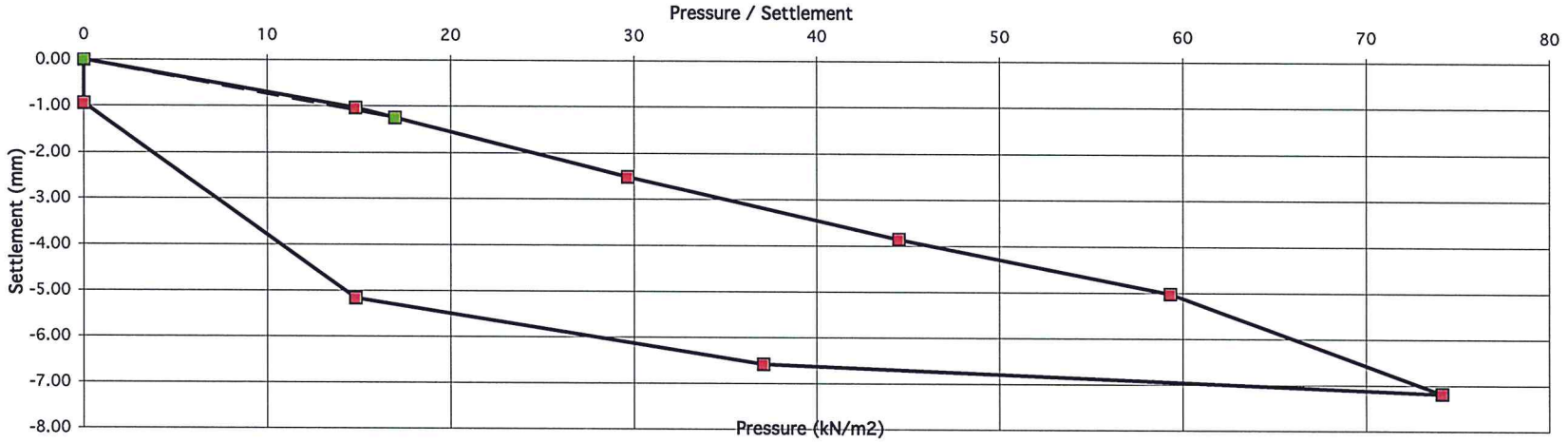
Applied Pressure/Settlement Curve

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

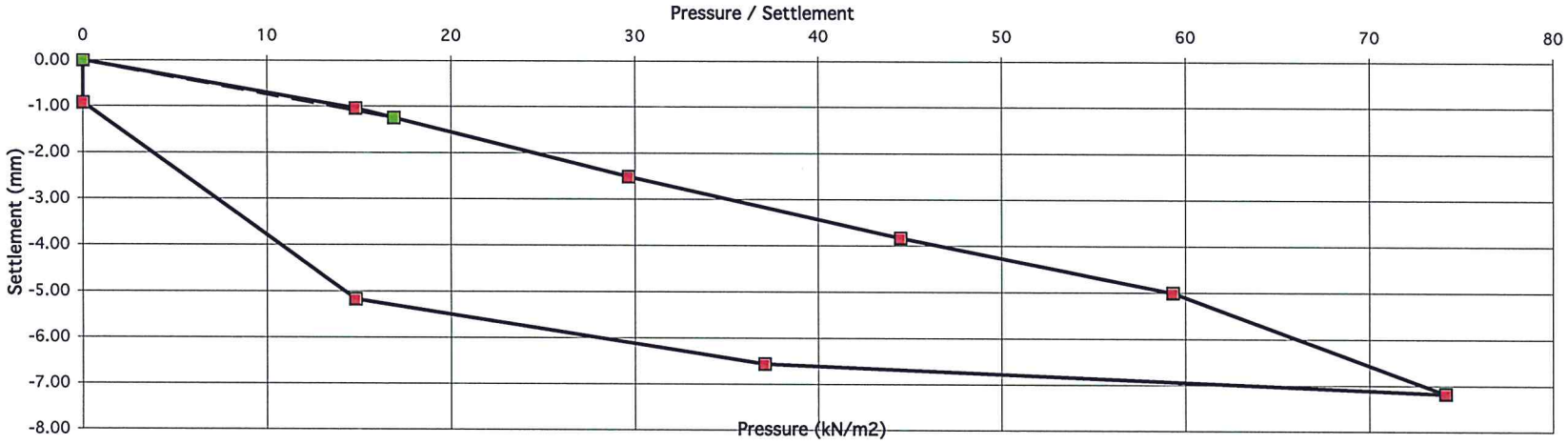
Reference No.	R80209
Contract	Capdoo Clane
Test No.	CBR08 reload
Location	687797.840, 728530.324, 67.431
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

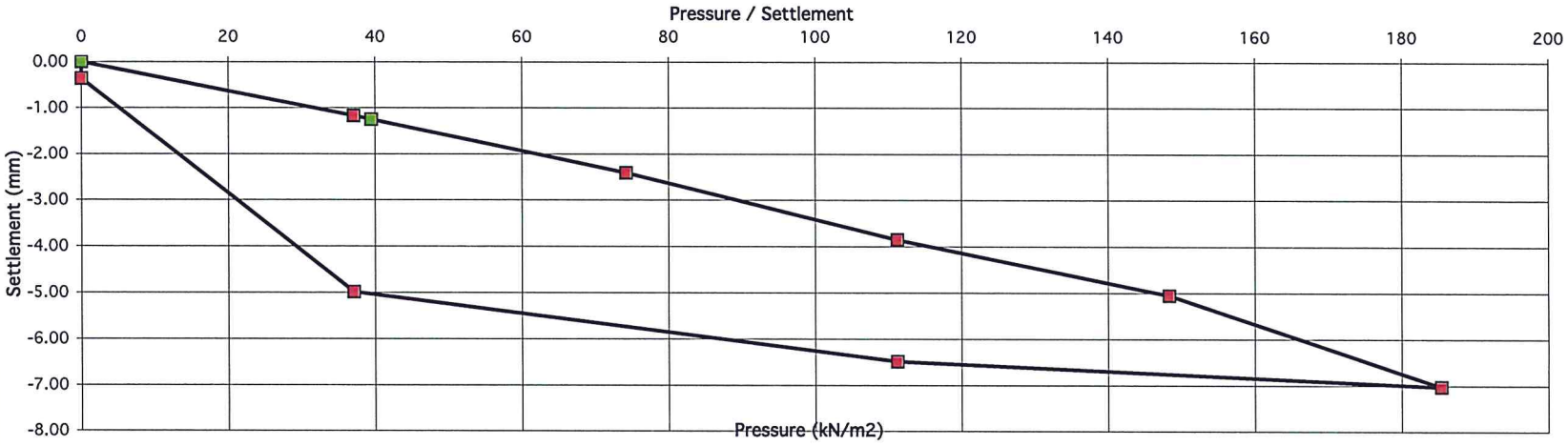
Applied Pressure/Settlement Curve

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)

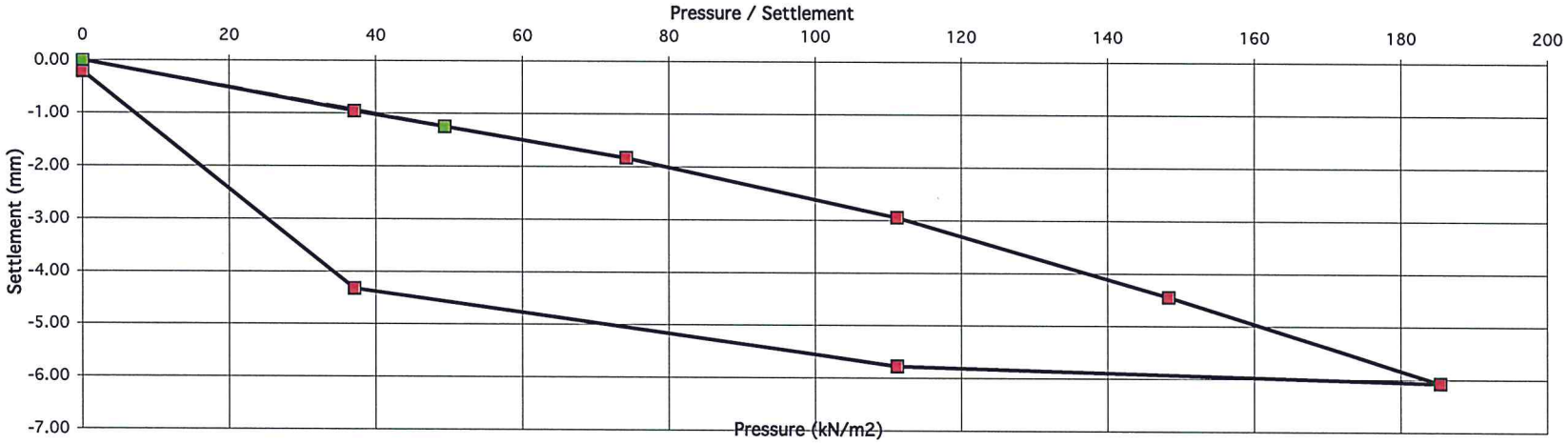
Applied Pressure/Settlement Curve

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)

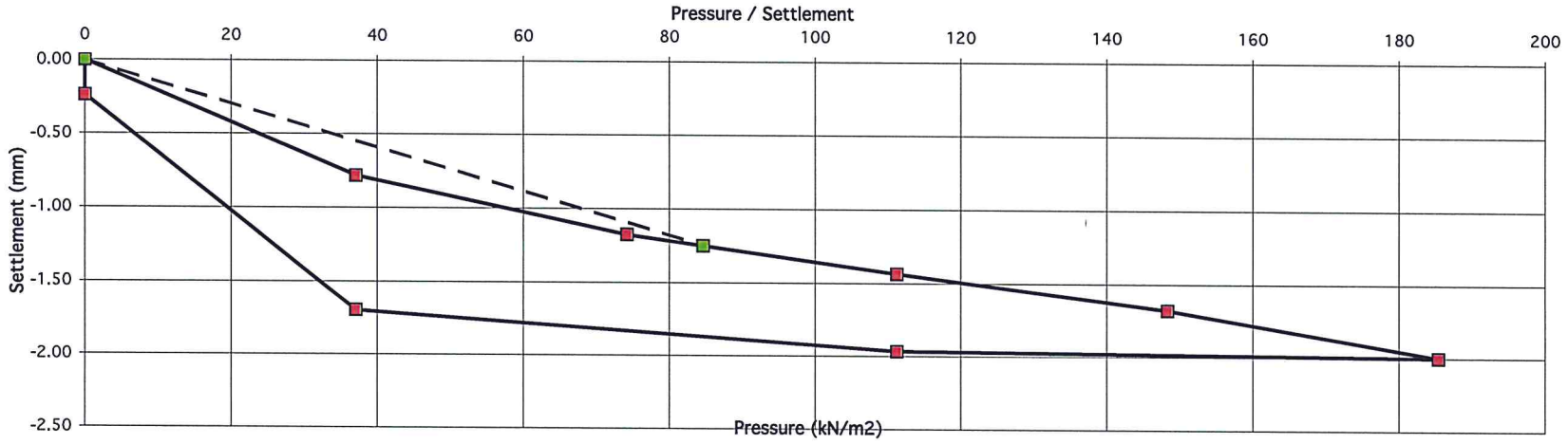
Applied Pressure/Settlement Curve

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

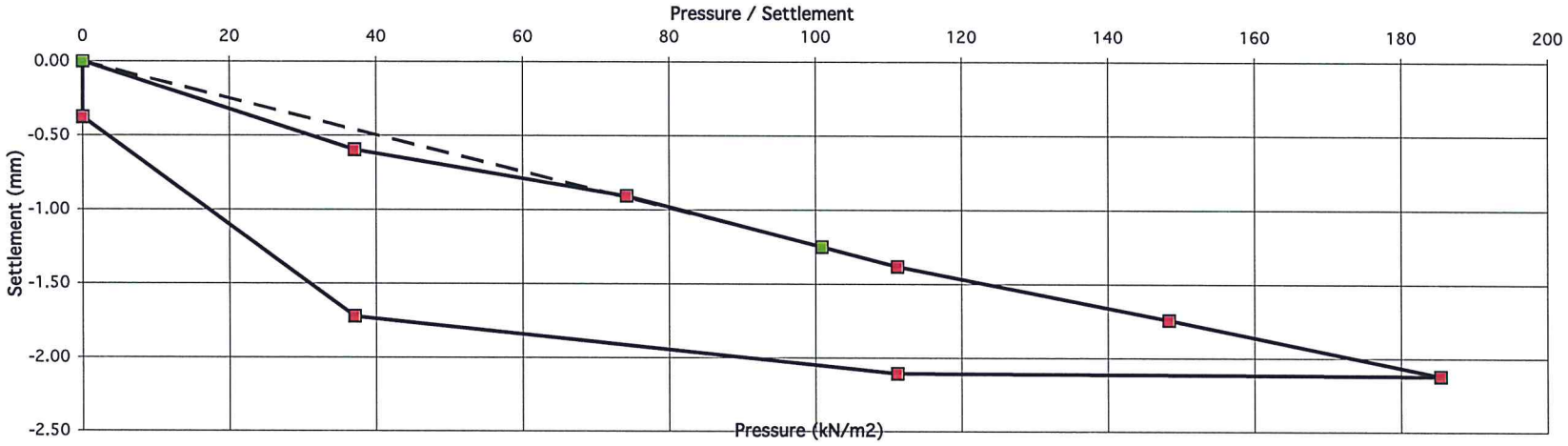
Reference No.	R80211
Contract	Capdoo Clane
Test No.	CBR10 reload
Location	687877.151, 728463.847, 67.959
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

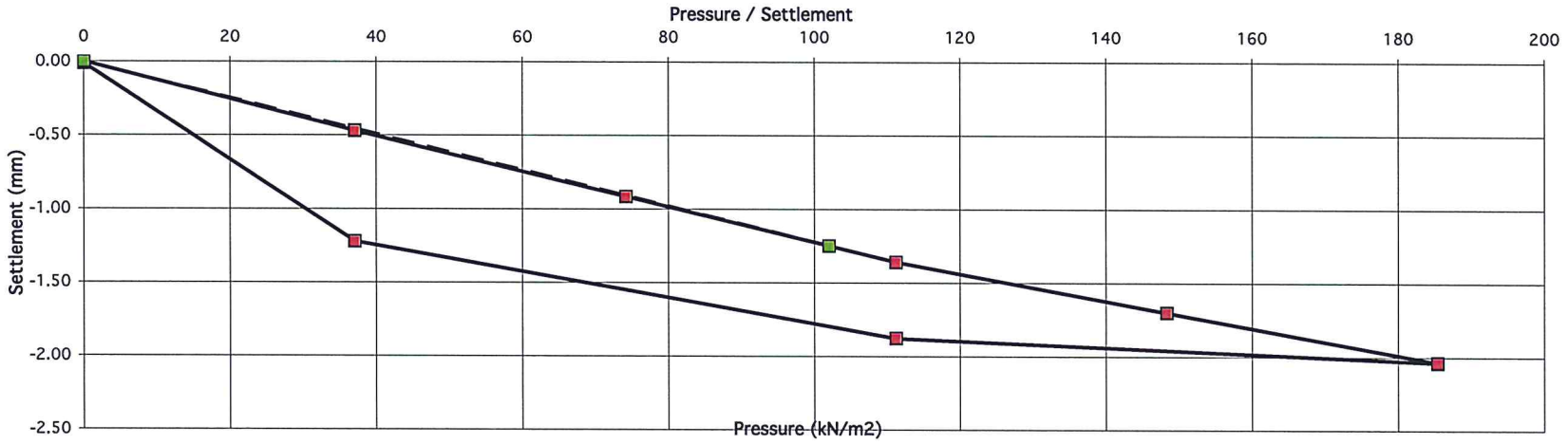
Reference No.	R80212
Contract	Capdoo Clane
Test No.	CBR11
Location	687789.531, 728406.658, 68.844
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

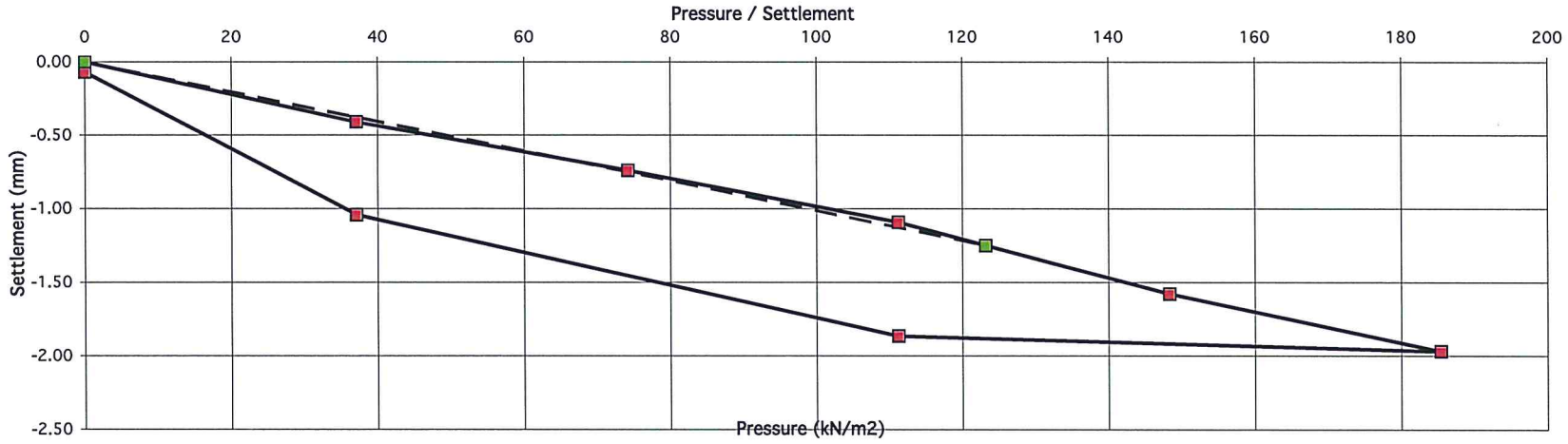
Reference No.	R80208
Contract	Capdoo Clane
Test No.	CBR11 reload
Location	687789.531, 728406.658, 68.844
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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 %

