

Homes and Communities Agency

Daedalus – Site Investigation Report

R1696/16/7422

September 2016



<b>Report Produced For:</b>	<b>Homes and Communities Agency</b>
<b>Report Number:</b>	<b>Report no: R1696/16/7422</b>
<b>Report Title:</b>	<b>Daedalus Site Investigation Report</b>
<b>Report Status:</b>	<b>Final</b>
<b>Author(s):</b>	Reg 13(1)
<b>(Signature &amp; Date)</b>	Reg 13(1) <hr/>
<b>Technical Review:</b>	Reg 13(1)
<b>(Signature &amp; Date)</b>	Reg 13(1) <hr/>
<b>QA Approved:</b>	Reg 13(1)
<b>(Signature &amp; Date)</b>	Reg 13(1) <hr/>

This report has been prepared by Celtic with reasonable skill, care and diligence and taking account of the contract terms and conditions and manpower and resources devoted to it in agreement with the client. Celtic disclaims any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and their advisors, and Celtic accepts no responsibility to third parties to whom the report, or any part thereof, is made known. Any such party using any information contained within the report does so at their own risk.

Celtic is the trading name of Celtic Technologies Ltd.

**CONTENTS**

<b>1.0 EXECUTIVE SUMMARY</b>	<b>4</b>
<b>2.0 INTRODUCTION</b>	<b>6</b>
2.1 Previous Site Investigations .....	6
2.2 Scope of Works .....	7
2.3 Report Format.....	7
<b>3.0 SITE DETAILS</b>	<b>8</b>
3.1 Site Location .....	8
3.2 General Site Setting.....	8
3.3 Site Access and Restrictions .....	8
3.4 Services .....	8
3.5 Environmental Setting.....	9
3.5.1 Geology .....	9
3.5.2 Hydrogeology .....	9
3.5.3 Surface Water .....	9
3.6 Site History.....	9
<b>4.0 SITE INVESTIGATION</b>	<b>10</b>
4.1 MIP (Membrane Interface Probe) Investigation .....	10
4.2 Borehole Installation .....	11
4.3 Ground Conditions .....	12
4.3.1 Visual and Olfactory Evidence of Contamination .....	13
4.3.2 Obstructions .....	13
4.3.3 Hand Pitting.....	14
<b>5.0 CONTAMINATION ASSESSMENT</b>	<b>15</b>
5.1 Summary of MIP Findings .....	15
5.2 Soil Sampling .....	15
5.3 Groundwater .....	16
5.3.1 Groundwater Observations .....	16
5.3.2 Groundwater Assessment for PCE .....	18
<b>6.0 SOIL OXIDANT DEMAND TESTING</b>	<b>21</b>
6.1 Soil Natural Oxidant Demand (NOD) Test Methodology .....	21
6.2 SOD Test Results .....	21
6.3 Conclusions .....	22
<b>7.0 CONCLUSIONS .....</b>	<b>23</b>
<b>8.0 OUTLINE REMEDIATION DESIGN .....</b>	<b>25</b>
<b>APPENDICES .....</b>	<b>26</b>
Appendix A - Drawings	
Appendix B - Photo Log	
Appendix C - Lankelma MIP Report	
Appendix D - Celtic Borehole Logs	
Appendix E - Soil and Groundwater Analysis	
Appendix F - Soil Oxidant Demand Trial	
Appendix G - Contour Plots	

## 1.0 EXECUTIVE SUMMARY

<b>Site Location</b>	The site is located within the Daedalus Waterfront Zone to the north of Implacable Road, HMS Daedalus, Lee on Solent PO13 9NS, National Grid Reference 455899E 101385N.
<b>Environmental Setting</b>	The geological sequence at the site typically consists of Made Ground overlying superficial deposits (Brickearth and Plateau Gravel) which are underlain by the Bracklesham Beds. Groundwater within the superficial deposits and bedrock are classified as Secondary 'A' Aquifers and is considered that the aquifer within the superficial deposits provides shallow groundwater base flow to the River Alder to the east and is in continuity to the Solent Estuary.
<b>Current Uses and Site History</b>	<p>A number of buildings in the vicinity of the site investigation areas are remnants of its former uses as a military airfield which are now leased from the Homes and Communities Agency (HCA) for commercial and manufacturing uses. Dunning Hanger is currently occupied by Marine Concepts Ltd and Esmonde Hanger is currently occupied by a steel fabrication company.</p> <p>The site was first established in c.1917 as RNAS Lee on Solent and has been operated by the Ministry of defense (MOD) site until c.1996. Ownership of the site was split in 2006 with the waterfront zone, which is the location for the site investigation works transferred to the South East England Development Agency (SEEDA) then later the Homes and Communities Agency (HCA).</p>
<b>Site Investigation</b>	<p>The primary aim of the site investigation work was to further delineate the identified dissolved phase Tetrachloroethene (PCE) plume within the groundwater across the apron area, to the west Dunning Hanger and to provide information for the design of the subsequent remediation works.</p> <p>The PCE plume identified within underlying groundwater was considered by the Campbell Reith Detailed Quantitative Risk Assessment (DQRA), September 2014 to pose a potentially significant risk to controlled waters and the surrounding sensitive ecology (SSSI, SPA and Ramsar designated areas)</p> <p>Additional site investigation works were also undertaken within an area identified to be a former vehicle refuelling facility located to the south of the apron area.</p> <p>A total of fourteen MIP (Membrane Interface Probe) locations and thirteen boreholes were undertaken during this phase of works. Ground conditions encountered were generally in line with the anticipated geology. Similarly, groundwater elevations recorded within well installations indicate a groundwater flow in a westerly direction across the apron area, as identified in previous site investigations across this area.</p> <p>Investigation works within the former refuelling area comprised one borehole and one MIP (terminated at 0.20 metres below ground level mbgl due to an obstruction). As a result of the obstructed MIP test in this area a hand pitting exercise was undertaken to determine the extent of the near-surface concrete obstruction. All but one of the hand pits encountered a concrete obstruction near-surface. Consequently, it is recommended that further investigation</p>

	<p>works in the form of trial pits is undertaken on order to determine the extent of the obstruction and the potential for an underground storage tank.</p>
<p><b>Contamination Assessment</b></p>	<p><b>Groundwater</b> – PCE concentrations exceeding the remedial target value were identified at four borehole locations across the apron area and as such PCE within underlying groundwater is still considered to pose a significant risk to controlled waters. The identified PCE plume extends westward from the south west corner of Dunning Hanger at CELBH03 and the identified concentrations indicate the source of PCE to be in the vicinity of the pre-existing borehole MCBH01. It is also considered that the drain identified in the south-west corner of Dunning Hanger is no longer a source for the PCE contamination as boreholes CELBH01 and CELBH02 did not identify elevated concentration of PCE within groundwater and soils.</p> <p><b>Soils</b> – Elevated Concentrations of Total Petroleum Hydrocarbons (TPH) were identified within the superficial deposits and groundwater at CELBHMIP11A indicating the presence of a localised TPH hotspot between the boiler house and Dunning Hanger. Asbestos in the form of cement bound (chrysotile) sheeting was identified within the Made Ground whilst undertaking hand pitting within the grassed area to the south of Implacable Road. Consequently, no further intrusive investigation was undertaken across this area.</p>
<p><b>Remediation Strategy</b></p>	<p>The remediation techniques that were proposed in Celtic’s original submission April 2015 remain suitable for the purposes of the objectives of the remediation works. However, the method of proposed application will need to change to accommodate the findings from the site investigation works.</p> <p>It is proposed to target the source areas of contamination by application of Chemox via injection into the existing well infrastructure in addition to additional wells. Furthermore, the addition of ZVI (Zero Valent Iron) would be installed into the source areas via mixed soil columns using an auger drilling technique.</p> <p>The vehicle refuelling area requires further investigation in the form of a trial pitting exercise, to confirm the presence or absence of a potential underground storage tank (UST) in this area of the site.</p>

## 2.0 INTRODUCTION

Celtic Englobe (Celtic) was commissioned by the Homes and Communities Agency (HCA) to undertake groundwater remediation in the vicinity of, as well as inside of Dunning Hanger. The investigation areas (hereafter referred to as 'the site') are situated within the Daedalus Waterfront Zone, Implacable Way, Lee-On-Solent, Gosport PO13 9NS. The site location is shown on Drawing D1696/SI/001. Following contractual negotiations the remediation works were separated in two phases including site investigation to further quantify the risk and subsequent remediation.

This report details the findings of the site investigation works and to provide discussion on a remedial strategy for the subsequent remediation phase.

The main site area targeted for the site investigation included the 'apron area' situated between Esmonde Hanger (to the west) and Dunning Hanger (to the east) as well as within the western area of Dunning Hanger itself, which was previously inaccessible during previous site investigation works.

Site investigation locations were focused on further delineating the presence and extent of dissolved tetrachloroethene (PCE) and associated compounds within groundwater, with particular focus on the south west corner of Dunning Hanger. The works have been focused on this area due to the presence of drain which has been identified, following previous investigations as a potential source for PCE. The drain is understood to have been used as a disposal point for solvents/ degreasing agents associated with former manufacturing uses within Dunning Hanger. Additionally, the previous investigations as detailed in Section 2.1 of this report determined that measured concentrations of PCE have been identified to pose a risk to controlled waters and to migrate in a westerly direction from Dunning Hanger.

A second, more localised area of investigation as shown on Drawing D1696/SI/002 was also undertaken in the vicinity of a former vehicle refueling station situated to the south of the main site investigation area and to the east of Hermes Road. Works were undertaken in order to further delineate the presence of Benzene within groundwater identified during previous site investigation works. This area is referenced as the 'vehicle refueling area' hereafter.

The works have been carried out in accordance with Celtic's letter of Intent dated 6<sup>th</sup> July 2016 with Campbell Reith acting as consultant on behalf the HCA. Campbell Reith undertook regular site visits during the works as well as reviewing all Construction Phase Health and Safety Documentation produced by Celtic prior to works commencing on site.

### 2.1 Previous Site Investigations

The site and the wider Daedalus Waterfront Zone has been subject to a number of previous investigations and assessments. The following reports have been provided to Celtic;

- WSP Phase One (Desk Study) May 1995;
- ENTEC LQA Review Draft Technical Note January 2001;
- ENTEC Phase Two Shallow Groundwater Investigation for Defence Estates May 2003;
- ENTEC Phase One Desk Study May 2005;
- Campbell Reith Land Quality Statement March 2011;
- Campbell Reith Supplementary Land Quality Statement September 2014;
- Campbell Reith MIP Investigation Summary Report December 2014.

The Campbell Reith Supplementary Land Quality Statement September 2014 includes a Detailed Qualitative Risk Assessment which determined that the identified Tetrachloroethene (PCE) plume

within groundwater pose a potentially significant risk to nearby surface waters and sensitive ecology (SSSI, SPA, RAMSAR) designated areas.

## 2.2 Scope of Works

The purpose of the additional investigation works at the Daedalus site was to further establish the extent of the chlorinated contamination (PCE and associated compounds) in respect to the concentrations previously observed and presented in previous reports at the tender stage. In addition, previous investigations have not been undertaken within Dunning Hanger itself and it is proposed that a number of intrusive investigation locations will be undertaken within Dunning Hanger in order to further delineate the extent of the chlorinated contamination.

The outline scope of works as outlined in Celtic Letter of Intent dated 6<sup>th</sup> July included the following;

- Collection and analysis of groundwater samples obtained from existing boreholes on site prior to Celtic's site investigation;
- MIP (membrane interface probe) testing within Dunning hanger, across the apron area and the vehicle refuelling area to the south of the main works area;
- Borehole drilling and well installation to supplement MIP findings as well as to obtain soil and groundwater samples from a number of locations in order to refine the contaminated areas;
- Production of an interpretive site investigation report and outline remediation strategy.

## 2.3 Report Format

This report contains information on the following items as appropriate;

Section 3	<i>Site Details</i> – site location, a description of the site and its former uses, access restrictions, a review of the site's geological, hydrogeological and hydrological setting and a summary of previous investigation works undertaken;
Section 4	<i>Site investigation</i> – a description of the works undertaken by Celtic in July-August 2016 and a summary of the ground conditions encountered;
Section 5	<i>Chemical Analysis and Contamination Assessment</i> – review of all soil and groundwater sample analysis and semi-quantitative MIP data obtained;
Section 6	<i>Soil Oxidant Demand</i>
Section 7	<i>Conclusions</i>
Section 8	<i>Outline Remediation Strategy</i>

### 3.0 SITE DETAILS

#### 3.1 Site Location

A summary of the site location details is provided in Table 1 below;

**Table 1 – Site Details**

Site Location	Hampshire
Site Address	Implacable Road, HMS Daedalus, Lee on Solent PO13 9YA
National Grid Reference	455899 101385

#### 3.2 General Site Setting

The site investigation areas are situated within the wider Daedalus waterfront area which is located to the south of the operational airfield. The site surface is generally flat and covered with hardstanding comprising tarmac and concrete and is accessed from the north via Broom Way. A number of buildings in the vicinity of the works area are remnants of its former uses as a military airfield which are now leased from the HCA for commercial and manufacturing uses. Dunning Hanger is currently occupied by Marine Concepts Ltd and Esmonde Hanger which is occupied by a steel fabrication company.

#### 3.3 Site Access and Restrictions

Vehicle and plant access is gained from Broom Way to the north of the apron area. The proposed site investigation areas are within operational areas predominantly used for storage and employee car parking by the occupiers of Esmonde and Dunning Hangers. Due to the continued operation by the occupiers of Esmonde and Dunning Hanger, a full perimeter fence around the proposed works area was not viable. As such, each site investigation location had temporary fencing erected prior to intrusive works which was lined with debris mesh.

Due to a radiological anomaly encountered during a previous investigation by Entec, it was made clear to Celtic by Campbell Reith that no intrusive works were to be undertaken within the grassed verge area to the south west of Dunning Hanger as shown on Drawing D1696/SI/002.

To ensure full access to proposed site investigation locations particularly when works were undertaken within Dunning Hanger and in the vicinity of Esmonde Hanger, close and clear verbal communication between onsite Celtic staff and the occupier of each hanger was undertaken and maintained throughout the project. This was to ensure access to proposed locations was maintained and sequenced without causing increased and unnecessary disruption to operational activities of the businesses, as well as to progress the site investigation works within the agreed programme.

#### 3.4 Services

Utility plans indicating the location of services across the proposed site investigation areas were provided by Campbell Reith and copies were available on site during the site investigation. Numerous services are present across the Apron area including drainage, water and electricity with electricity also indicated in the vicinity of the vehicle refueling area. Prior to any intrusive works Celtic instructed a utility clearance specialist to identify all existing services and clear proposed investigation locations



by using a CAT (Cable avoidance Tool) and GPR (Ground Penetrating Radar) prior to concrete coring and subsequent drilling and probing. Additional scanning with a CAT (Cable Avoidance Tool) was undertaken once each location was cored.

### **3.5 Environmental Setting**

#### **3.5.1 Geology**

The anticipated ground conditions beneath the site based on previous site investigations and the British Geological Survey 1:50 000 Geological Map for Portsmouth indicate that the site is underlain by Brickearth, over Plateau Gravels over the Bracklesham Beds.

The general sequence of deposits based on previous investigations at the site is as follows:

- Made Ground to 1.20 mbgl: reworked natural ground with brick and concrete;
- Brickearth (0.30-2.20 mbgl thick): soft to firm silty sand clay with occasional fine gravel;
- Plateau Gravels (2.5-5.5 m thick): medium dense and dense sandy fine to coarse flint gravel with occasional sand horizons;
- Bracklesham Group (up to 10m thick) medium dense silty fine sands with firm to stiff laminated clay.

#### **3.5.2 Hydrogeology**

Both the superficial deposits (Brickearth and Plateau Gravels) and solid geology (Bracklesham Beds) are classed as 'Secondary A' Aquifers which are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers. The site is not identified to lie within a Source Protection Zone with soils identified as having a high leaching potential. The Campbell Reith Land Quality Statement March 2011 considers that the aquifers within the superficial deposits provides shallow groundwater base flow to the River Alder to the east and is in continuity with the Solent Estuary.

#### **3.5.3 Surface Water**

No surface water courses/ features are situated in the vicinity of the site investigation areas. The nearest surface water is The Solent located approximately 280m south west of the apron area.

### **3.6 Site History**

The site and surrounding area was largely open agricultural land until c.1917 following development of a Royal Navy Air Station which later became a seaplane training school for the RAF before transferring back to the Royal Navy's Air Fleet Division. By c.1939 the airfield and additional associated infrastructure was developed. From c.1965 the site was named as HMS Daedalus and continued to be operated as a Ministry of defense (MOD) site until c.1996. Ownership of the site was split in 2006 with the airfield and central areas transferring to the Maritime and Coastguard Agency (MCA) and the surroundings areas including the waterfront zone, which is the location for the site investigation works to the South East England Development Agency (SEEDA) then later the Homes and communities Agency (HCA).

## 4.0 SITE INVESTIGATION

The primary aim of the additional investigation work was to further delineate the identified PCE plume within the groundwater across the apron area with particular focus on the south west corner of Dunning Hanger. Furthermore, these additional site investigation works provided the opportunity to undertake borehole/ MIP investigation within Dunning Hanger which has been previously inaccessible. The borehole and MIP locations were initially focused in this area due to the presence of a drain situated inside and adjacent to the south west corner of Dunning Hanger which has been identified as a potential source of PCE, as it is believed the drain may have been used as a solvent disposal point. Further borehole and MIP locations were undertaken to the north and south (cross hydraulic gradient) as well as to the east and west (up and down hydraulic gradient, respectively) across the apron area to further delineate the current extent of the PCE plume.

Following completion of the site investigation across the apron area, site investigation works were also undertaken in the vicinity of the former vehicle refueling area to the south. The findings of ground conditions encountered is provided in Section 4.3.

All exploratory locations were subject to underground service clearance and access restrictions associated with ongoing commercial operations by the occupiers of Dunning and Esmonde hangers as well as continued use of service roads to other commercial operations within the Daedalus Waterfront Zone.

The outline scope of the site investigation works included the following:

- Groundwater sampling of existing borehole locations across the waterfront zone 22<sup>nd</sup> July 2016;
- Service locations and identification including clearance of proposed borehole/ MIP locations by Utiliscan 27<sup>th</sup>-29<sup>th</sup> July 2016;
- Concrete coring at proposed borehole/ MIP locations by ADP Group 29<sup>th</sup> July & 1<sup>st</sup> August 2016;
- MIP probing by Lankelma Limited 1<sup>st</sup> August -13<sup>th</sup> August 2016;
- Borehole drilling and well installation by ADP Group 4<sup>th</sup> August-17<sup>th</sup> August 2016;
- Post well installation groundwater sampling and chemical analysis by a UKAS accredited laboratory.

### 4.1 MIP (Membrane Interface Probe) Investigation

The MIP investigation and borehole installation works were sequenced during the programme of the site investigation, in order that well installation and soil/groundwater samples could be obtained if required dependent upon the findings of the MIP at certain locations.