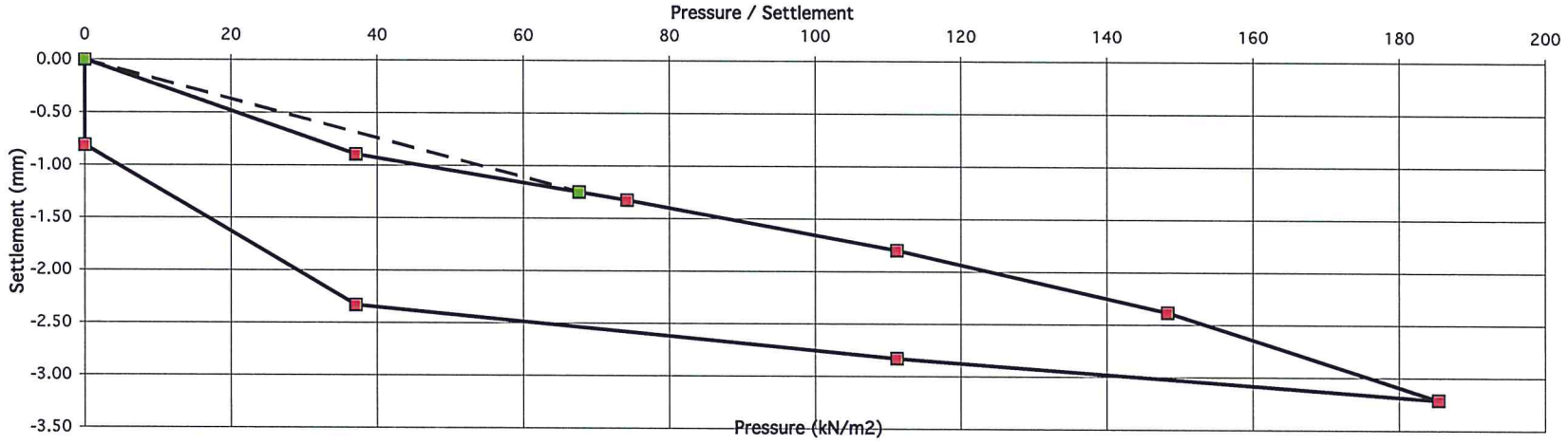
PLATE TEST REPORT SHEET (F3.1)

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

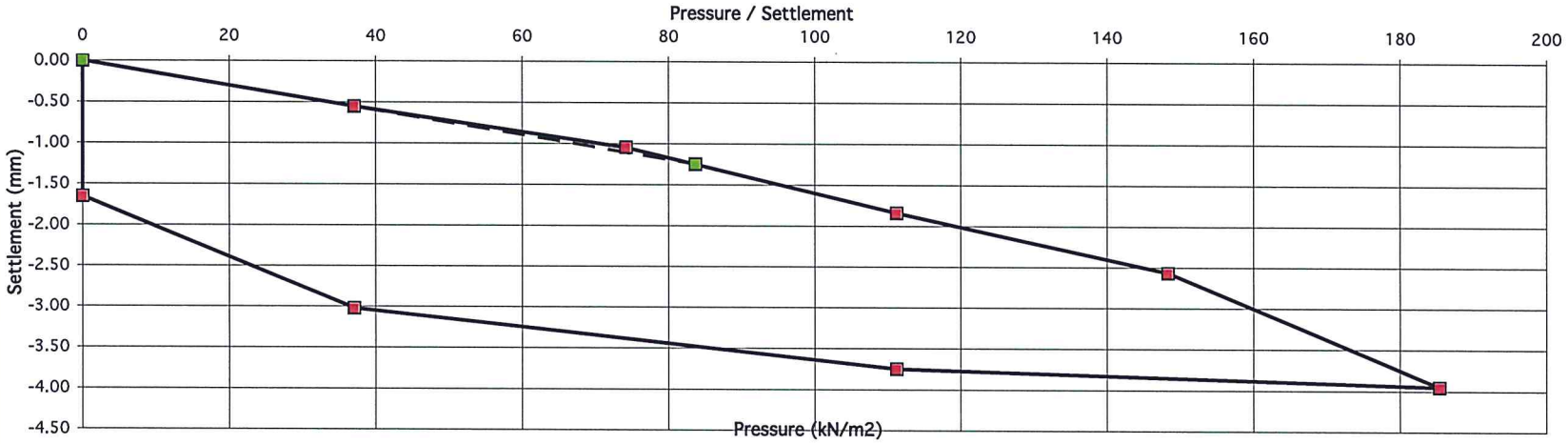
Reference No.	R80213
Contract	Capdoo Clane
Test No.	CBR12 reload
Location	687730.464, 728407.565, 72.162
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

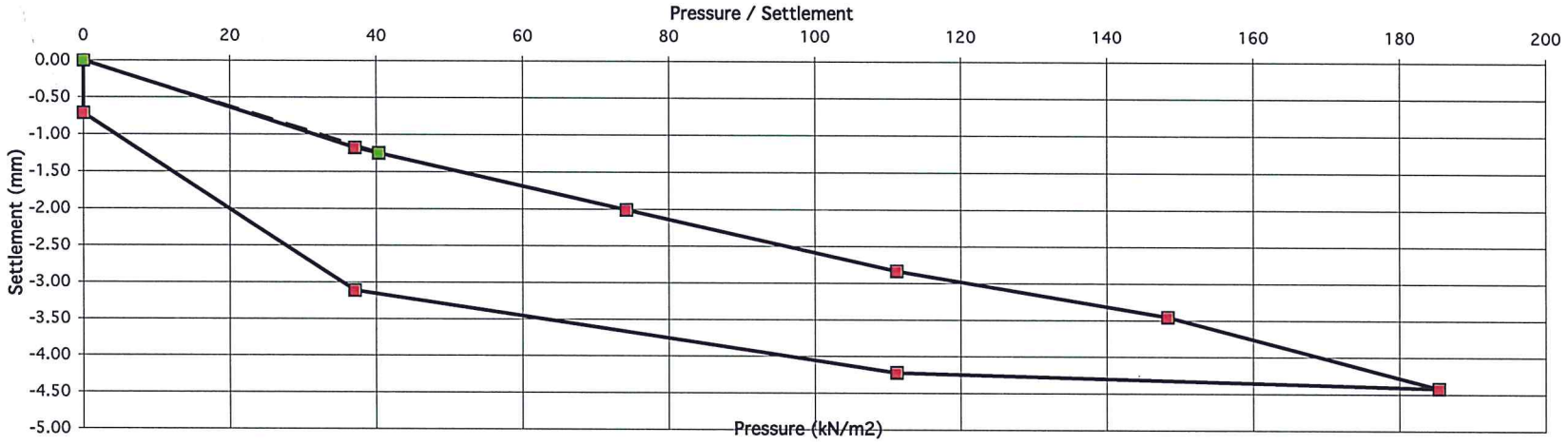
Reference No.	R80214
Contract	Capdoo Clane
Test No.	CBR13
Location	687654.908, 728465.015, 77.296
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

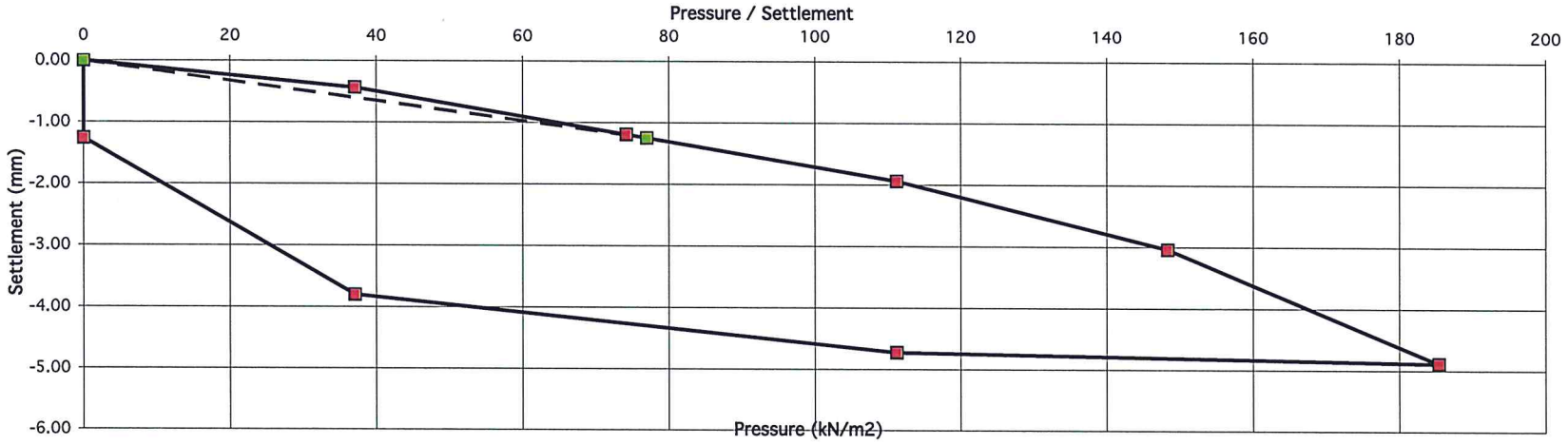
Reference No.	R80214
Contract	Capdoo Clane
Test No.	CBR13 reload
Location	687654.908, 728465.015, 77.296
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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 %

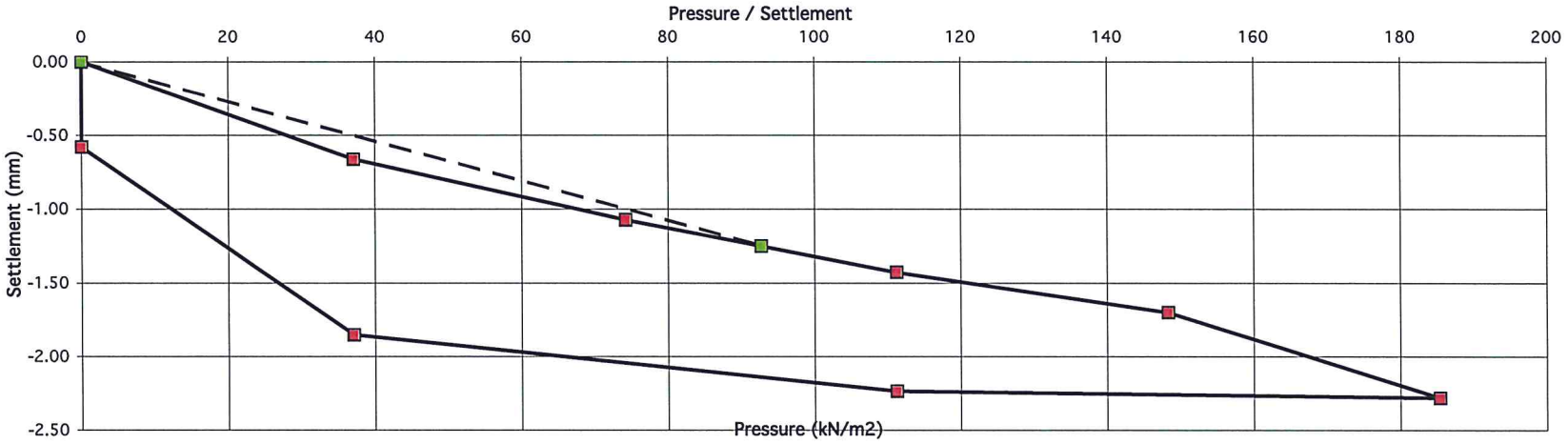
PLATE TEST REPORT SHEET (F3.1)

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

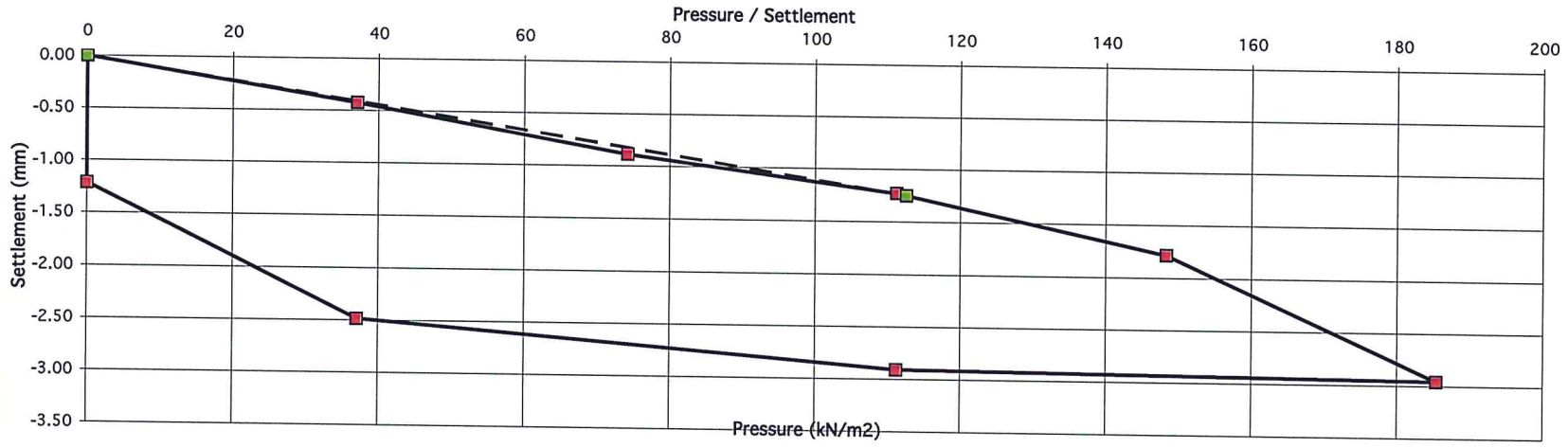
Applied Pressure/Settlement Curve

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)

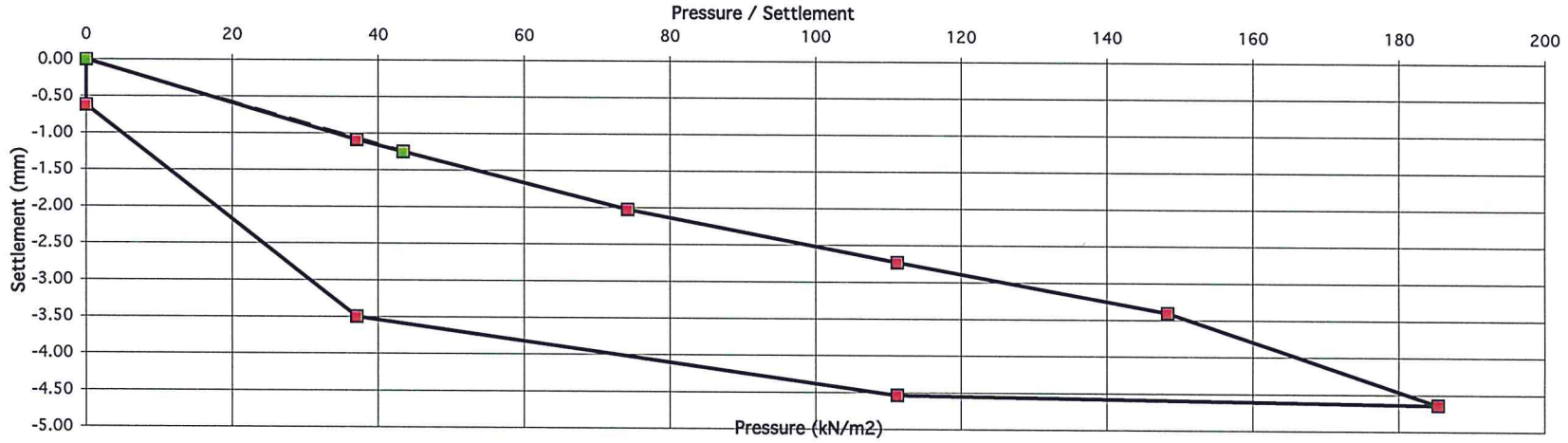
Applied Pressure/Settlement Curve

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)

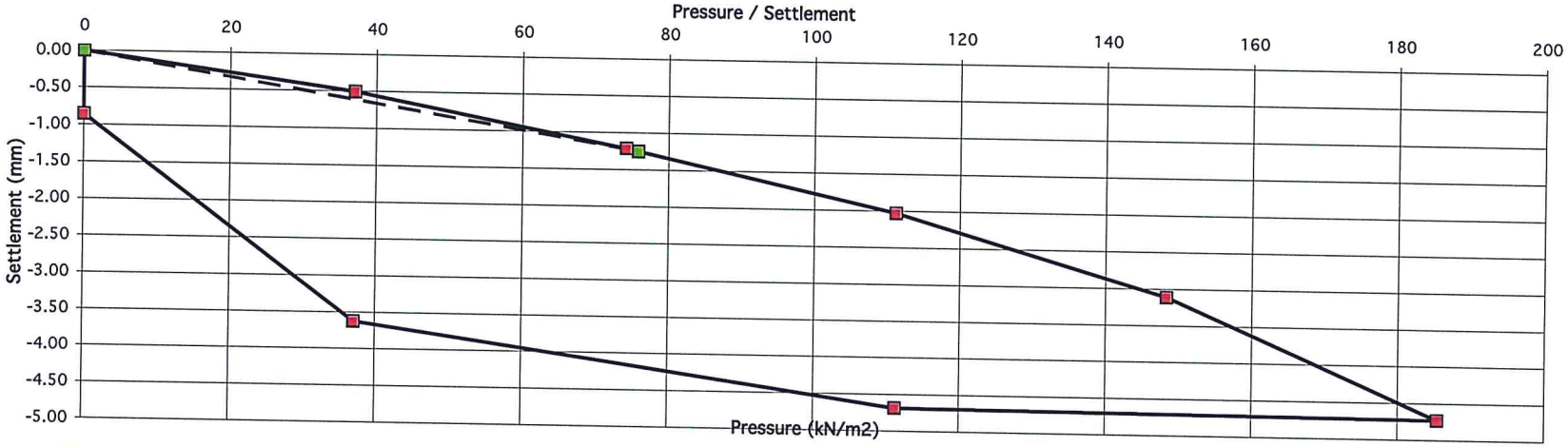
Reference No.	R80216
Contract	Capdoo Clane
Test No.	CBR16 reload
Location	687648.389, 728374.574, 75.477
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

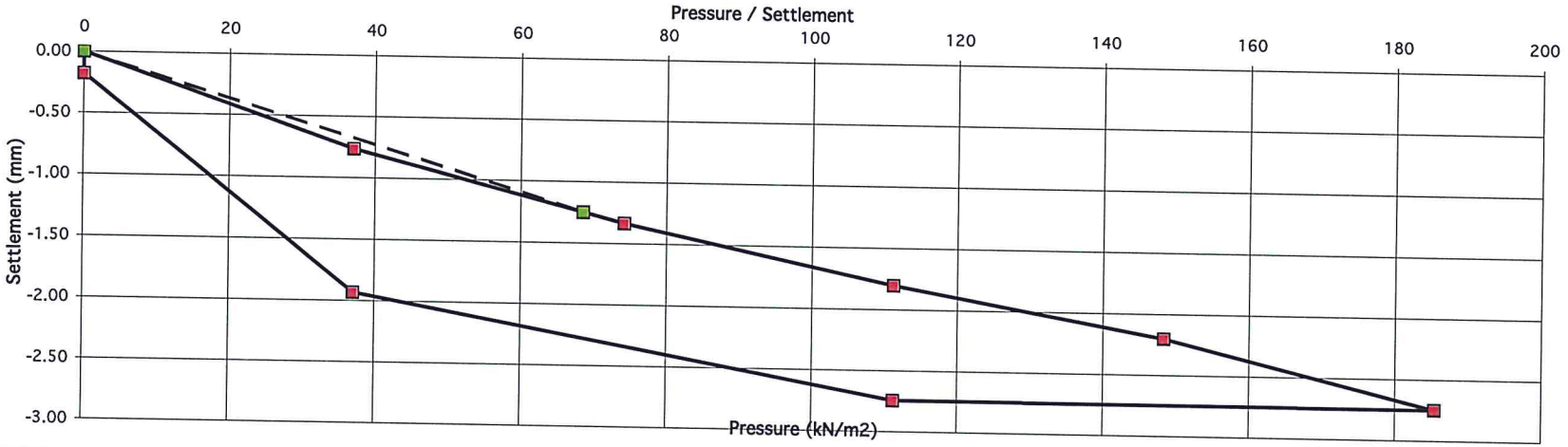
Reference No.	R80217
Contract	Capdoo Clane
Test No.	CBR17
Location	687599.217, 728320.626, 75.167
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

Applied Pressure/Settlement Curve

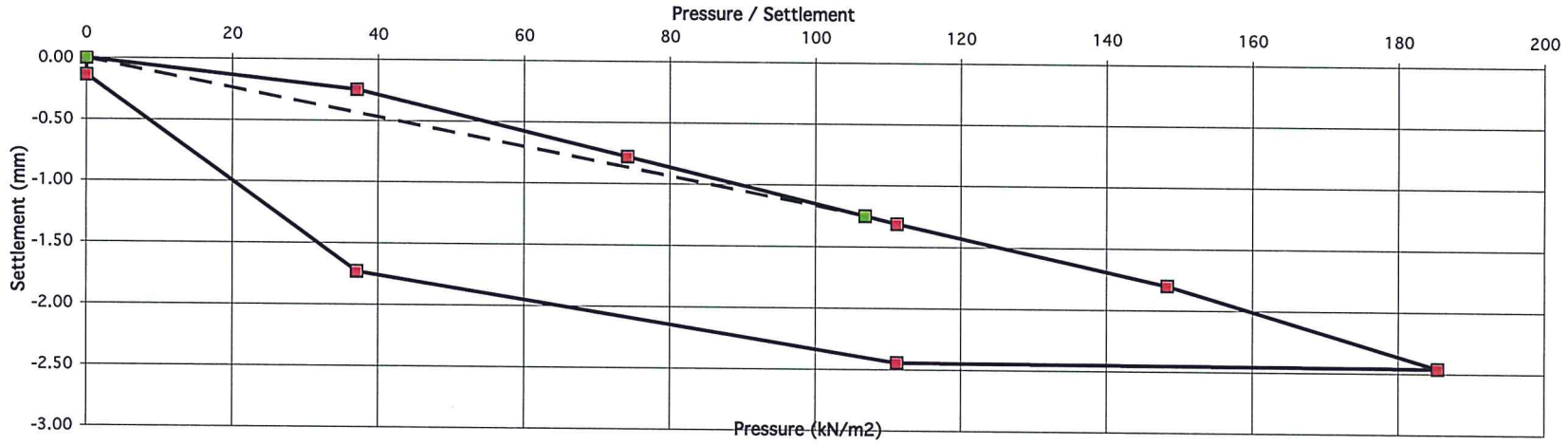
Reference No.	R80217
Contract	Capdoo Clane
Test No.	CBR17 reload
Location	687599.217, 728320.626, 75.167
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

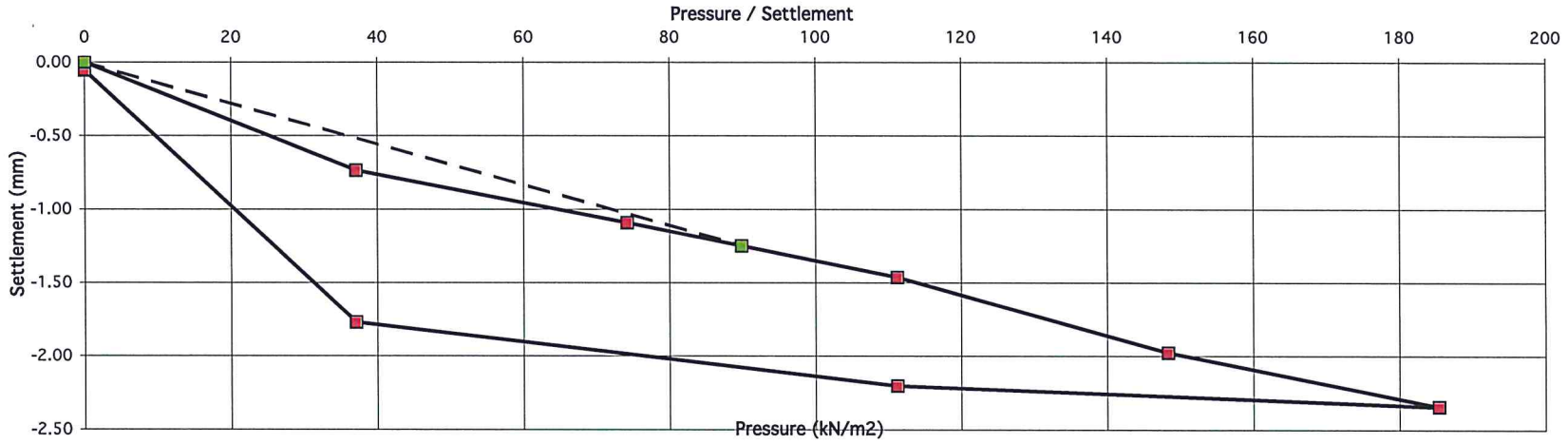
Reference No.	R80218
Contract	Capdoo Clane
Test No.	CBR18
Location	687662.505, 728326.399, 73.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

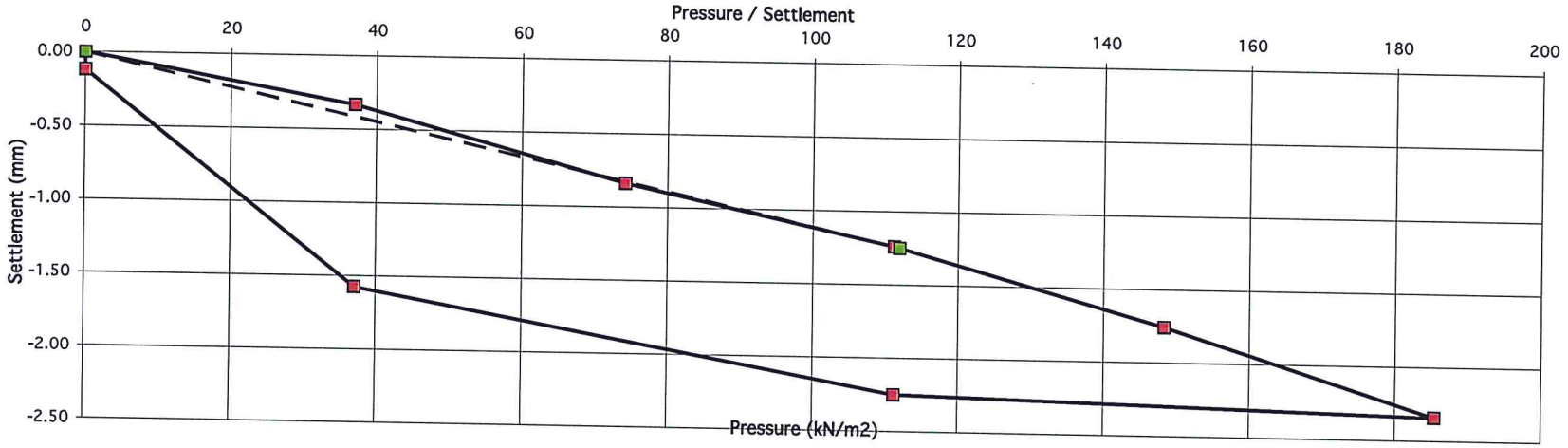
Reference No.	R80218
Contract	Capdoo Clane
Test No.	CBR18 reload
Location	687662.505, 728326.399, 73.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

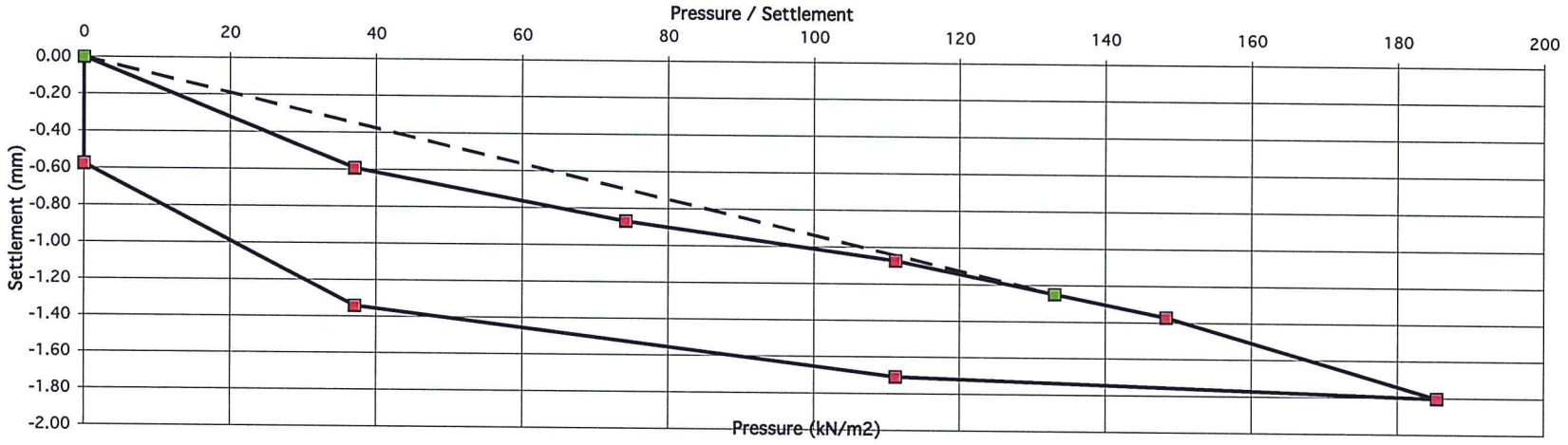
Applied Pressure/Settlement Curve

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

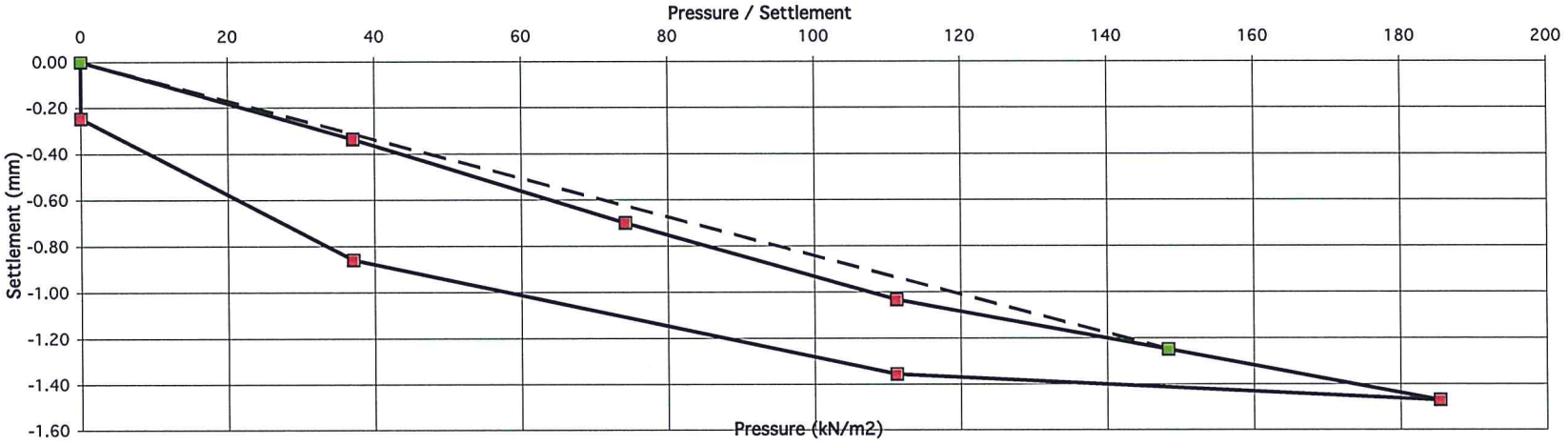
Reference No.	R80219
Contract	Capdoo Clane
Test No.	CBR19 reload
Location	687726.137, 728330.736, 71.323
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

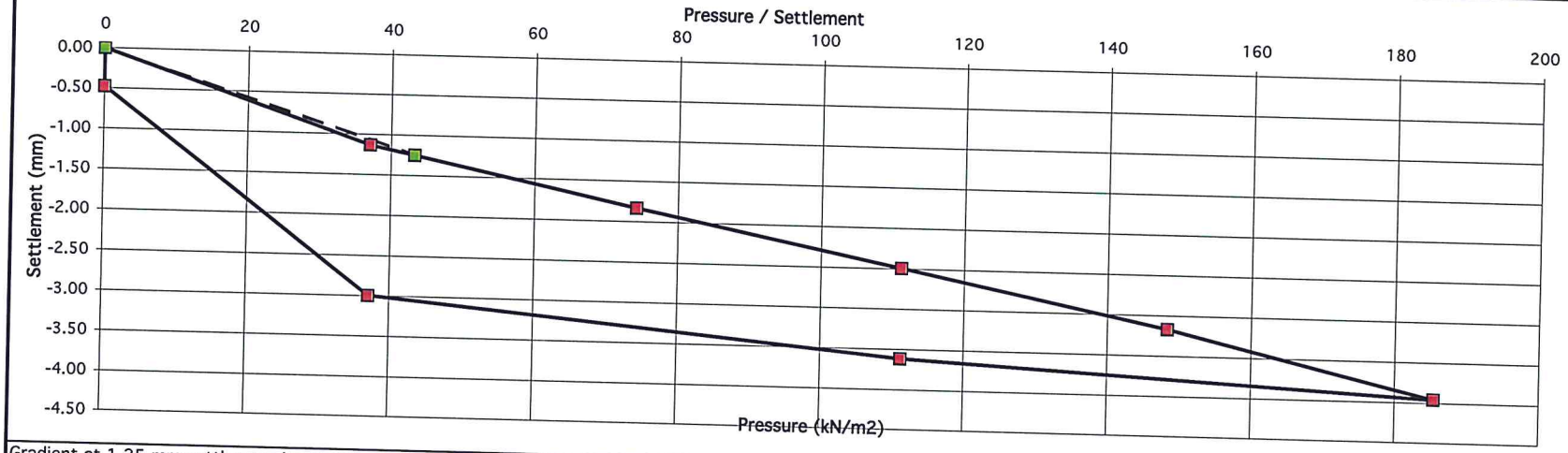
Reference No.	R80220
Contract	Capdoo Clane
Test No.	CBR20
Location	687776.122, 728319.541, 69.608
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