The exploratory locations of the MIP are shown on Drawing D1696/SI/002 and the corresponding data is provided within the Lankelma Environmental Soil Investigation Report which is provided in Appendix C.

The MIP features an Electrical Conductivity (EC) detector and can be used to indicate a stratigraphical profile of the sub-soil horizons where higher conductivity indicates dominantly cohesive materials and lower conductivity indicating more granular materials.

The final depths achieved using the MIP are summarised within Table 2 where by the following terminology applies to MIP refusal.

- Lateral Support – Support mechanism failed unable to progress MIP further;

- Dummy Push Refusal – Dummy push used to case upper 3.0m prior to progression of MIP, Casing refused shallower than 3.0m;
- Total Reaction Load – stress on probe stem could result in damage.

**Table 2: MIP Testing Summary**

MIP Location ID	Date	Final depth (m bgl)	Refusal factor	Comments
CELMIP01	08/08/16	10.52	Total Reaction Load	
CELMIP02	08/08/16	9.66	Total Reaction Load	
CELMIP03	09/08/16	10.99	Total Reaction Load	
CELMIP04	09/08/16	9.33	Total Reaction Load	
CELMIP05	09/08/16	9.17	Total Reaction Load	
CELMIP06	10/08/16	9.99	Target Depth	
CELMIP07	10/08/16	7.73	Total Reaction Load	New membrane used on probe
CELMIP08	10/08/16	8.66	Total Reaction Load	
CELMIP09	11/08/16	9.82	Total Reaction Load	
CELMIP10	11/08/16	9.49	Total Reaction Load	
CELMIP11	11/08/16	7.55	Total Reaction Load	
CELMIP12	12/08/16	7.99	Total Reaction Load	No EC readings
CELMIP13	12/08/16	0.0	Dummy Push Refusal	
CELMIP14	12/08/16	3.23	Lateral Support	No EC readings

All MIP tests refused within the Bracklesham Beds across the apron area with the exception of CELMIP14. CELMIP13 was undertaken in the vicinity of the vehicle refueling area, however a shallow obstruction was encountered and progression of the dummy casing was not possible.

A review of the EC readings generally indicates the top of the Bracklesham Beds between 7.50-8.50 mbgl.

A summary of the semi quantitative VOC data obtained during the MIP investigation is presented in Section 5 of this report.

#### 4.2 Borehole Installation

Concrete Coring and subsequent borehole drilling was undertaken by ADP Group. Drilling was undertaken using a Comacchio Geo305 using a combination of rotary open hole drilling and dynamic sampling. Dynamic sampling was undertaken at a number of locations - particularly in the vicinity of the south west corner of Dunning Hanger to obtain undisturbed soil samples and allow logging of soils encountered. The location of boreholes is shown on Drawing D1696/SI/003 and borehole logs are provided in Appendix D.

All Borehole locations (thirteen in total) were undertaken subject to service and obstruction clearance with the locations designed to further delineate the full extent PCE plume across the apron area with particular focus within Dunning hanger and adjacent to the south west corner. A number of borehole installations were subsequently undertaken at the same locations as previous MIP tests, where indications of potential contamination within subsoils were given by the MIP testing. A summary of all boreholes undertaken, including location and rationale is provided in Table 3.

**Table 3: Borehole Summary**

Borehole ID	Location	Easting, Northing	M AOD	Rationale/ comments
CELBH01	Inside Dunning Hanger	N/A	N/A	Adjacent to solvent disposal drain
CELBH02	Inside Dunning Hanger	N/A	N/A	Down hydraulic gradient of solvent disposal drain
CELBH03	Adjacent to the south west corner of Dunning Hanger	455937, 101369	8.084	Down hydraulic gradient of solvent disposal drain
CELBH04	Centre of apron area	455903, 101374	7.99	Centre of apron area
CELBH05	Inside Dunning Hanger	N/A	N/A	Cross hydraulic gradient, to determine north eastern most extent of PCE plume
CELBH06	To south of Boiler House	455972, 101341	8.124	Cross hydraulic gradient, to determine south eastern most extent of PCE plume
CELBH07	To north of Former naval stores in vicinity of existing well MCBH01	455928, 101353	8.193	Situated in vicinity of existing borehole MCBH01 which has historically had the highest concentrations of PCE during previous rounds of groundwater monitoring
CELBH07A	Opposite and in the vicinity of western doors to Dunning Hanger	455917, 101395	7.988	No well installation. Undertaken due to elevated PID readings at 1.0-3.0 mbgl during testing of MIP7. Corresponding soil samples obtained
CELBH08	To west of service road between Swann and Dunning Hangers	455874, 101377	8.081	Down hydraulic gradient of solvent disposal drain
CELBH09	North of apron area	455894, 101412	8.016	Cross hydraulic gradient, northernmost extent of PCE plume
CELBH10	Between Esmonde and Swann Hanger	455846, 101368	8.039	Borehole undertaken to 10 mbgl to obtain soil samples based on elevated DELCD readings at CELMIP09. Down hydraulic gradient, to determine western most extent of PCE plume
CELBHMIP11 A	Within service road Between, Dunning hanger and boiler house	455963, 101369	8.048	Undertaken based on MIP11 findings. Elevated PID reading between 4.0-5.0mbgl
CELBH12	Former vehicle refuelling area to the south	455921, 101193	8.714	Undertaking to assess ground conditions in vicinity of former vehicle refuelling area.

### 4.3 Ground Conditions

The ground conditions encountered during the intrusive investigation generally confirmed the anticipated deposits identified during the previous site investigations across the Daedalus Waterfront

Zone. These comprised Made Ground overlying Brickearth and plateau Gravel Deposits in turn underlain by deposits associated with the Bracklesham Beds. Borehole logs are presented in Appendix D.

#### **Made Ground**

Made ground was encountered at all borehole locations to a maximum depth of 0.50 mbgl and generally comprised reworked natural material generally described as soft to firm clayey SILT with brick, concrete and occasional clinker and ash fragments.

#### **Brickearth**

Brickearth deposits were encountered to depths between 1.50 mbgl and 2.20 mbgl in all locations and were generally described as soft to firm light orange brown clayey silt with occasional fine gravel of flint. However, deposits between 0.60 mbgl and 1.50 mbgl within CELBH06 have been described as silty gravelly sand.

#### **Plateau Gravels**

These deposits were encountered in all borehole locations generally comprising sandy gravel underlain by silty slightly gravelly sand generally to depths of 6.50-7.50 mbgl, although these deposits were encountered to depths of 8.0 mbgl within CELBH08 and 8.30 mbgl within CELBH10 which were both undertaken in locations in the west of the apron area.

#### **Bracklesham Beds**

All boreholes were progressed to encounter strata associated with the Bracklesham Beds. These deposits were generally encountered at depths between 6.50m and 8.30 mbgl and have been generally described as firm to stiff dark bluish grey laminated silt/clay with shell fragments. The Bracklesham beds are of variable composition and it should be noted that in a number of locations (CELBH01, CELBH02, CELBH07, CELBH10) a silty, slightly gravelly sand horizon was recorded within the upper strata of the Bracklesham Beds to a maximum depth of 10.0 mbgl. Based on the boreholes undertaken the depth to the top of the Bracklesham beds generally increases to the west of the apron area.

### **4.3.1 Visual and Olfactory Evidence of Contamination**

Visual and olfactory evidence of contamination such as soil staining and odours were encountered during drilling at locations CELBHMIP11A at 4.0 mbgl (saturated) and CELBH12 at 3.0 mbgl (unsaturated). Head space testing was undertaken on soils obtained from the aforementioned depths at each location with a VOC reading of 195ppm at 4.0 mbgl from CELBHMIP11A and 109ppm at 3.0 mbgl from CELBH12. Soils samples were obtained from these locations also and sent for laboratory analysis. A summary of the soil sample analysis is provided in Section 5.2 of this report.

### **4.3.2 Obstructions**

A number of proposed exploratory locations were first cored through surface concrete but were unable to be progressed further due to the presence of additional concrete hardstanding below 0.20 mbgl. One such location was located within Dunning Hanger and the second located to the south of the apron area as shown on Drawing D1696/SI/002. Furthermore, shallow concrete obstructions were encountered in the vicinity of the former vehicle refueling area with MIP13 unable to progress casings to facilitate subsequent MIP testing. Following completion of CELBH12 within the eastern area of the vehicle refueling area a series of hand pits as detailed in section 4.3.3 of this report were undertaken to determine the extent of the concrete obstruction in this area.

### 4.3.3 Hand Pitting

Near surface concrete obstructions were encountered in the vicinity of the former vehicle refuelling area with MIP13 unable to progress casing to allow subsequent MIP testing of sub soils. Following completion of CELBH12 within the eastern area of the vehicle refuelling area, a number of hand pits were undertaken to determine the extent of the concrete obstruction in this area. Drawing D1696/SI/004 shows the location of the hand pits in relation to CELBH12 and MIP13. All but one of the hand pits progressed below 0.40m bgl with reinforced concrete encountered across the north and centre of the refuelling area. Based on the obstructions encountered and anecdotal evidence of a fuel pump house in the vicinity, it is considered likely that an underground storage tank is present in this area and further investigation maybe required to determine the presence of a tank and or other structures below ground in this area.

Additionally, Celtic proposed to undertake a further borehole location and well installation within the grassed verge area directly to the south of the apron area and to the south of Implacable Road. Hand pitting was undertaken at this proposed location in order to clear the presence of underground utilities, however whilst undertaking hand pitting it was noted that near surface soils approx. 0.30 mbgl contained cement bound asbestos fragments (Chrysotile). Upon encountering the cement bound asbestos fragments the hand pit was immediately ceased and no further drilling was undertaken across the grassed area. Photographs of the material encountered is shown in Appendix B.

## 5.0 CONTAMINATION ASSESSMENT

### 5.1 Summary of MIP Findings

Whilst undertaking MIP testing across the site, Celtic's supervising engineer was in close liaison with the MIP operator to determine whether the presence of any contamination was being indicated by the MIP, in order to further determine whether a borehole was required at a certain MIP location. By undertaking boreholes and well installation this facilitated the collection of soil and groundwater samples to quantify and identify the nature of any contamination indicated by the MIP at a certain location.

The MIP tests were performed by static penetration using a wheeled rig equipped with hydraulic rams and a support vehicle equipped with MIP control equipment.

The MIP is designed to provide qualitative and semi qualitative detection of VOC's (Volatile Organic Compounds) in the sub surface by utilising the following three detectors;

- Photo-Ionisation Detector (PID) – detection of organic and inorganic compounds
- Flame-Ionisation Detector (FID) – detection of carbon-hydrogen bonded organic compounds (all hydrocarbons)
- Dry Electrolytic Conductivity Detector (DELCD) – Detection of chlorinated and Brominated Solvents

The highest DELCD readings were noted throughout the saturated zone of MIP1 (below 4.50m bgl) which is approximately 50m south west of Dunning Hanger. However, MIP locations MIP12 and MIP08 which are in closer proximity to the south west corner of Dunning Hanger recorded elevated, (albeit at a lower magnitude to DELCD readings at MIP01) DELCD readings at 7.50mbgl which likely corresponds with the top of the more impermeable Bracklesham Beds.

DELCD readings were lowest at locations MIP06 (approximately 50m to the north of the solvent disposal drain), MIP02 and MIP03 (approximately 15-25m to the north east of the solvent disposal drain) and MIP11 (approximately 15m to the south east of the solvent disposal drain) supporting findings of the previous investigation that the PCE plume is migrating away from the south west corner of Dunning Hanger.

Whilst the focus was generally on the presence of PCE contamination, it should be noted that there were noticeable PID readings within the unsaturated soils at MIP locations MIP07, MIP02 and within saturated and unsaturated soils at location MIP11A which is supported by olfactory evidence of contamination identified when undertaking a subsequent borehole installation at this location. In addition, soil samples were obtained for laboratory analysis at the aforementioned locations. Details of the soil samples collected based on findings of the MIP investigation along with all other soil samples obtained for laboratory testing is provided in Section 5.2 of this report.

### 5.2 Soil Sampling

A total of twenty soil samples were obtained during borehole drilling from a number of selected borehole locations to provide spatial coverage and information on the different soil deposits encountered at various depths. Soil samples were generally obtained based on geology, proximity to the solvent disposal drain, findings of the MIP, olfactory evidence of contamination and elevated VOC readings from Headspace testing.

All samples were analysed for Tetrachloroethene (PCE) and associated compounds. Nineteen of the twenty samples analysed did not indicate elevated concentrations of PCE and associated compounds (all below 1.0 µg/kg). However, one sample from CELBH04 (towards the centre of the apron area) at

7.30 mbgl from the top of the Bracklesham Beds recorded PCE concentrations of 1500 µg/kg and 85 µg/kg for Trichloroethene (TCE).

A number of additional soil samples were obtained from boreholes were preceding MIP testing at a number of locations indicated the potential presence of contamination. Those such locations and depths are listed below in Table 4.

**Table 4: Summary of soil samples obtained based on MIP findings**

MIP Location ID and subsequent Borehole ID	Indication from MIP	Depth mbgl	Elevated concentrations of contaminants identified and Tetrachloroethene (PCE) concentrations
MIP11/ CELBHMIP11A	Elevated PID readings	3.5-6.5	Tetrachloroethene (PCE) <1.0µg/kg Total TPH = 2800mg/kg at 3.5-4.0 mbgl Lead = 1000mg/kg at 5.0-6.0 mbgl
MIP7/ CELBH7A	Elevated PID readings	1.5-3.0	Tetrachloroethene (PCE) <1.0µg/kg within soil samples obtained from 1.50 m and 2.0 mbgl
MIP9/ CELBH10	Elevated DELCD readings	8.50 – 10.0	Tetrachloroethene (PCE) <1.0µg/kg within soil samples obtained from 9.0 m and 10.0 mbgl

As shown in Table 4 above, the soil samples which were obtained following an indication of potential contamination from the preceding MIP testing, did not identify any concentrations of Tetrachloroethene (PCE) at the three locations. However, elevated levels (2800mg/kg) of Total Petroleum Hydrocarbons (TPH) were identified within soil samples at 3.50-4.0mbgl from CELBHMIP11A and was supported by olfactory evidence noted during the site investigation. The presence of TPH within soils at CELBHMIP11A indicates the presence of a localised hot-spot situated between Dunning Hanger and the boiler house.

Soil samples were obtained from 4.0m bgl and 6.0m bgl at CELBH12 in the vicinity of the former vehicle refueling area due to the presence of olfactory contamination. However, soil analysis of the aforementioned samples did not indicate any noticeable elevated concentrations of contaminants and each sample recorded Benzene concentrations <1.0mg/kg and TPH concentrations <10mg/kg. All laboratory analysis for soil samples is presented in Appendix E.

### 5.3 Groundwater

#### 5.3.1 Groundwater Observations

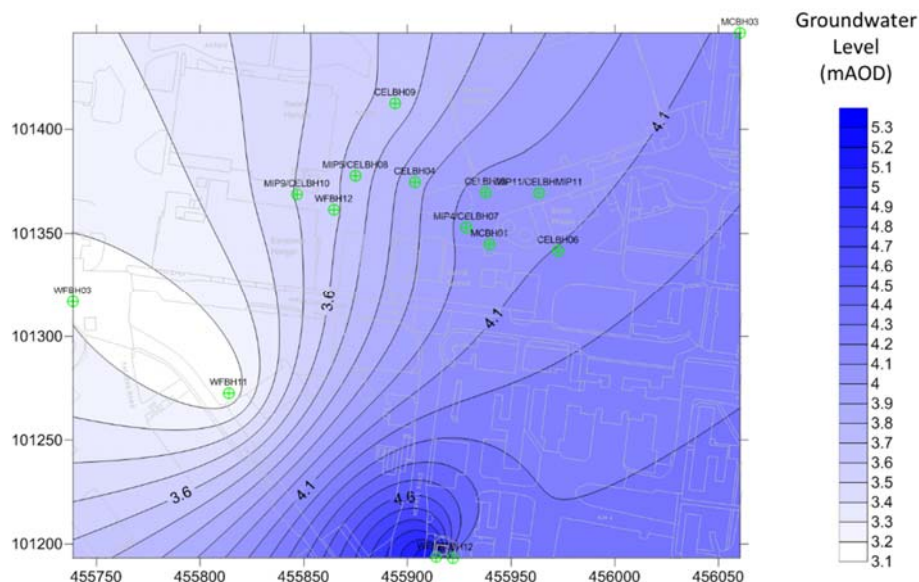
Prior to the intrusive site investigation Celtic undertook groundwater sampling from a number of existing wells across the Waterfront Zone. Furthermore, upon completion of the intrusive site investigation one round of post works groundwater sampling was undertaken. Table 5 summaries the recorded groundwater elevations from the existing wells and the boreholes installed as part of the works.



**Table 5: Summary of Groundwater Elevations**

Borehole ID existing wells	Date	Groundwater elevation MAOD
WFBH13	03/08/16	5.253
MCBH01	22/07/16	4.046
WFBH12	22/07/16	3.577
WFBH11	22/07/16	3.115
WFBH03	03/08/16	3.195
MCBH03	03/08/16	4.131
Celtic Borehole ID	Date	Groundwater elevation MAOD
CELBH01	09/08/16	N/A (recorded at 4.13 mbgl)
CELBH02	09/08/16	N/A (recorded at 4.12 mbgl)
CELBH03	10/08/16	4.054
CELBH04	10/08/16	3.871
CELBH05	10/08/16	N/A (recorded at 4.09 mbgl)
CELBH06	10/08/16	4.104
CELBH07	11/08/16	4.033
CELBH08	11/08/16	3.641
CELBH09	17/08/16	3.636
CELBH10	17/08/16	3.577
CELBHMIP11A	17/08/16	4.038
CELBH12	17/08/16	4.304

The lowest recorded groundwater elevations were recorded at the west of the site at existing well locations WFBH11 and WFBH03 with the Celtic boreholes across the apron area indicating groundwater flow in a westerly direction away from Dunning Hanger. This is generally in line with findings of the previous site investigations at the site. Groundwater encountered during the borehole installation works was first encountered within the Plateau Gravel Deposits at all borehole locations. No free product (*i.e.* Light or Dense non-aqueous Phase Liquid (LNAPL, DNAPL) was observed during groundwater monitoring at the existing and Celtic Boreholes. A contour plot of recorded groundwater elevations is Appendix G and Figure 1 below.

**Figure 1 – Contour Plot of Groundwater Elevations**


### 5.3.2 Groundwater Assessment for PCE

The primary focus of the site investigation was to further delineate the identified PCE Tetrachloroethene across the apron area and in the vicinity of the south west corner of Dunning Hanger due to the presence of a drain which has been identified as the potential source for PCE as the drain is believed to have been used as a solvent disposal point. All groundwater samples obtained from the existing wells and Celtic's borehole were tested for PCE and associated compounds. All boreholes were purged prior to sampling to ensure representative samples were obtained. Similarly, due to the inherent nature of PCE (Dense Non Aqueous Phase Liquid DNAPL) all groundwater samples were obtained close to the base of each borehole.