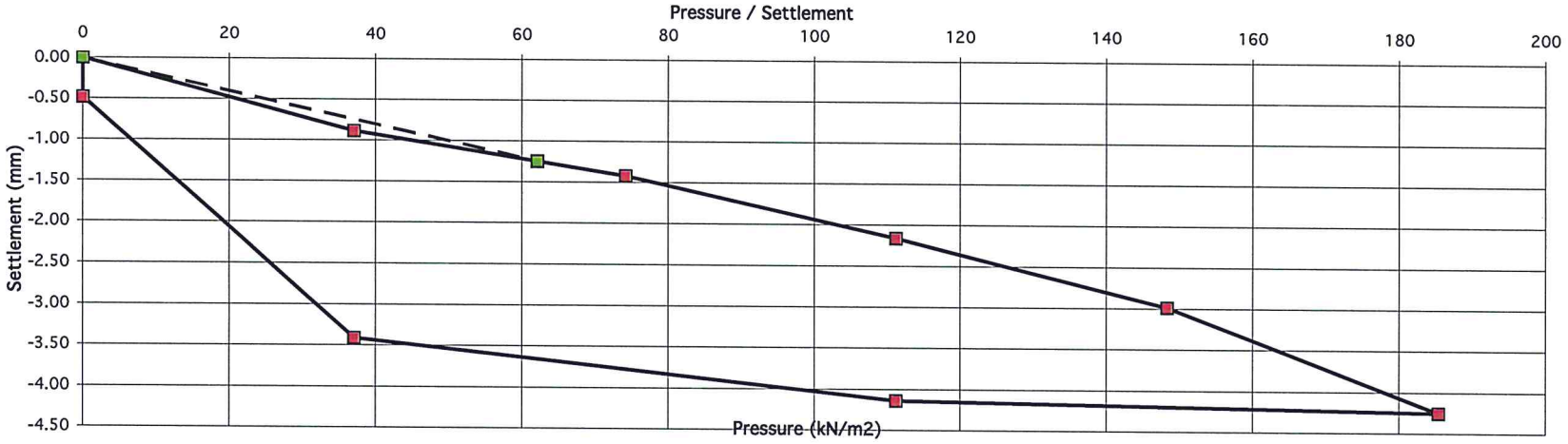
Reference No.	R80220
Contract	Capdoo Clane
Test No.	CBR20 reload
Location	687776.122, 728319.541, 69.608
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

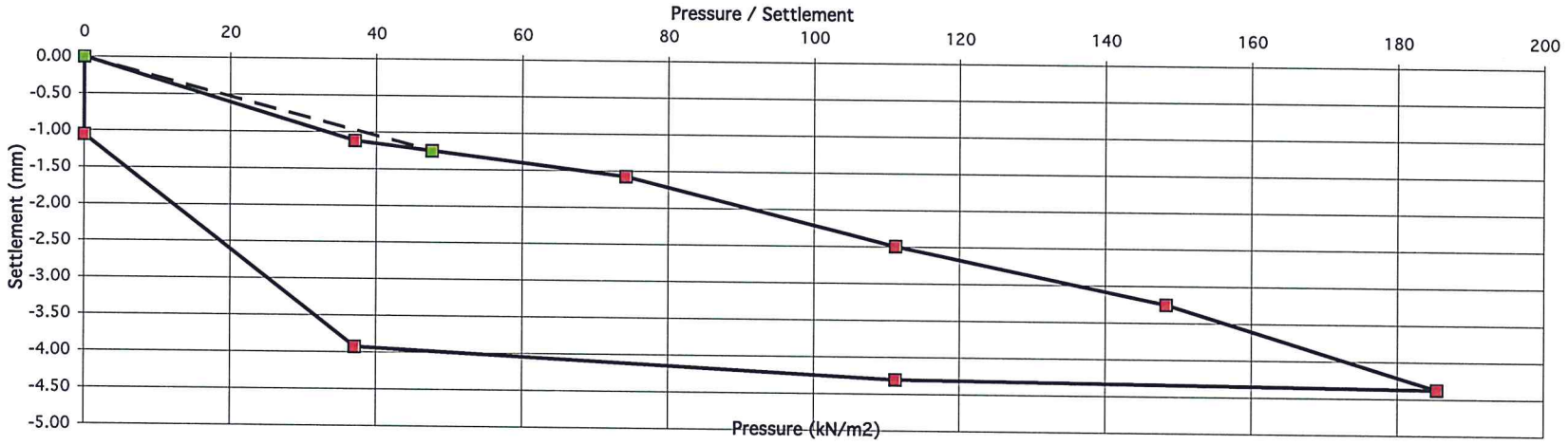
Reference No.	R80221
Contract	Capdoo Clane
Test No.	CBR21
Location	687588.623, 728231.419, 73.716
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

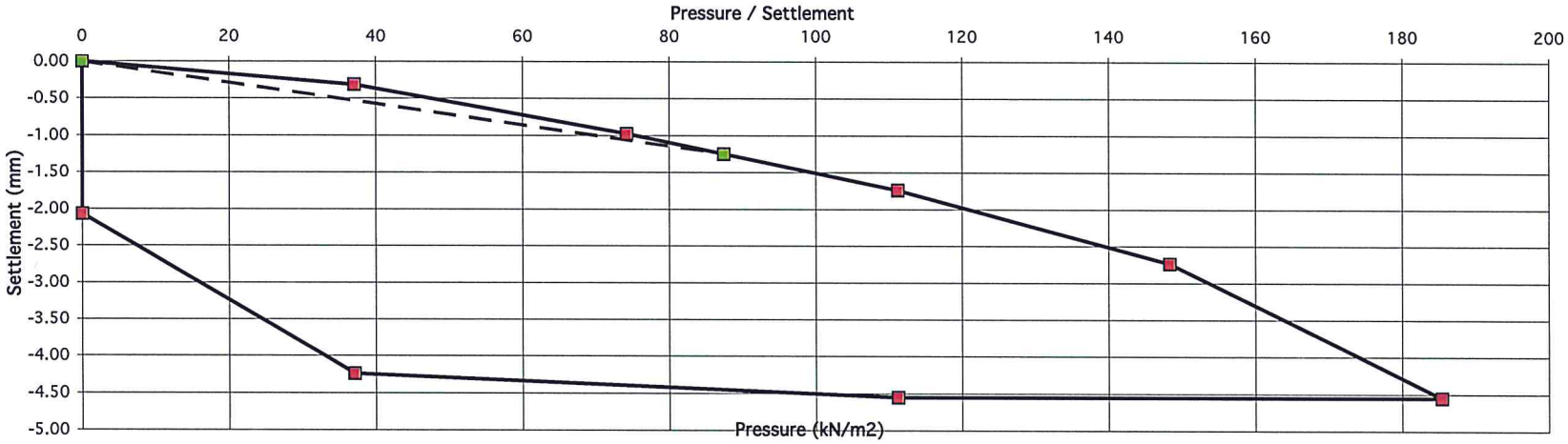
Applied Pressure/Settlement Curve

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

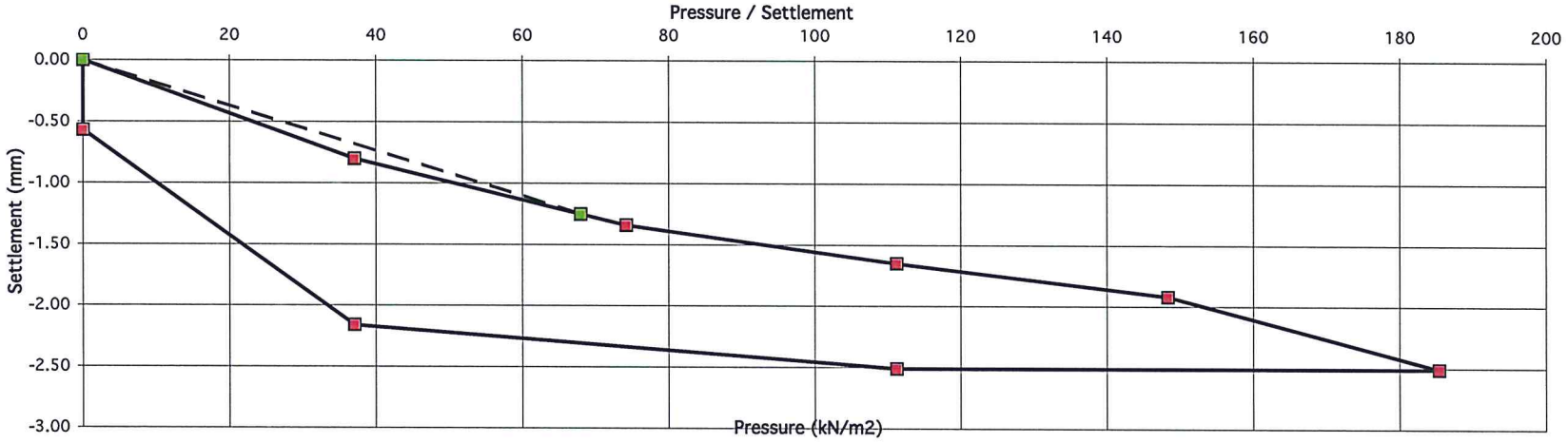
Reference No.	R80222
Contract	Capdoo Clane
Test No.	CBR22
Location	687577.681, 728212.567, 74.216
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

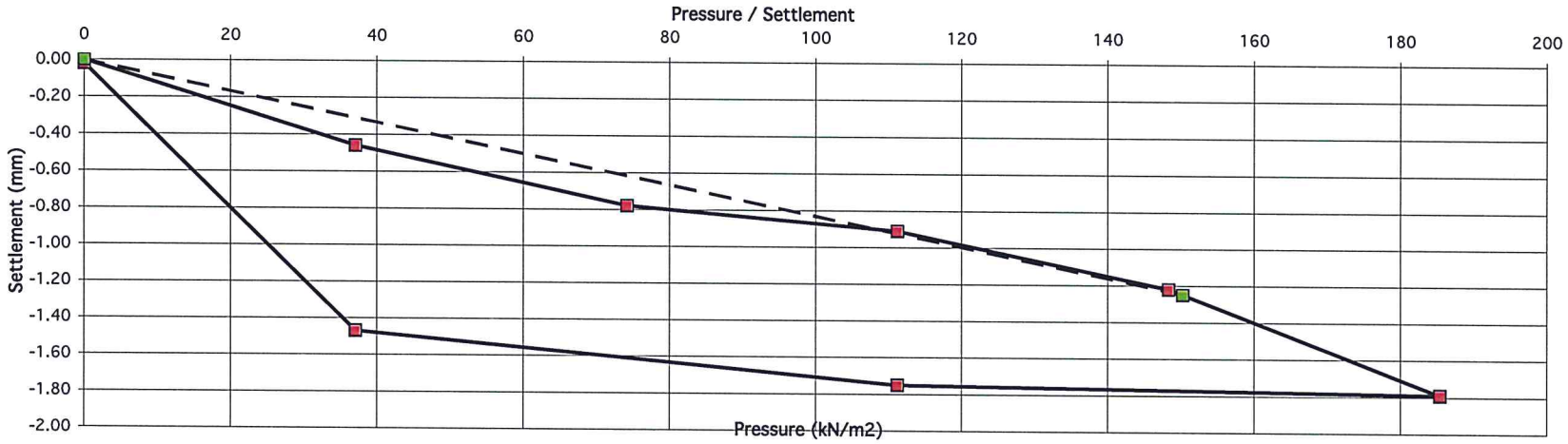
Applied Pressure/Settlement Curve

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)

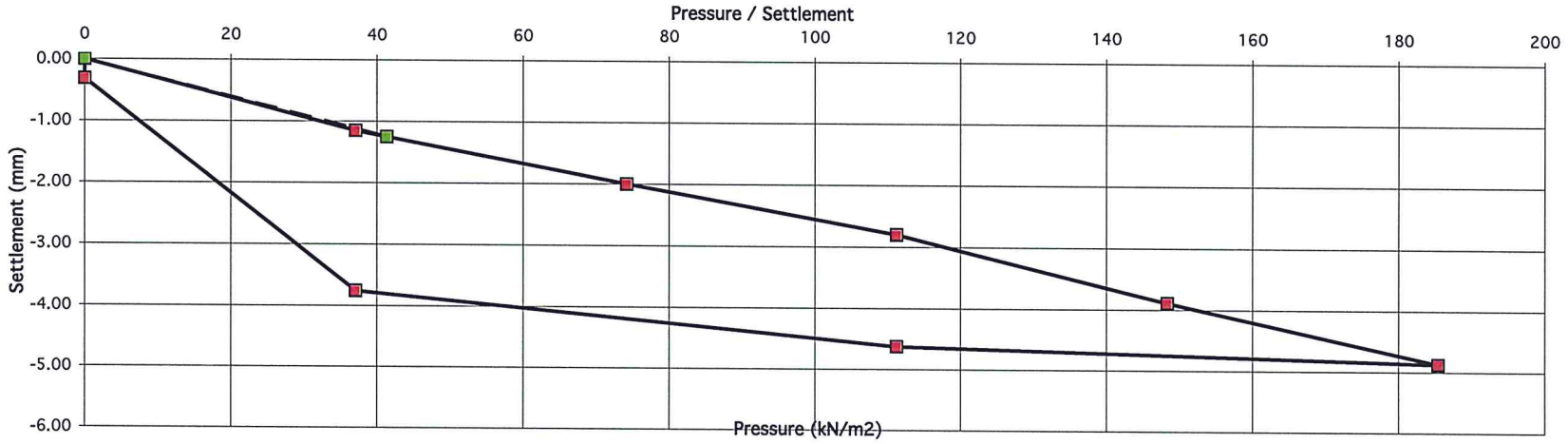
Applied Pressure/Settlement Curve

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

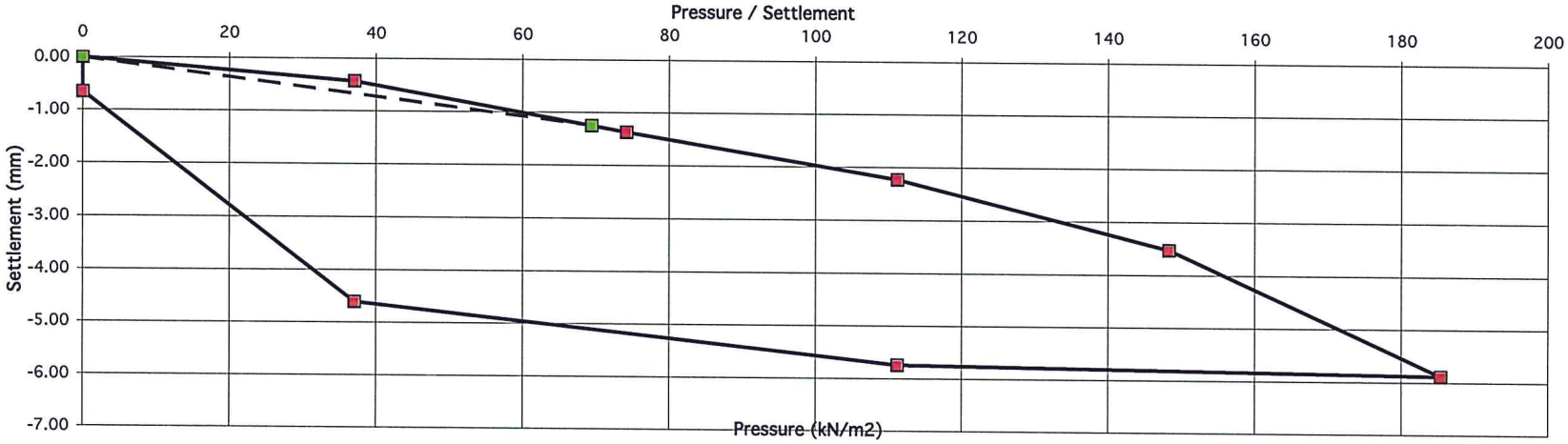
Reference No.	R80223
Contract	Capdoo Clane
Test No.	CBR23 reload
Location	687718.138, 728235.801, 71.321
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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

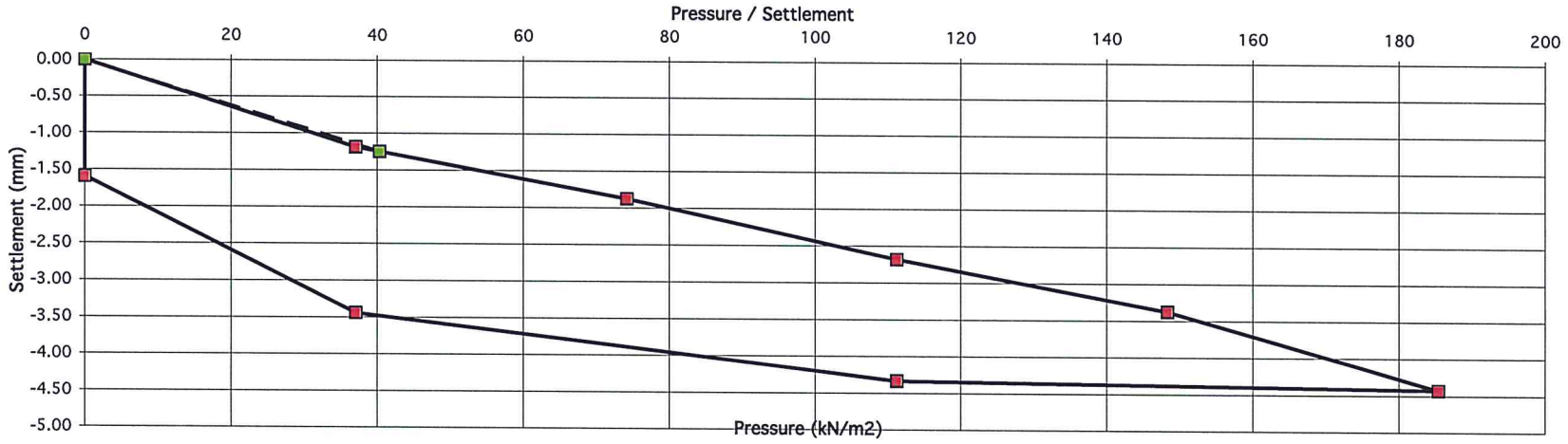
Reference No.	R80224
Contract	Capdoo Clane
Test No.	CBR24
Location	687676.704, 728195.476, 73.912
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	19-06-17

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)