PCE concentrations within the groundwater samples obtained as part of the works have been compared to the remedial target concentration of 521µg/l, which was determined within Campbell Reith's Controlled Waters Risk Assessment, September 2014. Table 6 below summaries the borehole locations which exceed the remedial target concentration for PCE as well as summarising recorded concentrations of associated breakdown compounds of PCE at these borehole locations also.

**Table 6 Summary of Borehole Location Exceeding Remedial Target Concentration for PCE**

Borehole ID	Tetrachloroethene (PCE) Concentrations µg/l	Trichloroethene (TCE) Concentrations µg/l	cis 1,2-Dichloroethene (DCE) Concentrations µg/l	Vinyl Chloride Concentrations µg/l
MCBH01	770	<1.0	2.5	<1.0
WFBH12	530	1.8	13	<1.0
CELBH03	610	<1.0	<1.0	<1.0
CELBH04	560	26	<1.0	<1.0

A contour plot for the PCE concentrations recorded across the apron area is presented in Appendix G and Figure 2 below. The locations of the boreholes where the groundwater samples exceed the remedial target concentrations indicate a PCE plume extending westward with the observed hydraulic gradient from the south west corner of Dunning hanger at CELBH03. The highest concentrations of PCE were recorded at the existing MCBH01 location.



samples from this location the TPH concentrations indicate a localised hotspot of TPH contamination within the Plateau Gravels Deposits situated between dunning Hanger and the Boiler House.

## 6.0 SOIL OXIDANT DEMAND TESTING

As part of the site investigation works Celtic undertook laboratory study to determine soil oxidant demand (SOD). This Section details the laboratory testing works for materials sourced from the Daedalus site. The samples for the bench scale trial were collected from site by Celtic in September 2016 from three locations.

### 6.1 Soil Natural Oxidant Demand (NOD) Test Methodology

The soil NOD testing was carried out in line with the methodology detailed in American Societies for Testing and Materials (ASTM) D7262 – 07 (Standard Test Method for Estimating the Permanganate Natural Oxidant Demand of Soil and Aquifer Solids) The test involved of addition of oxidant solution to a mass of aquifer material in a well-mixed batch reactor. The consumption of oxidant was then monitored after 48 hours.

Soil samples recovered from monitoring wells CELT-MW01, CELT-MW03 and CELT-MW09 were utilised for the NOD tests. Samples were recovered from the sand, sand and gravels, and the clay strata for testing and each sample were tested in duplicate.

### 6.2 SOD Test Results

The SOD test results for permanganate are presented in Table 7. The SOD in the sand, and sand and gravels layers are relatively low as expected and are in-line with Celtic and literature values. The SOD in the clay layer is an order of magnitude higher, also as expected, due to the natural organic matter present in the clay material. The SOD laboratory results are presented in Appendix F.

**Table 7 – Permanganate Soil NOD Results (48 Hours Test) Soil Moisture Compensated**

Sample Reference	Strata	Sample	Start Concentration (g/kg)	End Concentration (g/kg)	Calculated SOD (g/ kg)	Average SOD (g/kg)
CELT-MW01	Sand	Sample 1	20.0	17.3	2.7	2.7
CELT-MW01		Sample 2	19.7	17.1	2.6	
CELT-MW03		Sample 1	19.6	16.7	2.8	
CELT-MW03		Sample 2	19.9	17.1	2.8	
CELT-MW09		Sample 1	19.5	17.1	2.4	
CELT-MW09		Sample 2	19.7	17.0	2.7	
CELT-MW01	Sand & Gravels	Sample 1	16.6	15.1	1.6	1.7
CELT-MW01		Sample 2	16.7	14.7	2.0	
CELT-MW03		Sample 1	16.1	14.4	1.7	
CELT-MW03		Sample 2	16.1	13.9	2.2	
CELT-MW09		Sample 1	15.8	14.5	1.3	
CELT-MW09		Sample 2	15.9	14.4	1.5	
CELT-MW01	Clay	Sample 1	20.5	0.0	20.5	20.1
CELT-MW01		Sample 2	20.7	0.0	20.7	
CELT-MW03		Sample 1	20.2	0.3	19.9	
CELT-MW03		Sample 2	19.8	0.0	19.8	
CELT-MW09		Sample 1	20.0	0.0	20.0	
CELT-MW09		Sample 2	19.9	0.0	19.9	

### 6.3 Conclusions

The conclusions of the bench tests are as follows:

- The chemical oxidation SOD tests were successfully completed for samples collected from three different locations on site, using potassium permanganate as the chemical oxidant.
- The determined SOD for the sand, and sand & gravels layer ranged between 1.3 g/ kg to 2.8 g/kg with an average of 2.7 g/kg and 1.7 g/kg respectively. The SOD for the clay layer was significantly higher, as expected and ranged between 19.8 g/kg to 20.7 g/kg with an average of 20.1 g/kg.

## 7.0 CONCLUSIONS

Celtic undertook additional site investigation works utilising (membrane interface probing) MIP and subsequent borehole installations during August 2016. The site investigation was primarily focused on undertaking intrusive ground investigation within Dunning hanger and across the adjacent apron area to further delineate dissolved Tetrachloroethene (PCE) and associated compounds identified across this area by a number of previous site investigations. Intrusive site investigation works (although on a smaller scale) were also undertaken to the south of the apron area at the former vehicle refuelling area. The findings of this site investigation was to also assist with the design of which remediation techniques would be most viable.

The ground conditions encountered during the site investigation works were generally in line with findings of previous site investigations, such as a westerly groundwater flow across the apron area and the depth to the more impermeable Bracklesham Beds between 6.50 mbgl and 8.50m mbgl. Plateau Gravel deposits were recorded in all borehole locations to overlie the Bracklesham beds between 4.0m and 6.0m in thickness with these deposits generally increasing in thickness to the west of the apron area. All groundwater strikes during drilling of the boreholes encountered groundwater within the Plateau Gravel Deposits. It should be noted that Celtic proposed to undertake an additional well installation on the grassed area to the south of Implacable Road, however whilst undertaking hand pitting for the purposes of service location, asbestos containing materials in the form of cement bound asbestos was encountered within shallow soil at 0.35mbgl and therefore no additional intrusive site investigation works was undertaken within this area.

A number of boreholes were undertaken at the same location as preceding MIP tests, where there was an indication of potential contamination within the sub soil. Where elevated MIP readings were encountered soil samples were obtained from subsequent drilling at the corresponding depths. No soil samples obtained based on the MIP finding recorded any significantly elevated concentrations of PCE or other contaminants with the exception of soil samples from CELBHMIP11A which recorded TPH concentrations of 2800mg/kg within the Plateau Gravel Deposits. Elevated TPH concentrations were also recorded within groundwater at CELBHMIP11A indicating the presence of a localised TPH hotspot between Dunning hanger and the Boiler House Building. All soil samples obtained were also analysed for Tetrachloroethene (PCE) and associated compounds. All further soil samples obtained from boreholes recorded PCE concentrations at or below 1.0mg/kg with the exception of one soil sample from CELBH04 at the top of the Bracklesham beds (7.30mbgl) which recorded PCE concentrations of 1500 µg/kg. Secondly, PCE concentrations within groundwater from this borehole location were recorded to exceed the remedial target concentration for PCE.

Tetrachloroethene (PCE) concentrations within groundwater from previous investigations were determined by Campbell Reith to present a significant risk to controlled waters and generated a remedial target value of 521 µg/l which has been agreed with the EA. As such concentrations of PCE with groundwater samples obtained during this site investigation were compared against the remedial target value. A total of four locations (including CELBH04 detailed above) recorded PCE concentrations above the remedial target value. The recorded concentrations at the four borehole locations indicate the plume to be migrating in a westerly direction across the apron area, however the recorded PCE concentrations indicate a potential source of PCE to be situated externally close to the location MCBH01 and that the solvent disposal drain within Dunning hanger is no longer a continuing source of PCE. This is based on borehole locations CELBH01 and CELBH02 situated within dunning hanger and in the vicinity of the drain recording PCE concentrations within both soil and groundwater samples to be well below the remedial target value.

Site investigation works within the former vehicle refuelling area recorded Benzene concentrations of 20 µg/l within groundwater at CELBH12. However, due to a number of concrete obstructions encountered at shallow depths additional intrusive works were not possible. It is considered likely that an underground storage tank maybe present in this area based on anecdotal evidence of a fuel pump house directly to the south. As such it is proposed that additional site investigation works in the form of trial pitting is required to further understand ground conditions in this area.

Based on the findings of the site investigation which include, the extent of the PCE plume identified during Site Investigation works, the location of below ground services and obstructions, in addition to activities of the tenants around the site, it will be necessary to amend the proposed remediation application method, although the original remedial techniques proposed by Celtic's original tender submission (April 2015) will remain the same. A description of the proposed remediation works is provided in Section 8.



## 8.0 OUTLINE REMEDIATION DESIGN

Following the completion of the site investigation works, it can be confirmed that the remediation techniques that were originally proposed to treat the primary contaminant of concern (PCE) would still be applicable. This recommendation is based on the data, which was collected as part of the site investigation works when compared against the objective of the remediation works to reduce PCE concentrations to below the EA agreed concentration of 521 µg/l.

The original approach utilised the injection of a chemical oxidant (Chemox), to break down the primary contaminant of concern within the aquifer to benign degradation compounds. This was combined with the installation of reactive zone, utilising Zero Valiant Iron (ZVI) to provide a longer term reagent to further reduce contaminant concentrations within the aquifer and treat any residual impact.