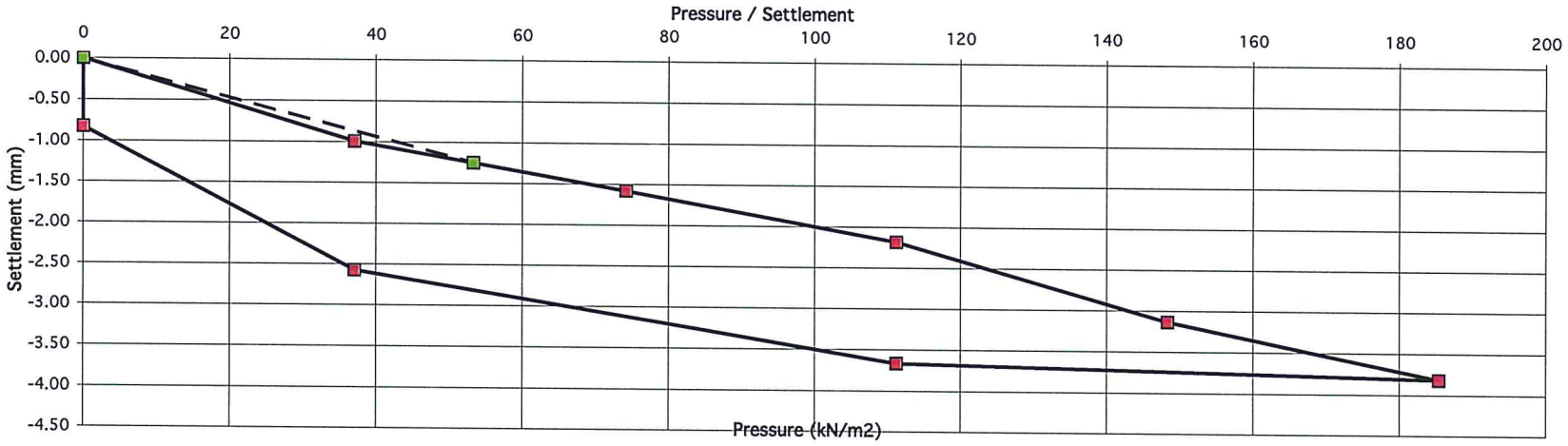
Applied Pressure/Settlement Curve

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

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

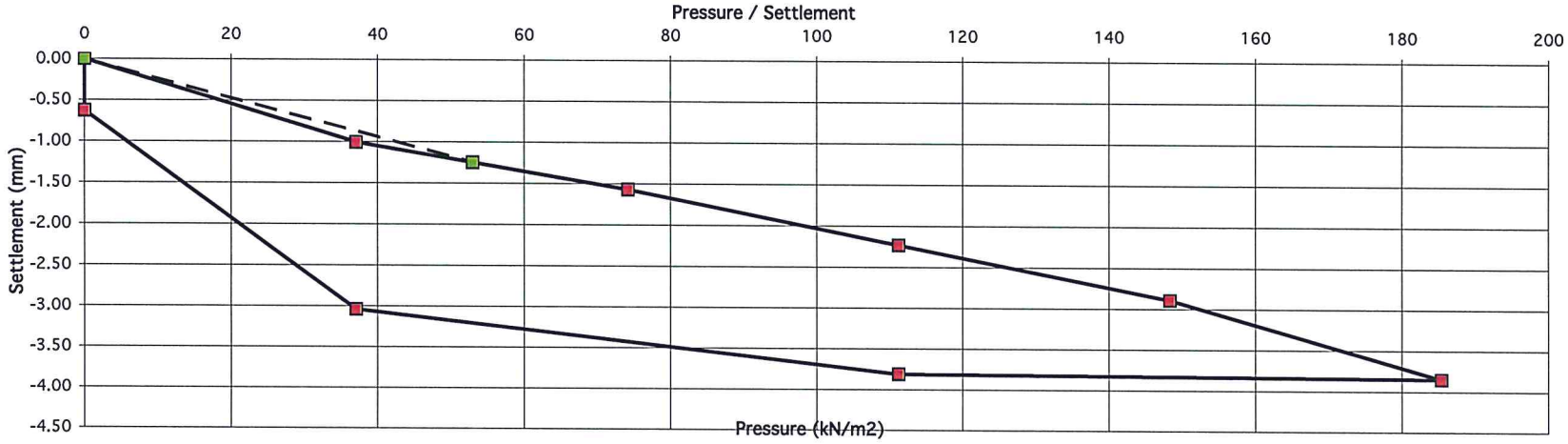
Reference No.	R80225
Contract	Capdoo Clane
Test No.	CBR25
Location	See map
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

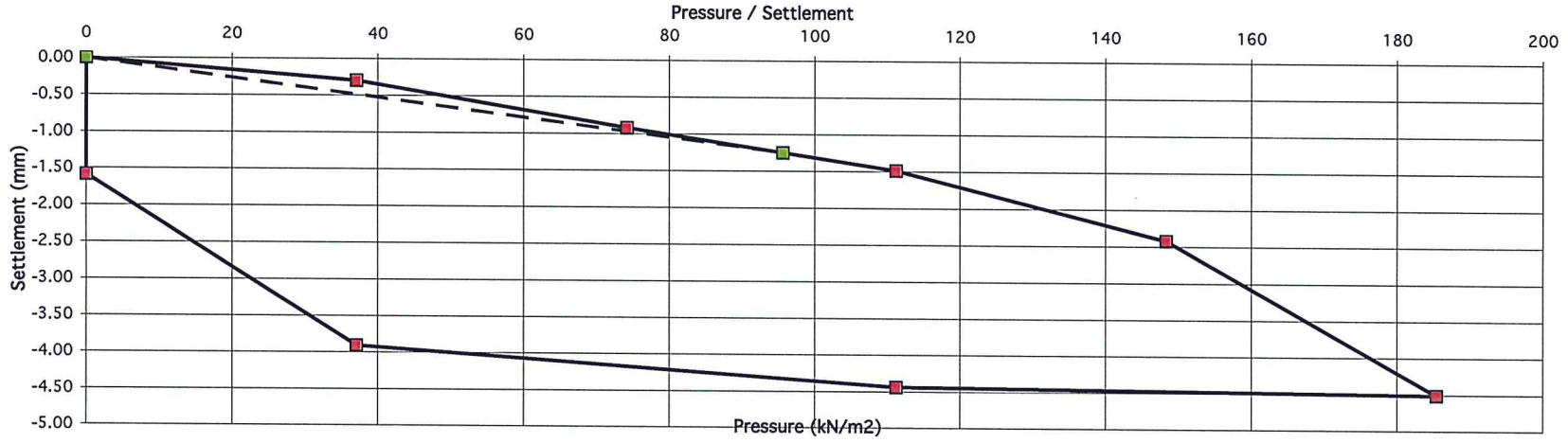
Reference No.	R80225
Contract	Capdoo Clane
Test No.	CBR25 reload
Location	687631.745, 728185.586, 75.104
Depth	0.5m
Client	Ardstone/DBFL
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16-06-17

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

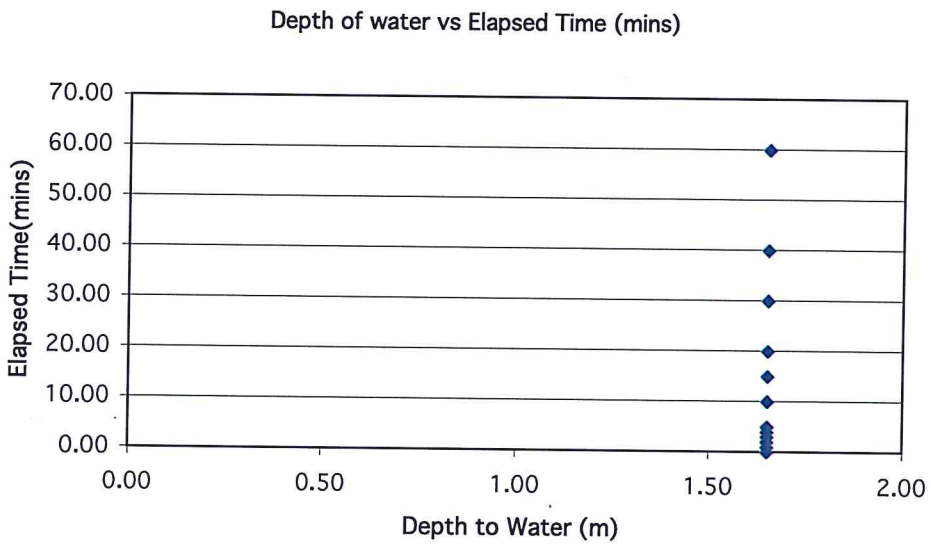
Depth to Water (m)	Elapsed Time (min)
1.65	0.00
1.65	1.00
1.65	2.00
1.65	3.00
1.65	4.00
1.65	5.00
1.65	10.00
1.65	15.00
1.65	20.00
1.65	30.00
1.65	40.00
1.65	60.00

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

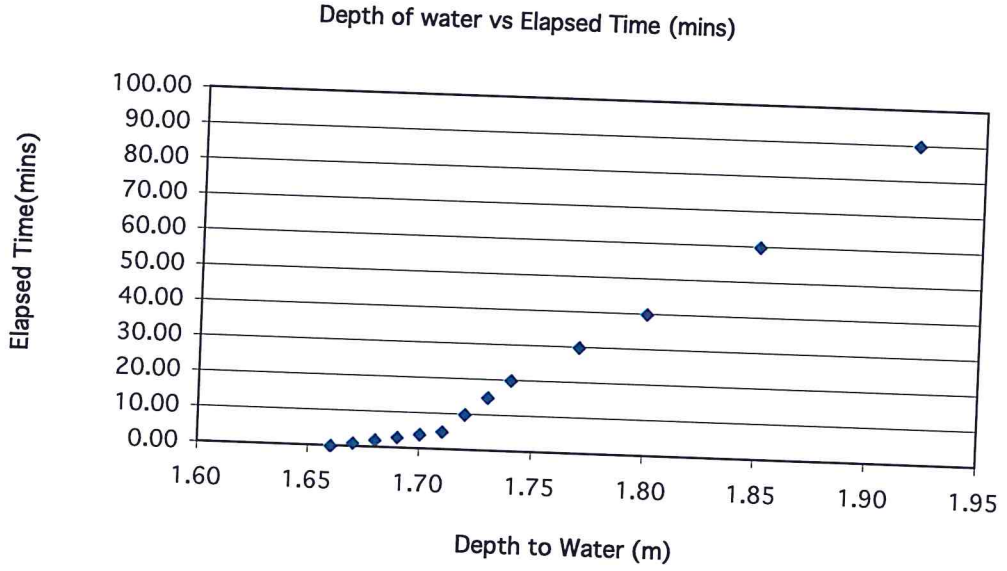
Depth to Water (m)	Elapsed Time (min)
1.66	0.00
1.67	1.00
1.68	2.00
1.69	3.00
1.70	4.00
1.71	5.00
1.72	10.00
1.73	15.00
1.74	20.00
1.77	30.00
1.80	40.00
1.85	60.00
1.92	90.00

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 period	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

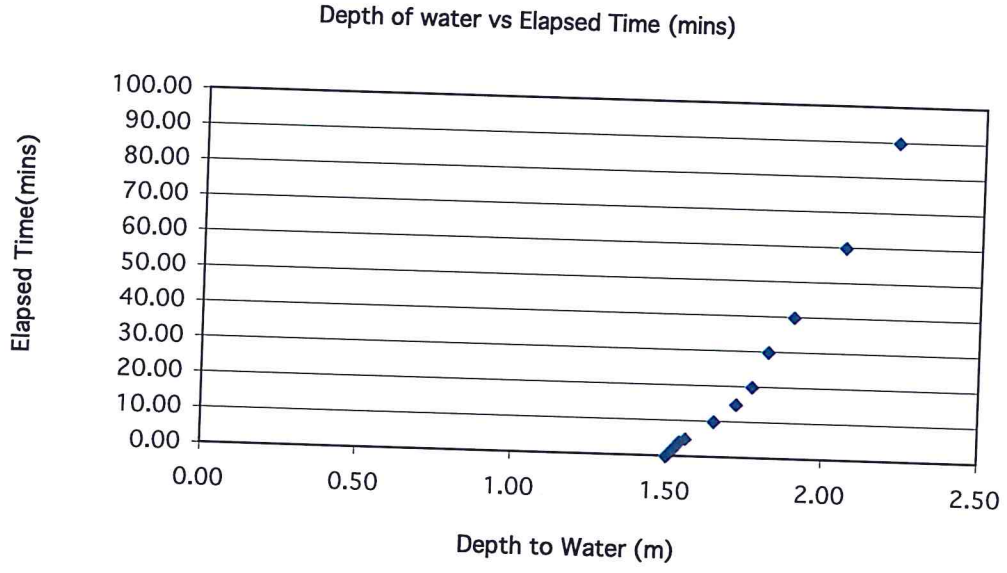
Depth to Water (m)	Elapsed Time (min)
1.50	0.00
1.51	1.00
1.52	2.00
1.53	3.00
1.54	4.00
1.56	5.00
1.65	10.00
1.72	15.00
1.77	20.00
1.82	30.00
1.90	40.00
2.06	60.00
2.22	90.00

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
Test No. IT04
Client Ardstone/DBFL
Date: 21/06/2017

Contract No. 20159

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

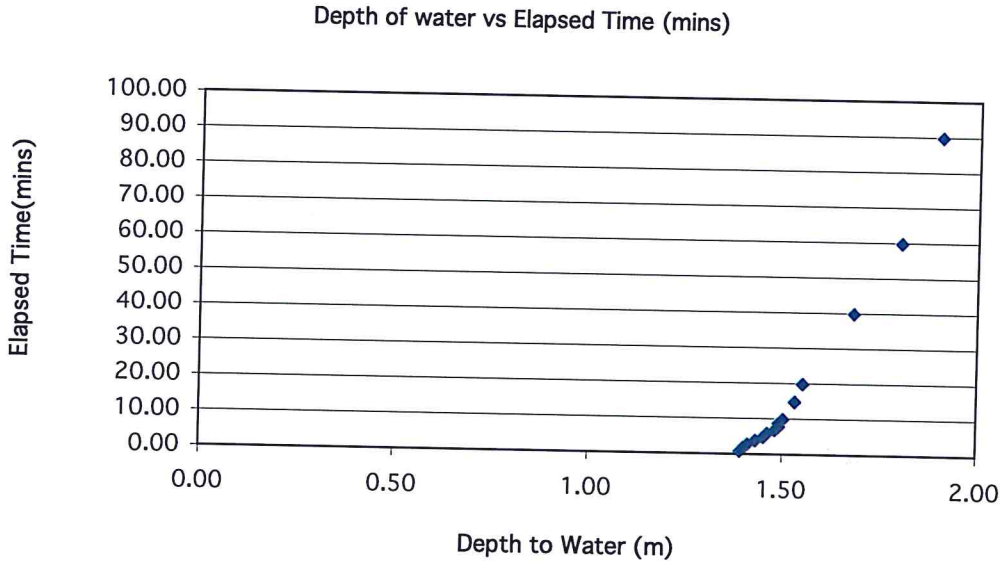
Depth to Water (m)	Elapsed Time (min)
1.38	0.00
1.39	1.00
1.40	2.00
1.41	3.00
1.43	4.00
1.45	5.00
1.46	6.00
1.48	7.00
1.49	8.00
1.49	9.00
1.50	10.00
1.53	15.00
1.55	20.00
1.68	40.00
1.80	60.00
1.90	90.00

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

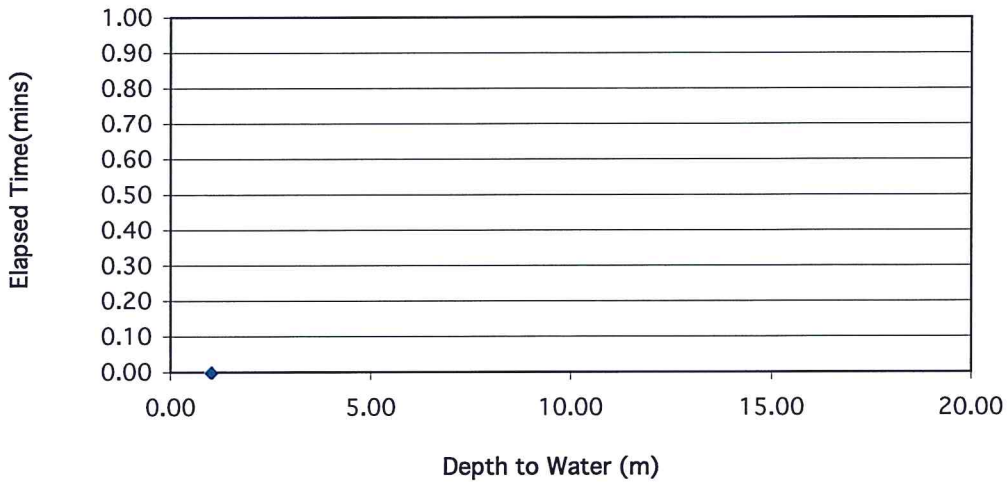
Depth to Water (m)	Elapsed Time (min)
NA	NA

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

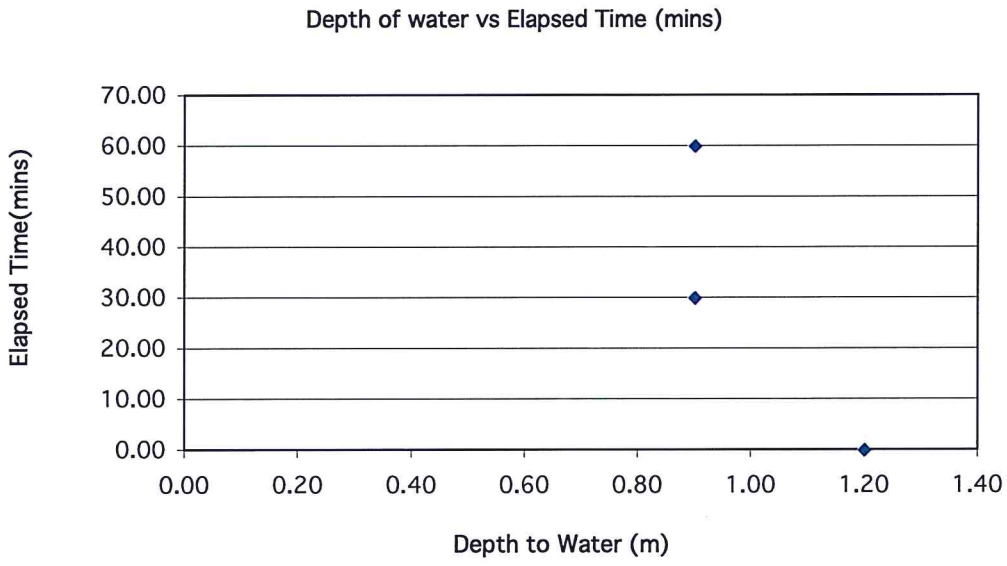
Depth to Water (m)	Elapsed Time (min)
1.20	0.00
0.90	30.00
0.90	60.00