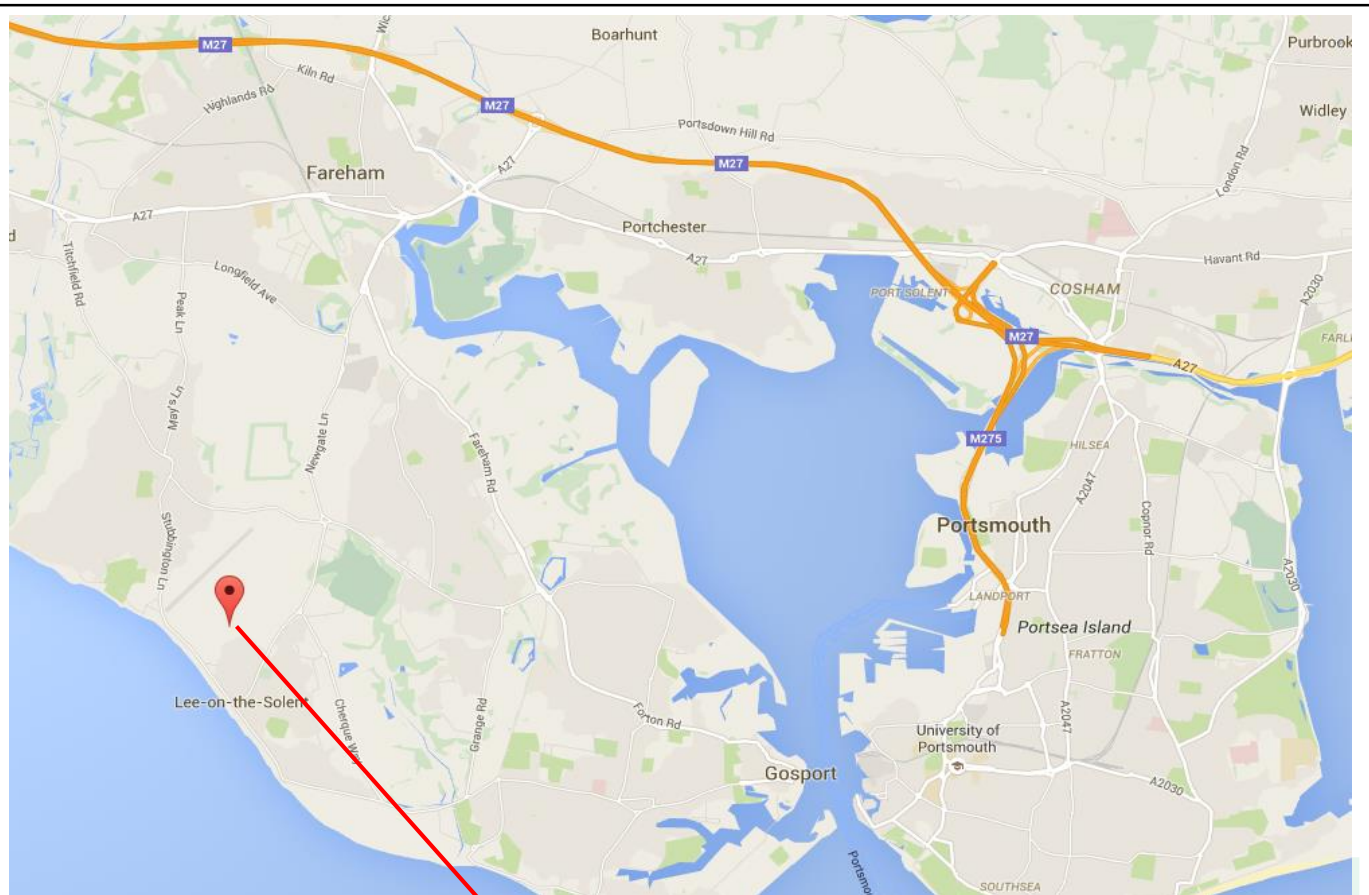
However, based on a combination of the location of the source contaminants identified during Site Investigation works, the location of below ground services and obstructions, in addition to activities of the tenants around the site, it will be necessary to amend the application method of the treatment. Therefore, it is proposed to target the source areas of contamination as identified in the site investigation works by application of the Chemox solution via injection into the existing well infrastructure in addition to some additional wells. Furthermore the addition, ZVI would be installed into the source areas via mixed soil columns using an auger drilling technique.

The remediation of the former vehicle refuelling area, requires further investigation, in the form of a trial pitting exercise to confirm the presence or absence of the potential underground storage tank (UST) in this area of the site.

In summary, the remediation techniques that were proposed in Celtic's original submission remain suitable for the purposes of the objectives of the remediation works. However, the method of proposed application will need to change to accommodate the findings from the site investigation works.


## APPENDICES

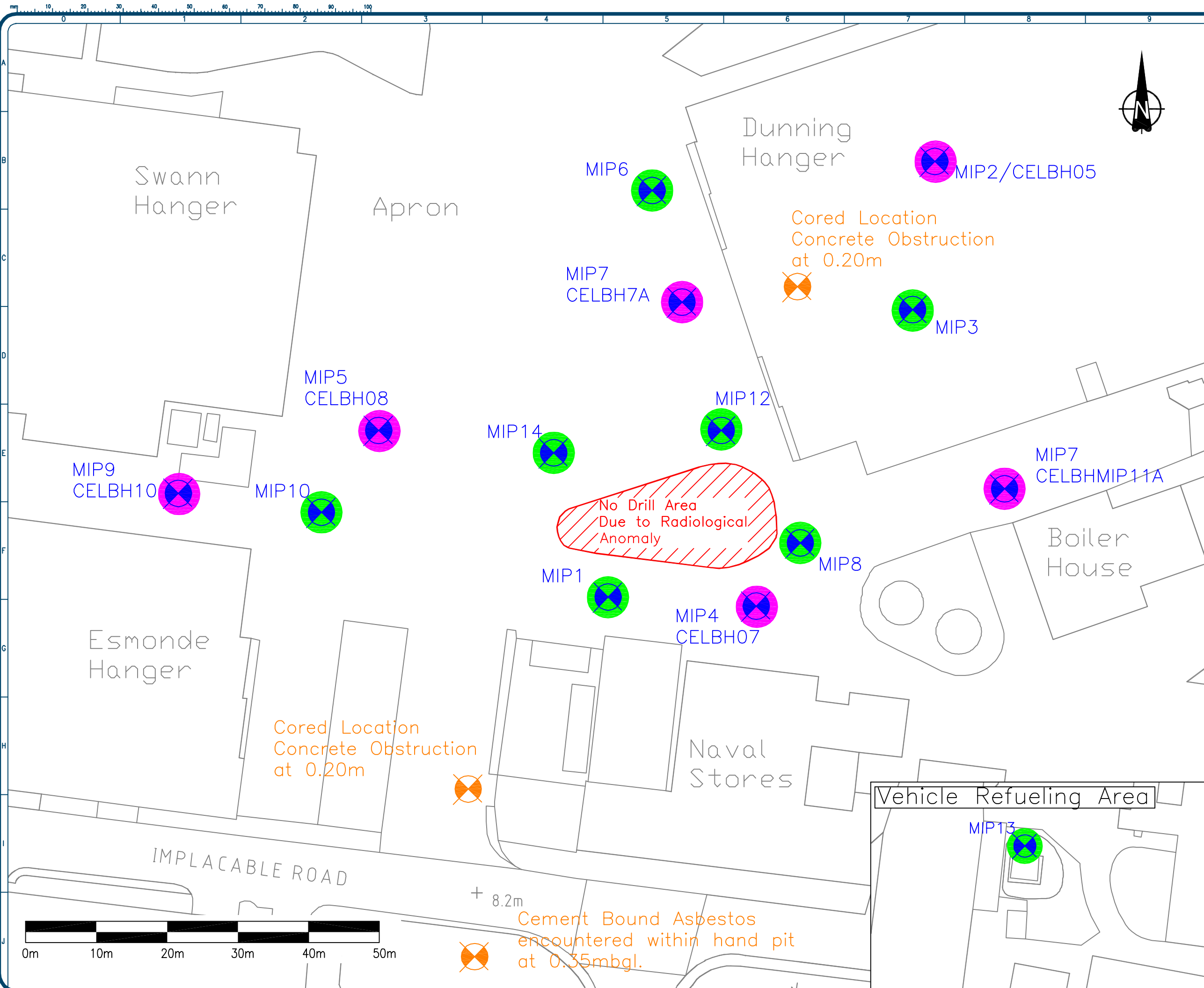
## APPENDIX A - DRAWINGS





Source: Google maps

Date: September 2016	Scale: NTS	Title: Site Location Plan
----------------------	------------	---------------------------

	Client: Homes and Communities Agency	
	Project: Daedalus	Job No: C1696
	Figure : D1696/SI/001	



Legend  
Site Co-ords: 455896.75, 101391.47

-  Celtic MIP Location August 2016
-  MIP Location with subsequent borehole based on MIP findings

REV	COMMENT	DATE
2	Drawing Revised	21/09/16
1	Drawing Revised	23/08/16
0	ISSUED FOR COMMENT	10/08/16



Unit 8  
Commerce Park  
Brunel Road  
Thrale  
Reading  
RG7 4AB  
enquiries@celtic-uk.com  
www.celtic-uk.com