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

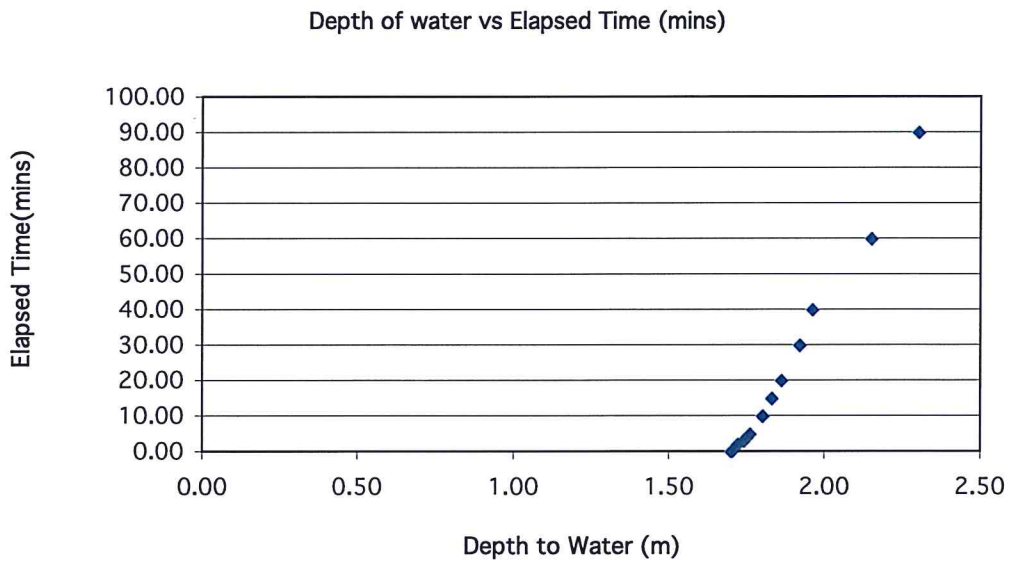
Depth to Water (m)	Elapsed Time (min)
1.70	0.00
1.71	1.00
1.72	2.00
1.74	3.00
1.75	4.00
1.76	5.00
1.80	10.00
1.83	15.00
1.86	20.00
1.92	30.00
1.96	40.00
2.15	60.00
2.30	90.00

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

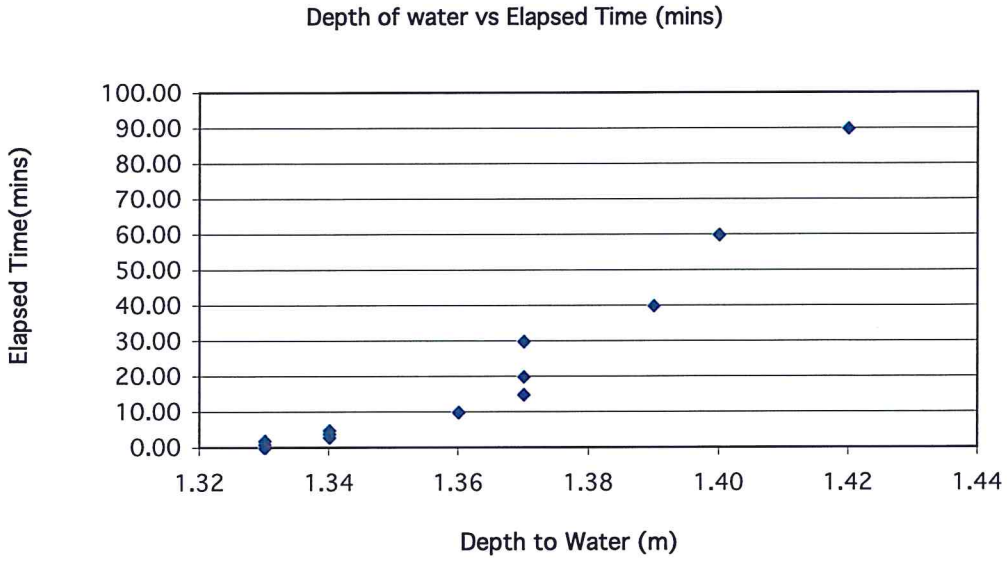
Depth to Water (m)	Elapsed Time (min)
1.33	0.00
1.33	1.00
1.33	2.00
1.34	3.00
1.34	4.00
1.34	5.00
1.36	10.00
1.37	15.00
1.37	20.00
1.37	30.00
1.39	40.00
1.40	60.00
1.42	90.00

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

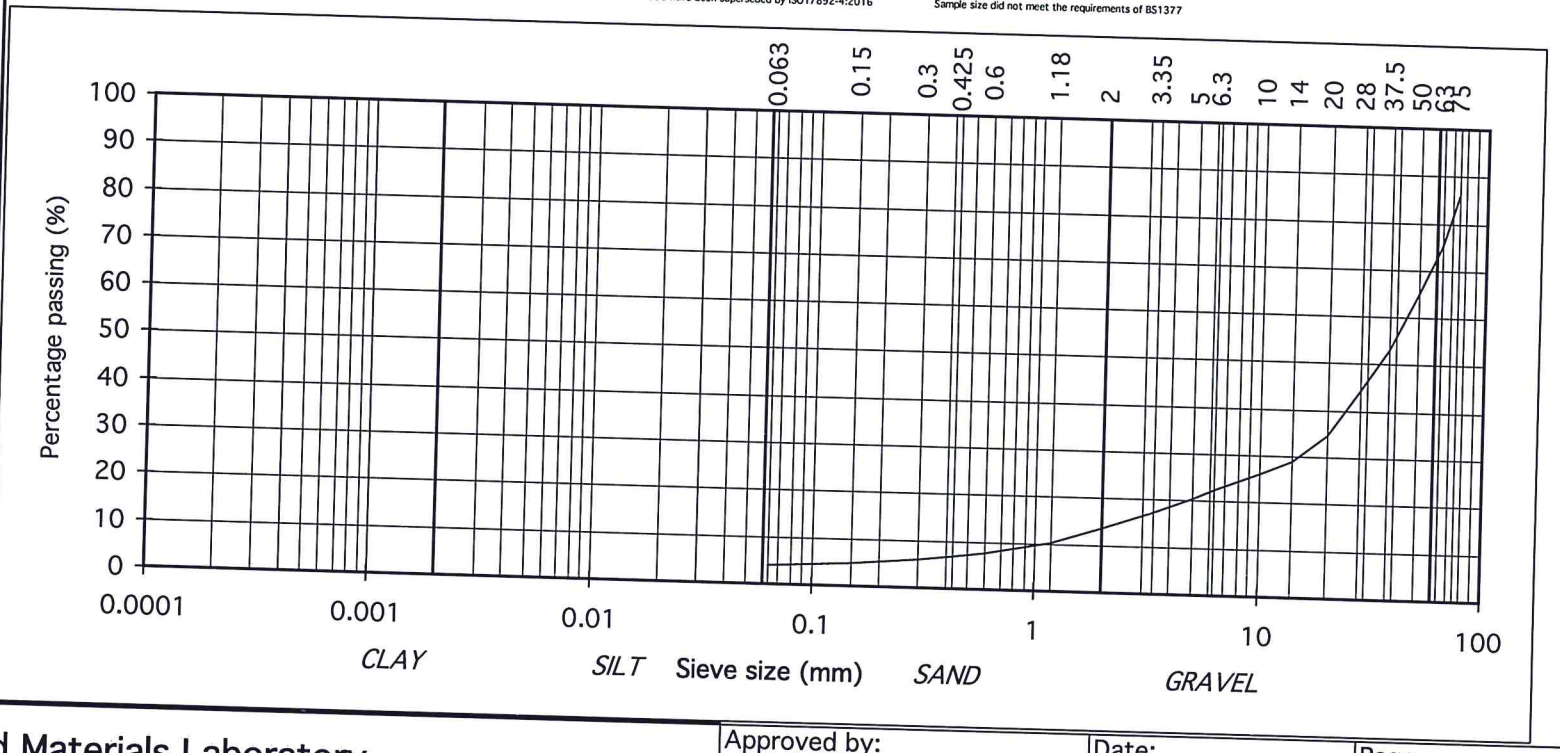
Date Received 04-07-17 Date Testing started 05-07-17

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

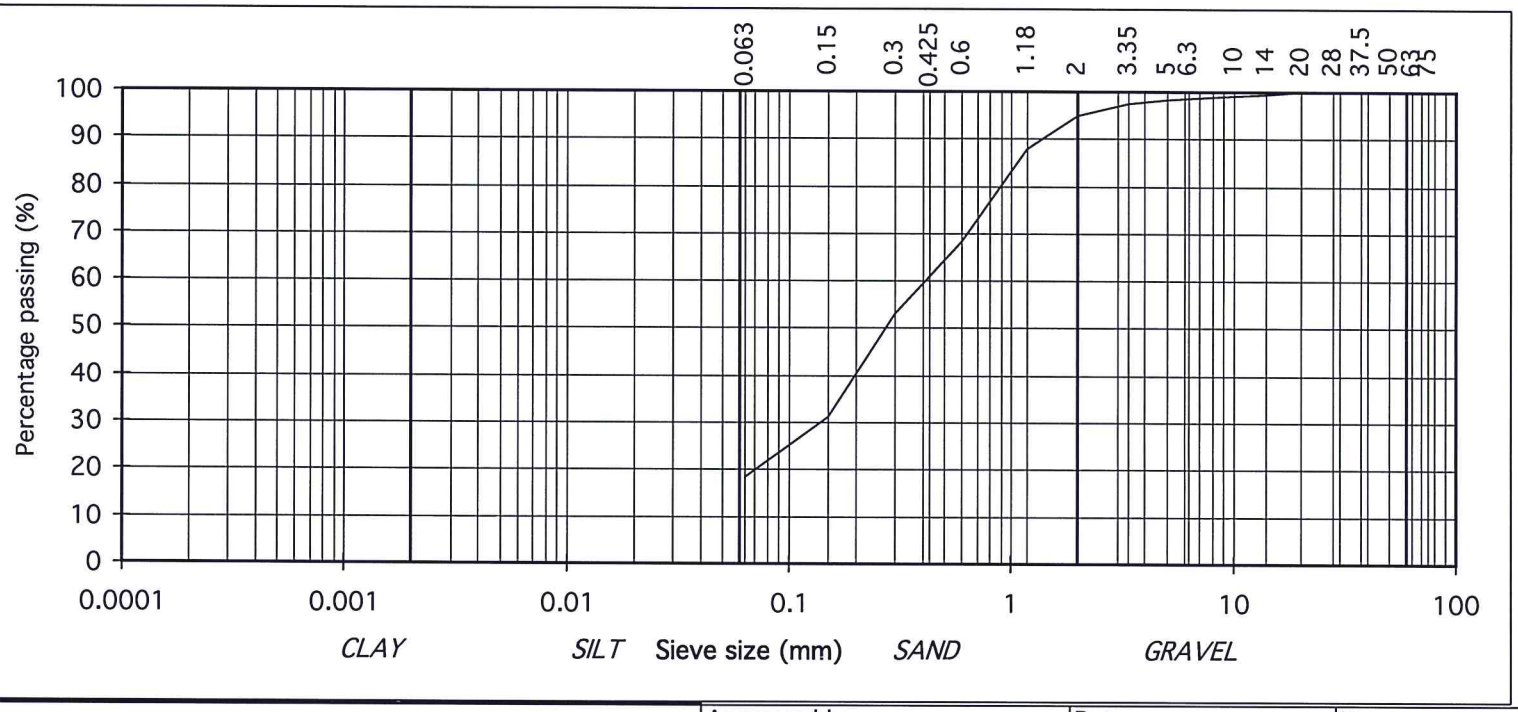
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

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

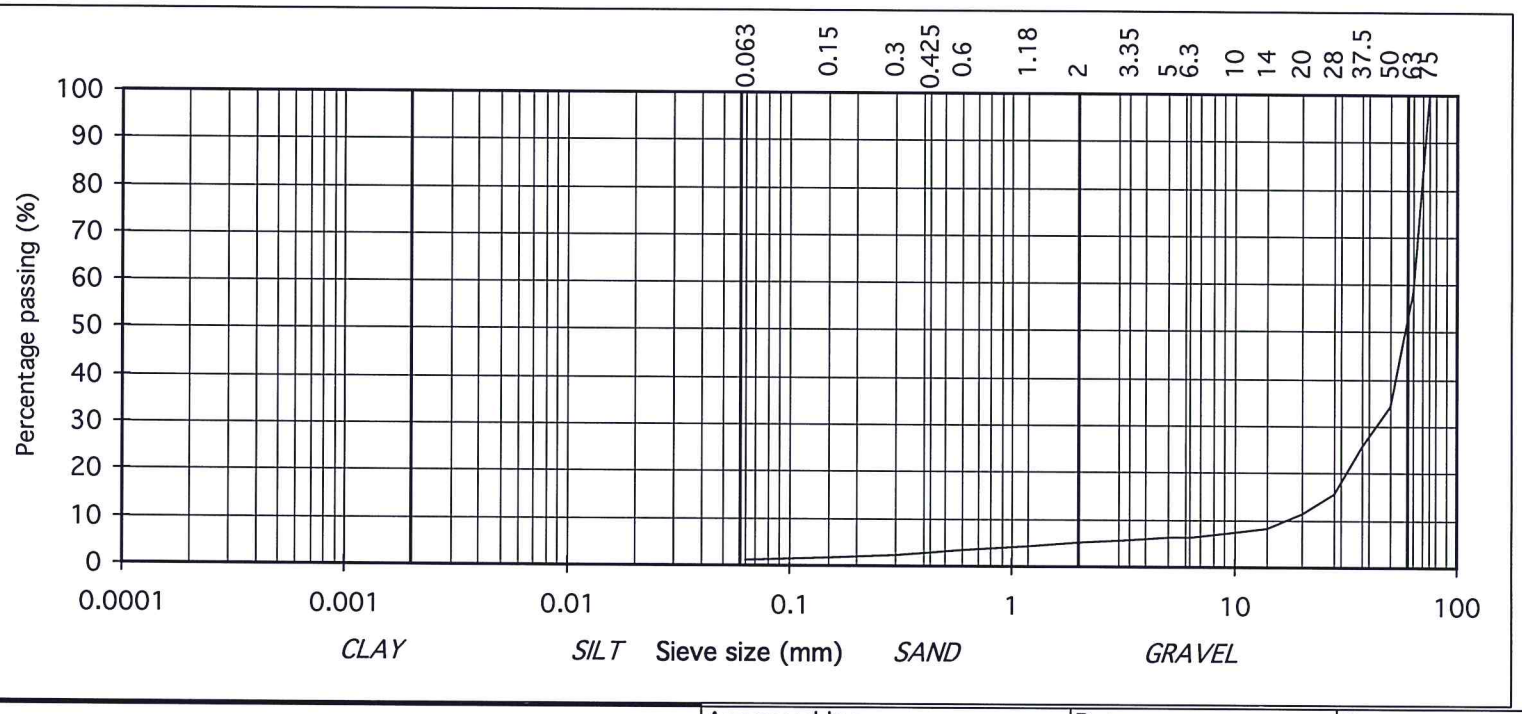
Sample Type: B

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

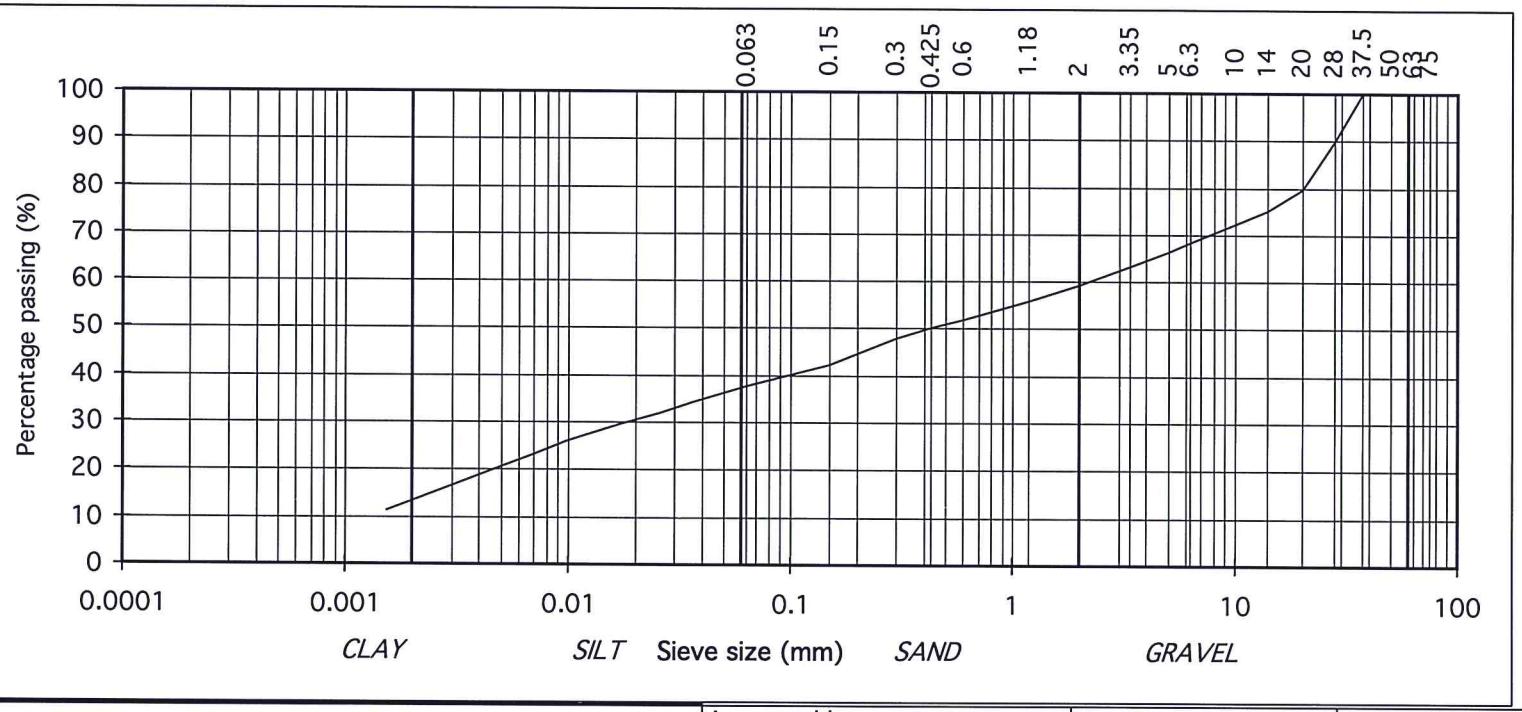
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