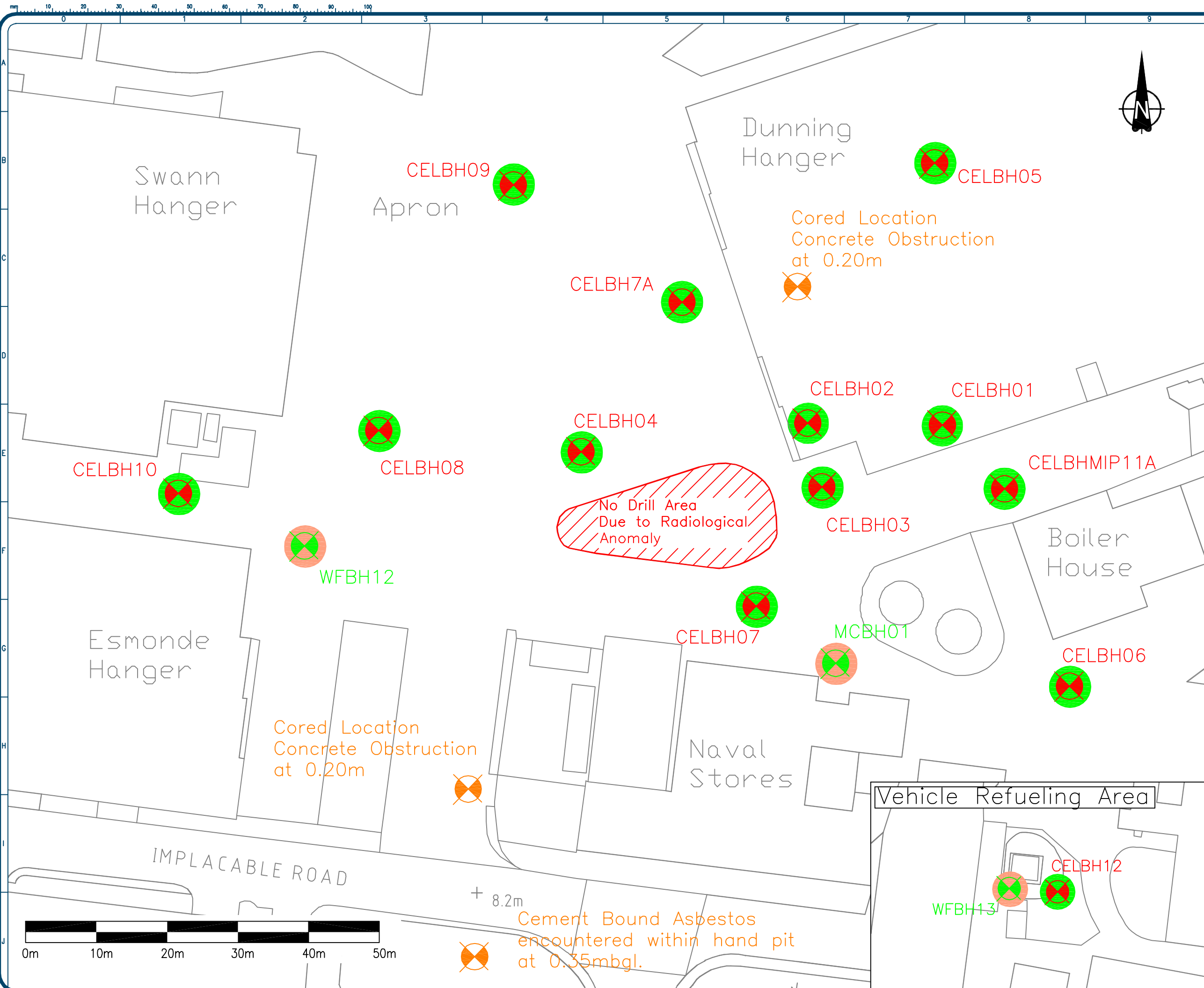
Client:  
Homes and Communities Agency

Project:  
HMS Daedalus

Title:  
MIP Investigation Locations

Drawn by	Checked	Date	Authorised	Date
GEP	SV	10/08/16		
Original Scale	Date	Rev	Paper	
1:500	10/08/16	2	A3	

Drawing Number  
D1696/SI/002



Legend  
Site Co-ords: 455896.75, 101391.47

- Celtic Borehole August 2016
- Existing Borehole Locations

REV	COMMENT	DATE
2	Drawing Revised	21/09/16
1	Drawing Revised	23/08/16
0	ISSUED FOR COMMENT	10/08/16



Unit 8  
Commerce Park  
Brunel Road  
Thrale  
Reading  
RG7 4AB  
enquiries@celtic-uk.com  
www.celtic-uk.com

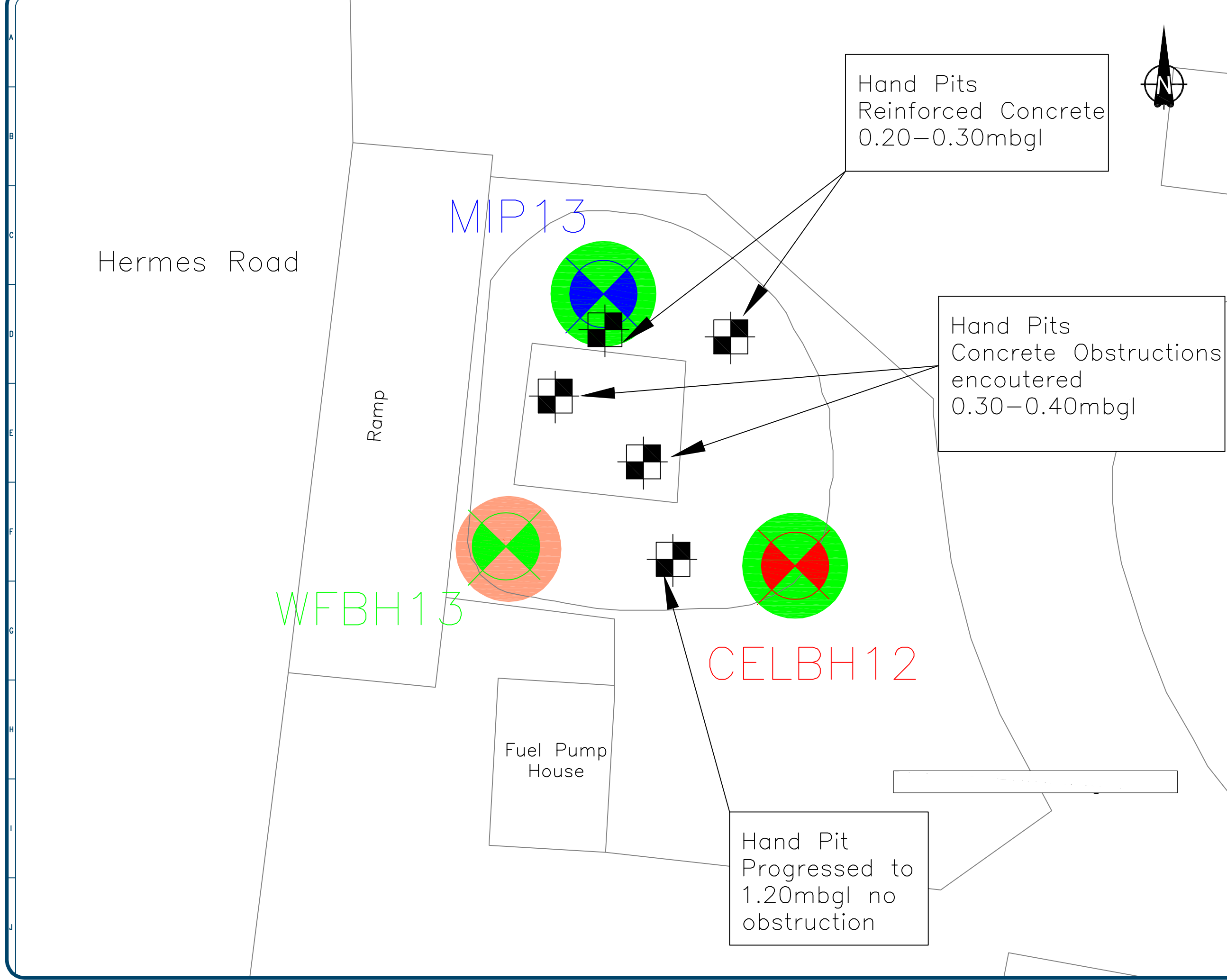
Client:  
Homes and Communities Agency

Project:  
HMS Daedalus





Title:  
Borehole Investigation Locations

Drawn by	Checked	Date	Authorised	Date
GEP	SV	10/08/16		
Original Scale	Date	Rev	Paper	
1:500	10/08/16	2	A3	

Drawing Number  
D1696/SI/003



Legend  
Site Co-ords: 455896.75, 101391.47

-  MIP Location
-  CelticBorehole August 2016
-  Existing Borehole Locations
-  Hand Pit August 2016

0	ISSUED FOR COMMENT	22/09/16
REV	COMMENT	DATE



Unit's  
Commerce Park  
Brunel Road  
Reading  
RG7 4AB

enquiries@celtic-uk.com  
www.celtic-uk.com

Client:  
**Homes and Communities Agency**

Project:  
**HMS Daedalus**

Title:  
**Hand Pit Investigation at Former Vehicle Refueling Area**

Drawn by	Checked	Date	Authorised	Date
GEP	SV	10/08/16		
Original Scale	Date	Rev	Paper	
1:200	10/08/16	0	A3	

Drawing Number  
**D1696/SI/004**

## APPENDIX B – PHOTO LOG





Grassed area to south west of Dunning Hanger where no intrusive works were to be undertaken



Concrete coring inside of Dunning Hanger



Borehole installation at CELBH02 within Dunning Hanger



Borehole installation at CELBH03 adjacent to the south west corner of Dunning Hanger



Borehole installation at CELBH04



Bracklesham Beds encountered within dynamic sampling of CELBH09



MIP testing at location MIP11 between Dunning Hanger and the Boiler House



Hand pitting within former vehicle refueling area



Asbestos containing materials identified within shallow soils at the hand pit location to the south of Implacable Road