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

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

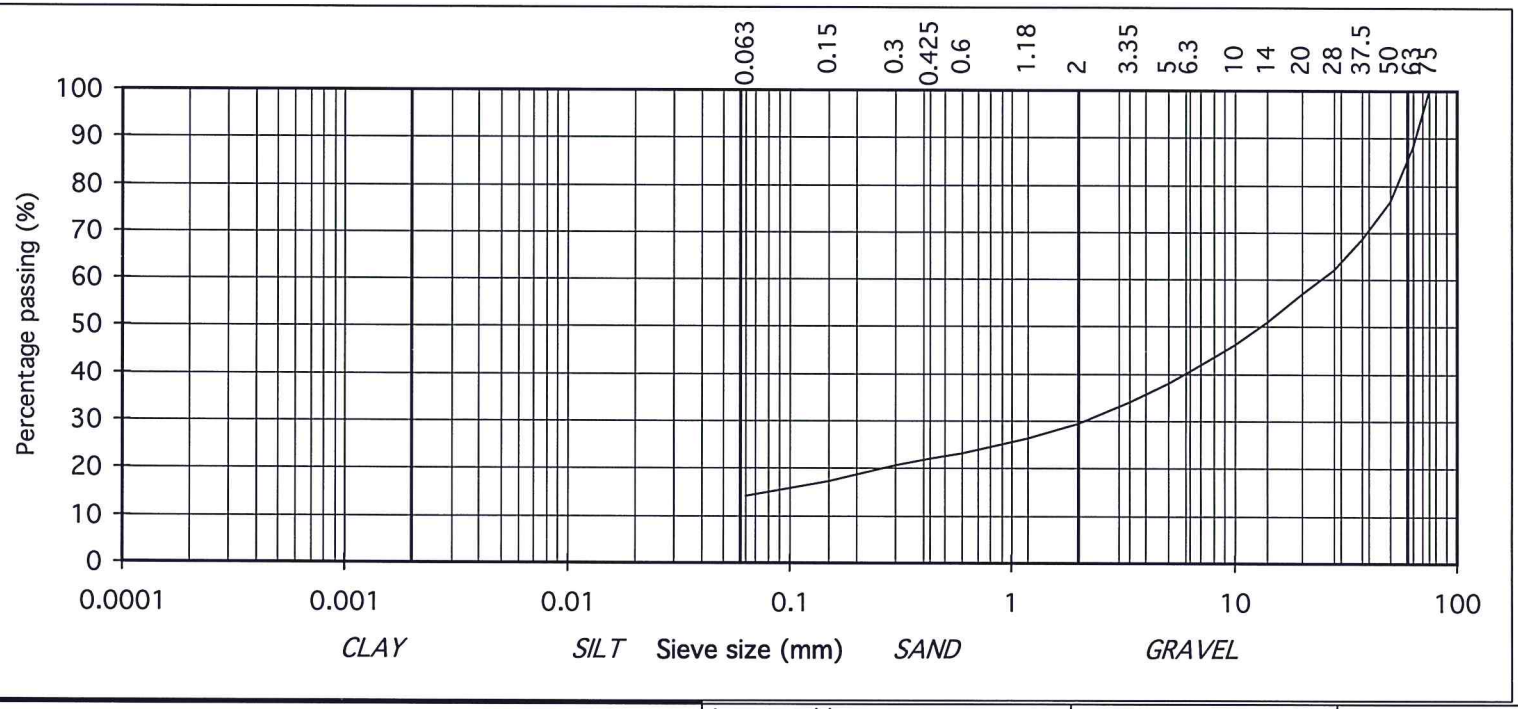
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

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

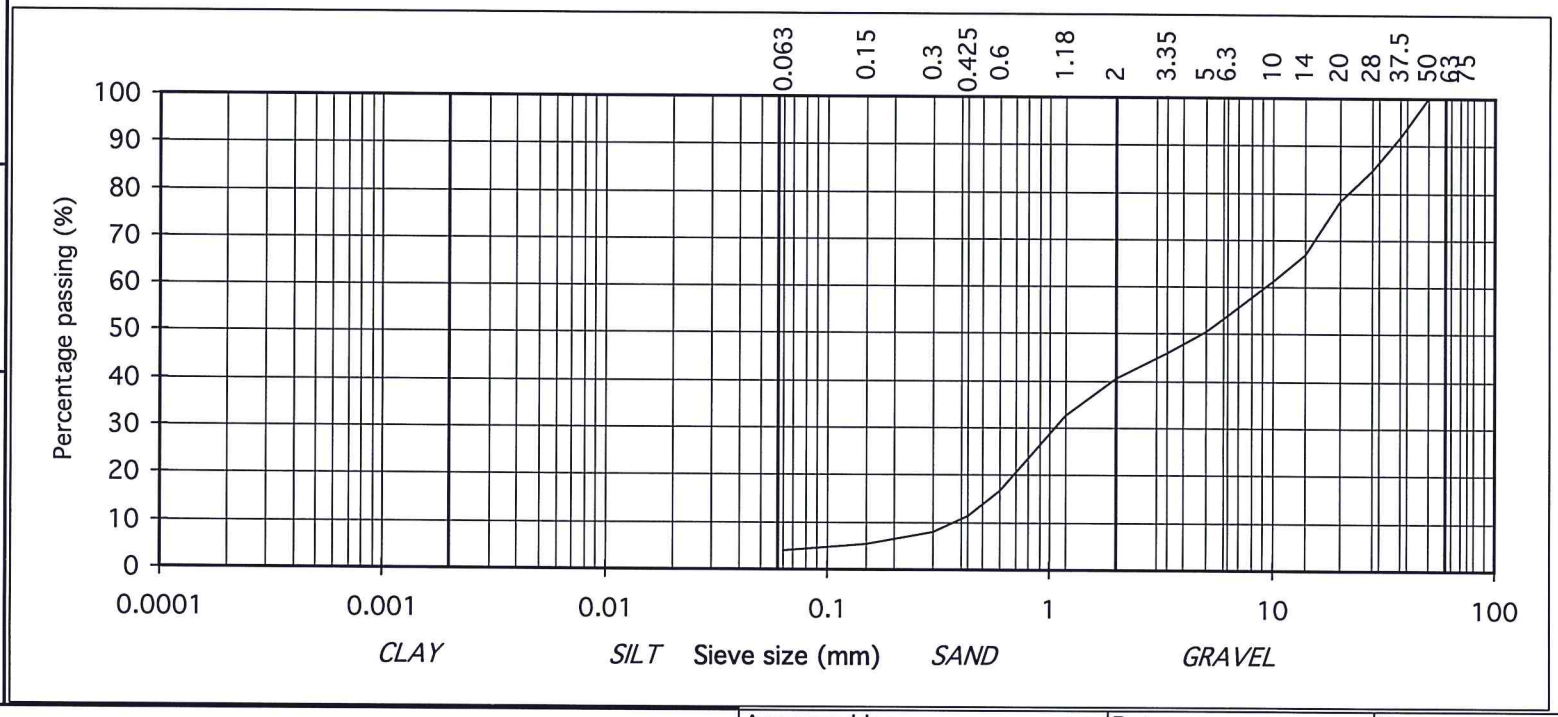
Depth (m) 1.60 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

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



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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

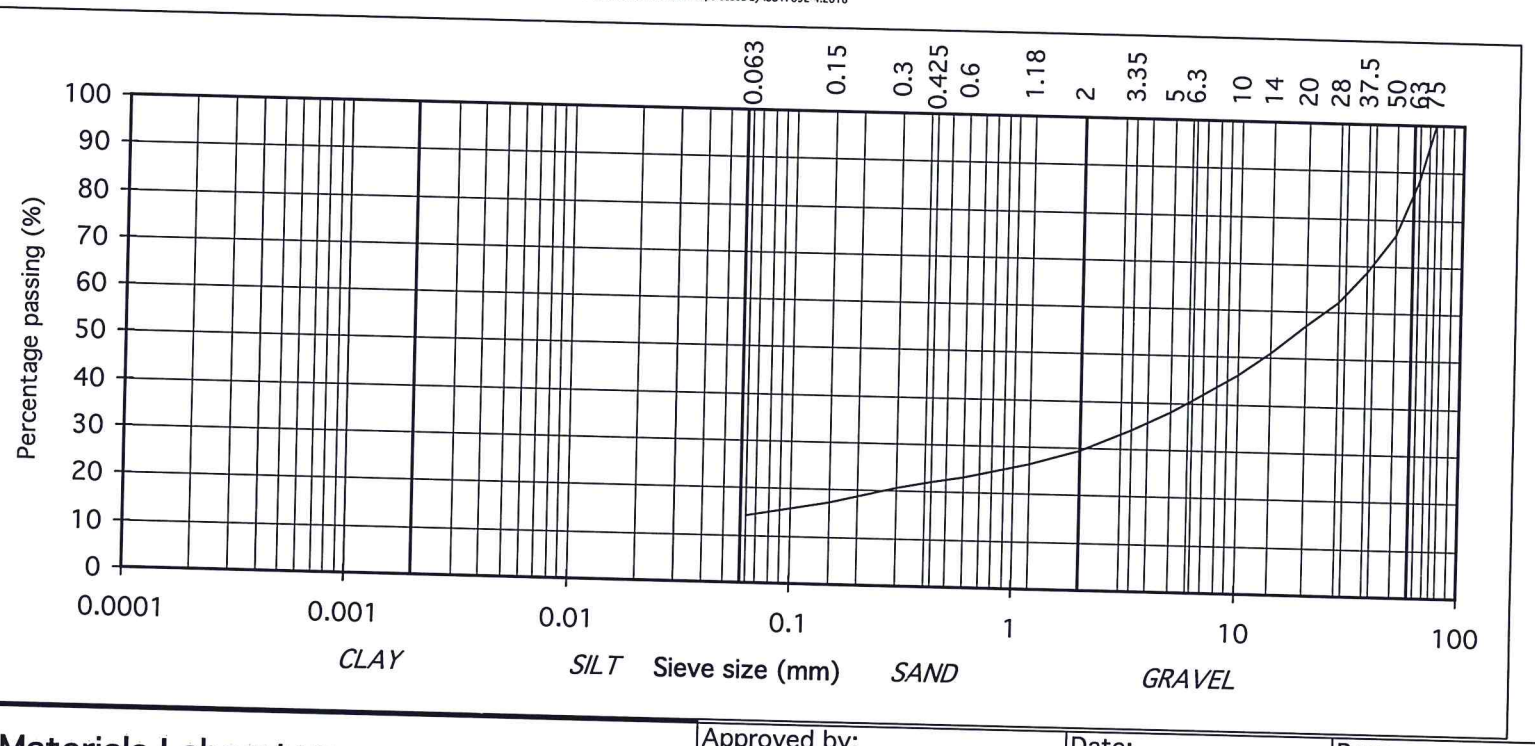
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

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

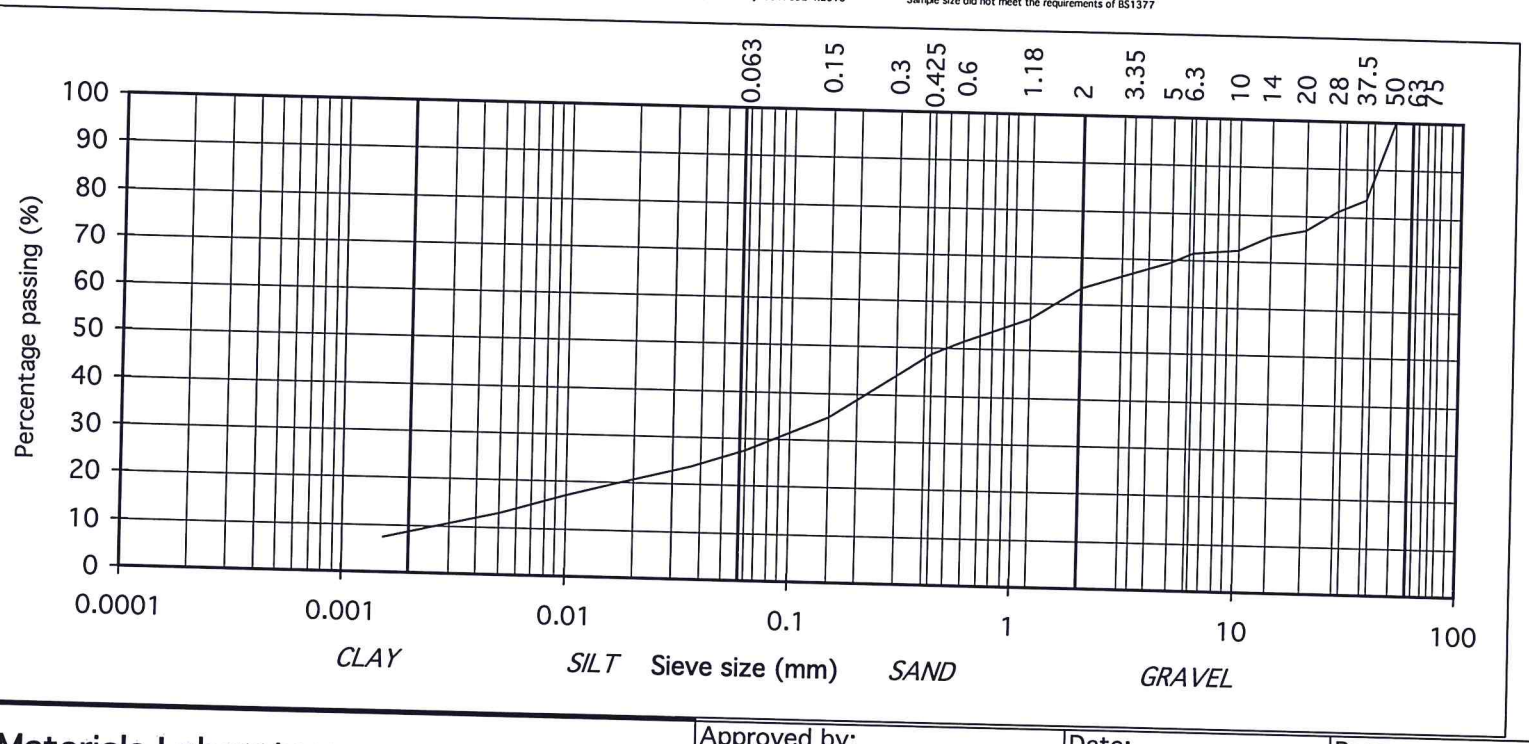
Date Received 04-07-17 Date Testing started 05-07-17

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

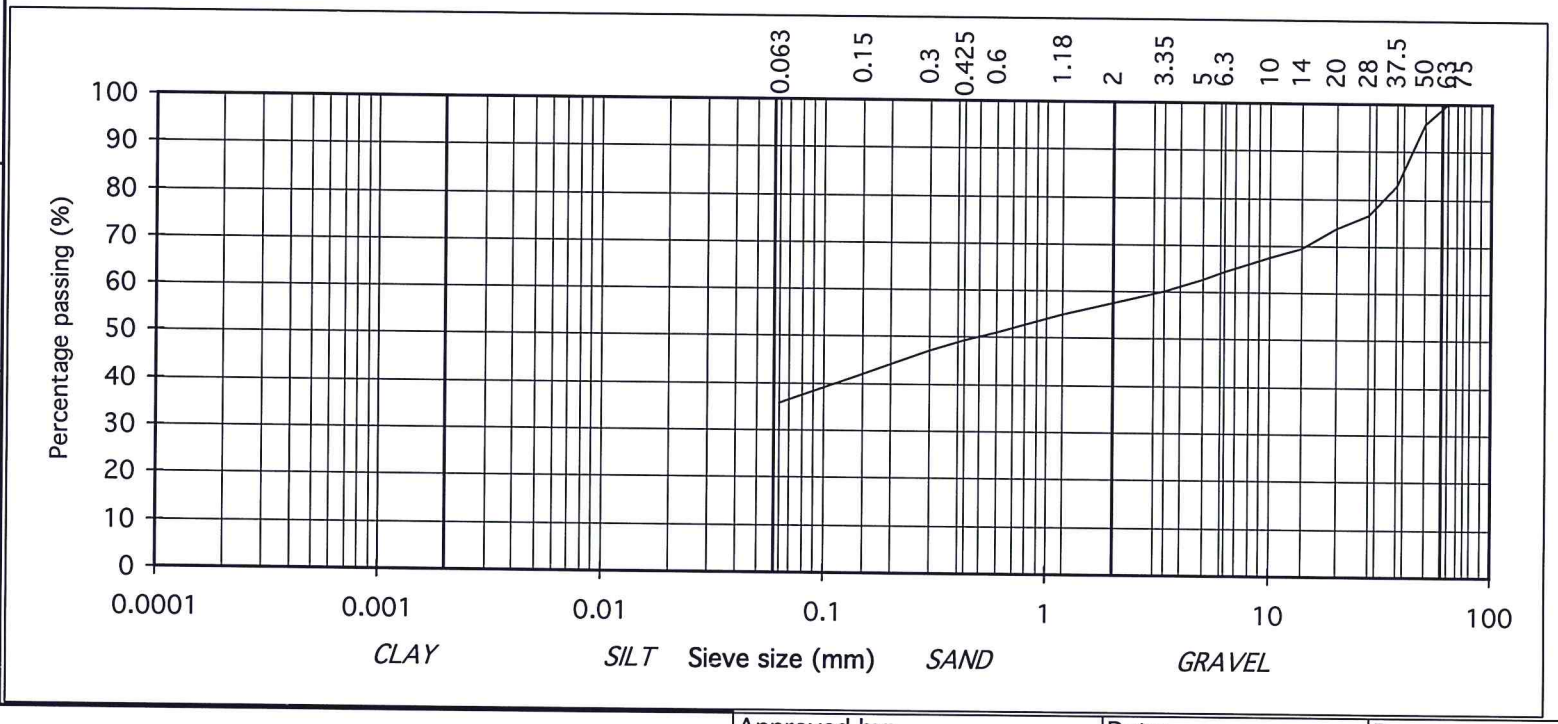
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 IVNAB 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:
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

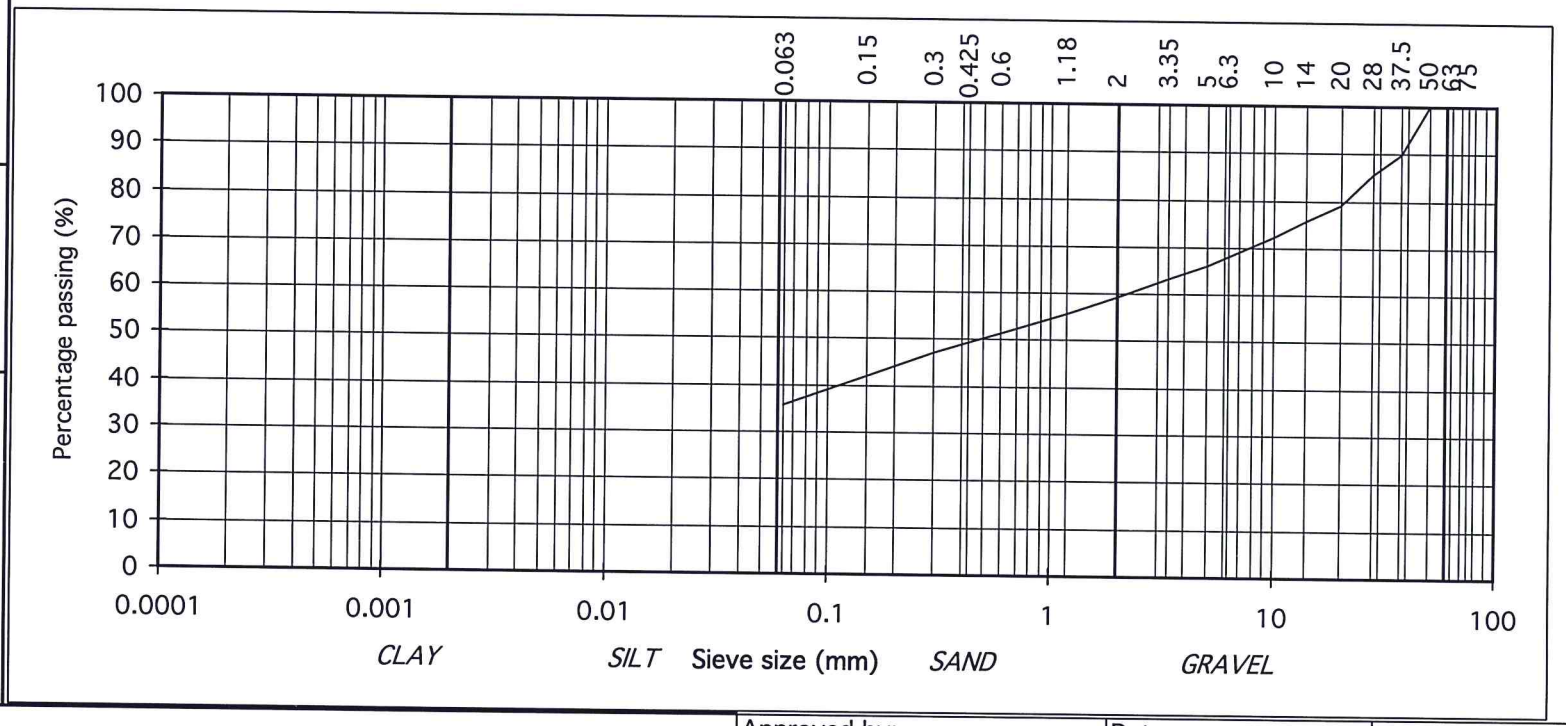
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

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

particle size	% passing	
75	100	COBBLES
63	100	
50	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



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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)

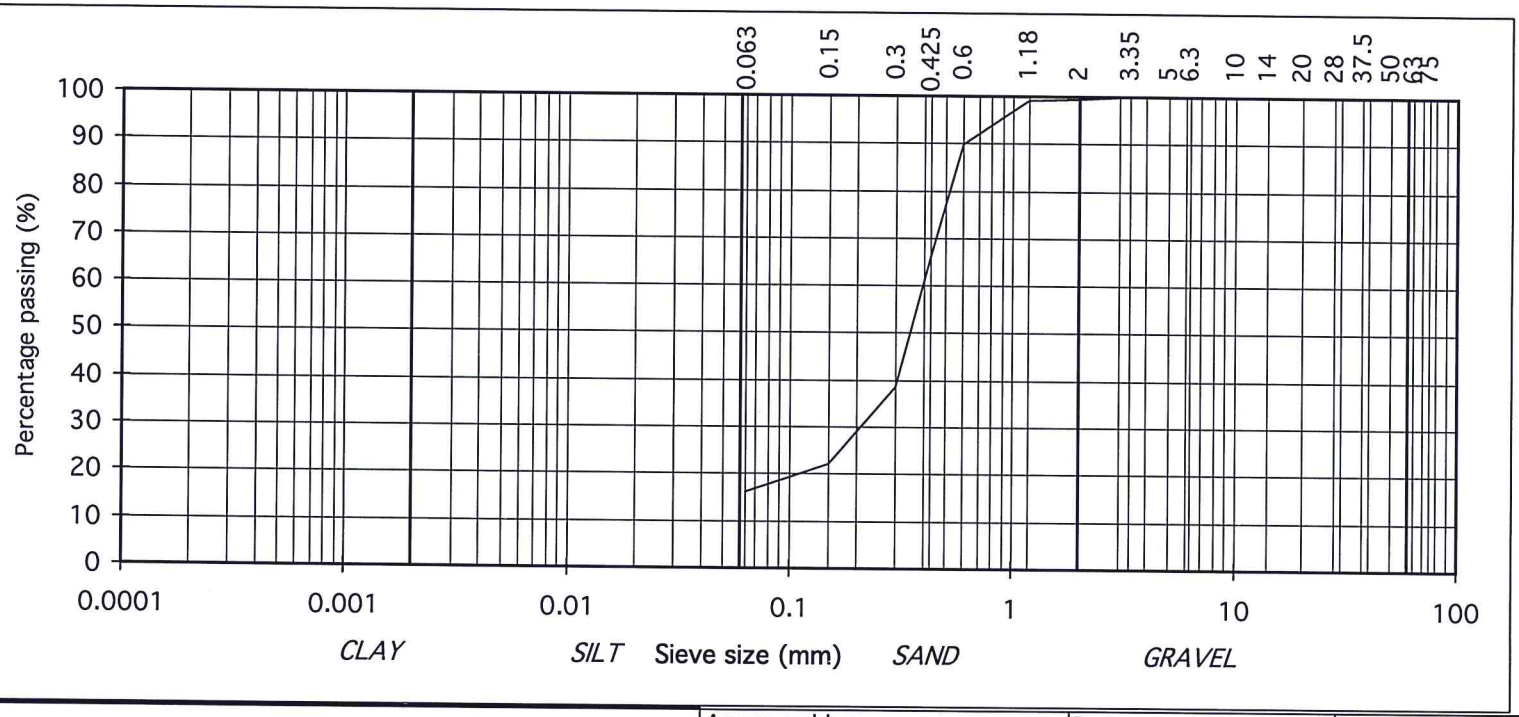
ISO 17025 IVNAB TESTING DETAILED IN SCOPE REG NO. 133T

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 IVNAB TESTING DETAILED IN SCOPE REG NO. 13-3T

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

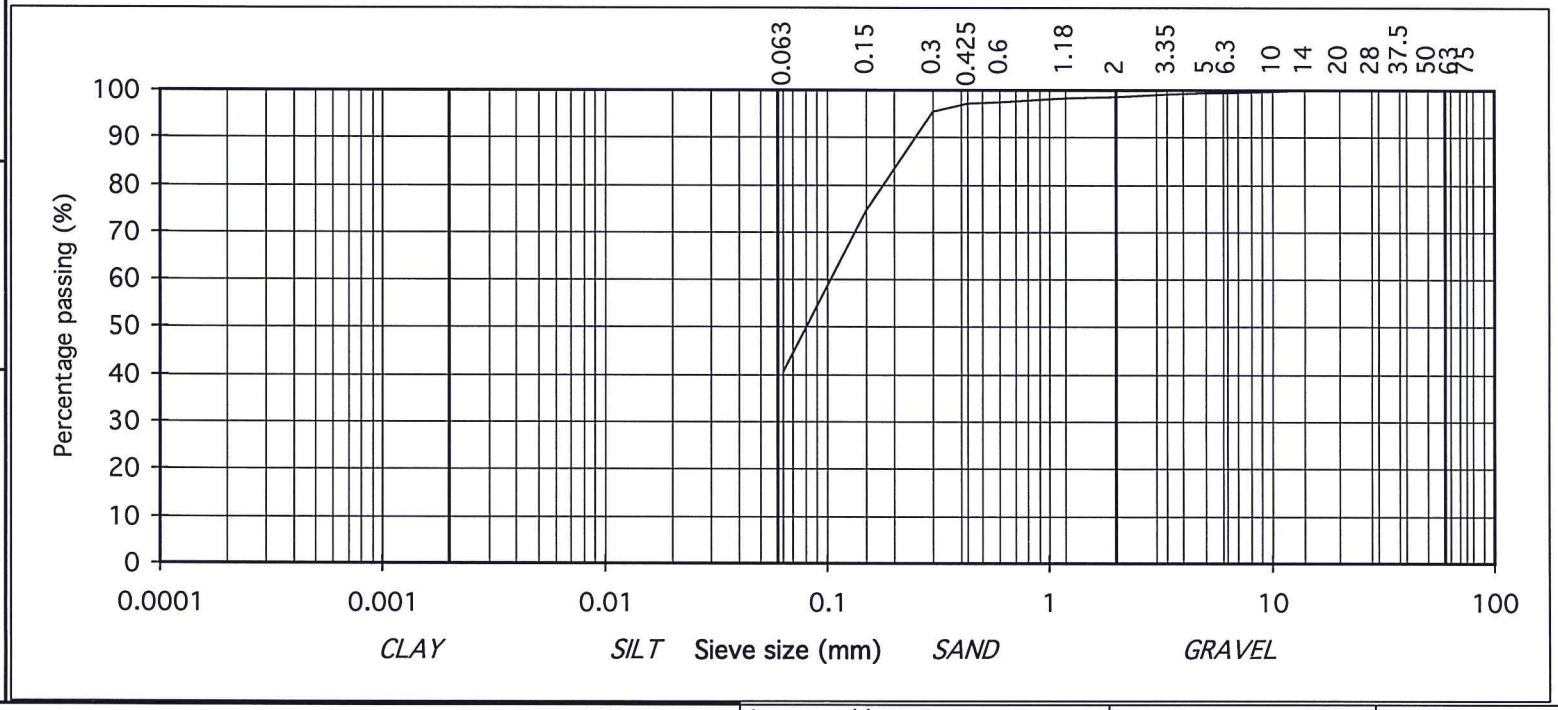
Sample Type: B

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:
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	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

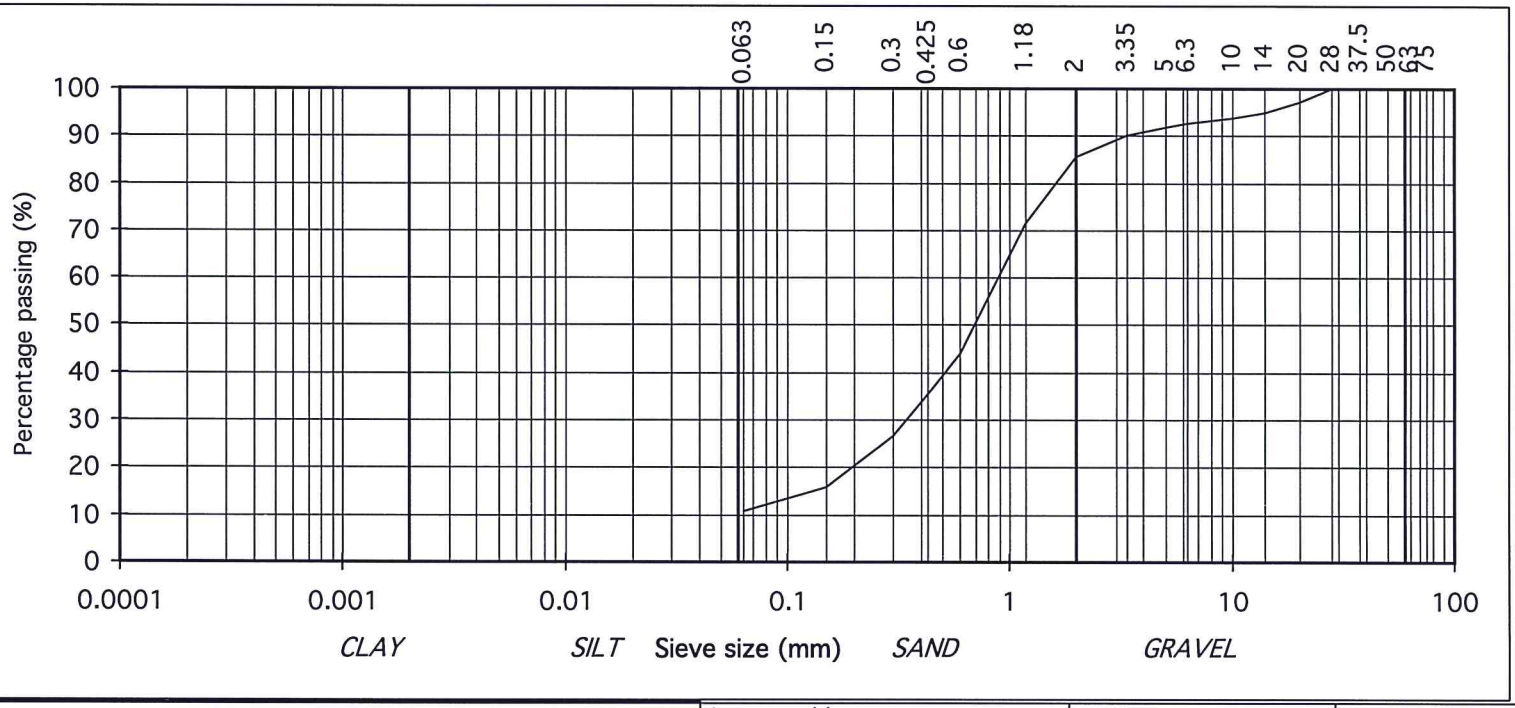
Depth (m) 1.80 Customer: DBFL Consulting Engineers,Ormond House, Upper Ormond Quay, Dublin 7, Ireland

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



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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)

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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

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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

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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

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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	

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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

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Results - Single Stage WAC

Project: 20159 - Capdoo Clane (DBFL)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-17340						
Chemtest Sample ID:	480025						
Sample Ref:	78693						
Sample ID:	TP4						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
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.

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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 DISCREPENCIES 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. CO-ORDINATES RELATE TO ITM.
4. CONTRACTOR TO UNDERTAKE INVESTIGATION IN THE VICINITY OF PROPOSED TEST LOCATIONS TO MINIMISE THE POTENTIAL FOR ENCOUNTERING EXISTING SERVICES DURING EXCAVATION (INCLUDING BUT NOT LIMITED TO USE OF CAT TYPE CABLE DETECTION DEVICE) AND OBTAIN AND REVIEW RELEVANT UTILITY OPERATOR RECORD DRAWINGS.
5. CBRs TO BE PLATE BEARING TESTS UNDERTAKEN AT SUBSOIL 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 04/04/2017

SITE INVESTIGATION LEGEND

CBR	CBR, PLATE BEARING TEST (26 No.)
DP	DYNAMIC PROBE LOCATION TARGET DEPTH 4.0m TO 5.0m BELOW GROUND LEVEL (50 No.)
TP	TRIAL PIT (25 No.) TARGET DEPTH 3.0m BELOW GROUND LEVEL
IT	INFILTRATION TRENCH (8 No.)
BH1	BOREHOLE TARGET DEPTH 6.0m BELOW GROUND LEVEL (3 No.)

ORDNANCE SURVEY IRELAND LICENCE
No EN 0017917
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GOVERNMENT OF IRELAND

DBFL CONSULTING ENGINEERS LTD
FOR INFORMATION

PLANNING

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REPORT No. 20159 JULY 2017

PROJECT: LANDS AT CAPDOO, CLANE, CO. KILDARE

DRG TITLE: SITE INVESTIGATION PLAN

CLIENT: ARDSTONE RESIDENTIAL FUND

DRG NO: 162074-1000