## APPENDIX C – LAMKELMA MIP REPORT

# HMS DAEDALUS

## ENVIRONMENTAL SOIL INVESTIGATION

### MIP REPORT

#### Membrane Interface Probe Test

---

**Project Ref.: P-106456-6**



PROJECT:	HMS Daedalus
----------	--------------

CLIENT:	Celtic Ltd.
---------	-------------

**FIELDWORK**

Equipment	31.0 tonne wheeled unit (UK17)
Date Fieldwork Started	1 <sup>st</sup> August 2016
Date Fieldwork Completed	12 <sup>th</sup> August 2016
Lankelma's Representative	Reg 13(1)
Client's Representative	Reg 13(1)

**REPORT**

Status	Revision	Action	Date	Name
Final	00	Completed	19/08/16	Reg 13(1)
		Checked	19/08/16	Reg 13(1)
		Approved	19/08/16	Reg 13(1)



## CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	COMPLETED WORKS.....	1
<b>2</b>	<b>FIELDWORK.....</b>	<b>1</b>
2.1	MEMBRANE INTERFACE PROBE .....	1
2.2	MIP QUALITY CONTROL .....	3
2.3	FIELD LOGISTICS .....	3
<b>3</b>	<b>GAS CHROMATOGRAPH COMPOUND RESPONSES .....</b>	<b>4</b>
3.1	FLAME IONISATION DETECTOR .....	4
3.2	PHOTO-IONISATION DETECTOR .....	5
3.3	DRY ELECTROLYTIC CONDUCTIVITY DETECTOR.....	7
3.4	VOC DETECTION FROM COMBINATION GAS CHROMATOGRAPHY... 8	8
<b>4</b>	<b>MIP INTERPRETATIVE DATA.....</b>	<b>10</b>
4.1	BASIC SOIL TYPE FROM ELECTRICAL CONDUCTIVITY .....	10
<b>5</b>	<b>MIP DATA REDUCTION AND PRESENTATION .....</b>	<b>10</b>
<b>6</b>	<b>MIP DATA INTERPRETATION NOTES .....</b>	<b>11</b>
<b>7</b>	<b>REFERENCES .....</b>	<b>12</b>

### SUMMARY TABLES

Table 1 MIP Test Summary.....		13
-------------------------------	--	----

### APPENDICES

APPENDIX A General Information

APPENDIX B Membrane Interface Probe Results - Raw [REDACTED]

APPENDIX C Membrane Interface Probe Results - Treated [REDACTED]

APPENDIX D Detector Response Tests - Overlay Plots [REDACTED]

APPENDIX E Detector Response Tests - Extrapolated Plots

## 1 INTRODUCTION

At the request of Celtic Ltd, an environmental ground investigation was carried out on project *HMS Daedalus*.

Site location:

HMS Daedalus  
Broom Way  
Lee-on-Solent  
PO13 9YA

### 1.1 COMPLETED WORKS

- 13 nr. Membrane Interface Probe Tests; and
- Factual report.

The *Summary Tables* section details the field records.

## 2 FIELDWORK

### 2.1 MEMBRANE INTERFACE PROBE

The Membrane Interface Probe (MIP) tests were performed by static penetration using a wheeled rig (UK17) equipped with hydraulic rams and a Lankelma support vehicle equipped with MIP control equipment.

The probe comprises of a heater block, operating at 120 °C, a permeable membrane and electrical conductivity [EC] sensor, connected by an inert trunkline to a gas chromatograph [GC] equipped with a range of volatile organic compound (VOC) detectors. It is advanced by a hydraulic push method in 0.33 m increments at a penetration rate typically varying between 0.5 - 1.5 m/min.

The system is intended to provide semi-quantitative detection of ground borne VOC.

The gas chromatograph contains 3 detectors:

Name	Function	Limit of Detection
Photo-ionisation detector [PID]	Detection of a broad range of organic and inorganic compounds with ionisation potential less than or equal to 10.6eV. Output recorded against depth in µV.	<1 ppm (parts per million)
Flame ionisation detector [FID]	Detection of carbon-hydrogen bonded organic compounds (all hydrocarbons). Output recorded against depth in µV.	<10 ppm

Dry electrolytic conductivity detector [DELCD]	Detection of chlorinated and brominated organic compounds. Output recorded against depth in $\mu\text{V}$ .	<1 ppm
Electrical Conductivity [EC]	Electrical conductivity can be used to indicate basic stratigraphy. Higher conductivity indicates dominantly cohesive material, with lower conductivity indicating more granular materials.	N/A

At each 0.33 m increment, the probe is paused for 45 seconds to allow the heater block to heat the ground interface. This volatilises the resident compounds which then diffuse through the membrane in a gaseous phase and are collected by the carrier gas flow behind the membrane. The gases are carried up the trunkline to the GC and through the detector array.

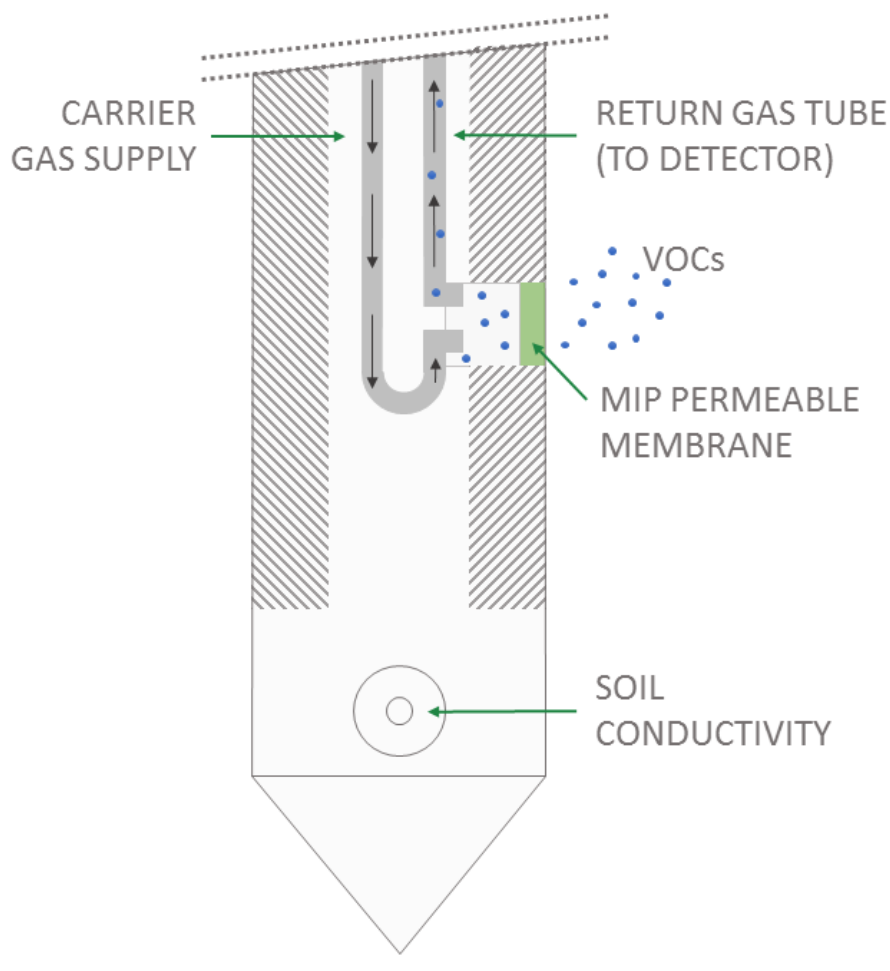


Figure 2-1. Cross section model of a typical membrane interface probe (not to scale).

The EC sensor on the probe acquires electrical conductivity data that enables an approximation of basic soil type.

## 2.2 MIP QUALITY CONTROL

In order to validate probe functionality and the GC detection system, chemical response tests are performed prior to each MIP test location.

Gases used throughout testing were CP Grade (>99.99% purity) Nitrogen and Hydrogen. During the tests, gas pressure was monitored to prevent any significant loss or gain of pressure.

A known chemical, ideally of a potential site compound, is introduced to the membrane at two measured concentrations. The following outputs are recorded:

- Detector responses (FID, PID & DELCD)
- Trip time between the introduction of compound at the membrane and detection at GC

The trunkline used was 20 m in length with a measured trip time of 27 seconds (+/- 1s). A flow rate of 40-45 ml/min was maintained. The test compound used was TCE ( $C_2HCl_3$ ) at concentrations of 10 parts per million (ppm) and 100 ppm.

The above outputs are used to confirm functionality and provide baseline 'zero' readings. The observed readings before the test compounds are introduced are averaged to provide an estimate of the baseline levels. These are later subtracted from the measured test values.

Measurements of detector response time were taken at each test for the specified trunkline.

After each test, the dipole conductivity was checked using a bronze/silver dipole tester consisting of both bronze and silver pin sets. The checker is placed first on the bronze side to test low level resistance (55  $\Omega$ ) and then the silver side for high resistance (290  $\Omega$ ). The results are logged using recording software to ensure they are within range.

## 2.3 FIELD LOGISTICS

The client was responsible for the positioning and re-survey of all investigative locations.

Target depth for the investigation was between 10 - 15 m. All tests were also dummy pushed to between 3.0 and 4.2 m at each location. Table 1 details the final test depths and reasons for test termination (Refusal Factor). Termination depths were advised by, and agreed with, the client's on-site representative.

### 3 GAS CHROMATOGRAPH COMPOUND RESPONSES

#### 3.1 FLAME IONISATION DETECTOR

The flame ionisation detector (FID) involves a process in which organic compounds are ionised to form carbon ions. An outline of the process is shown below;

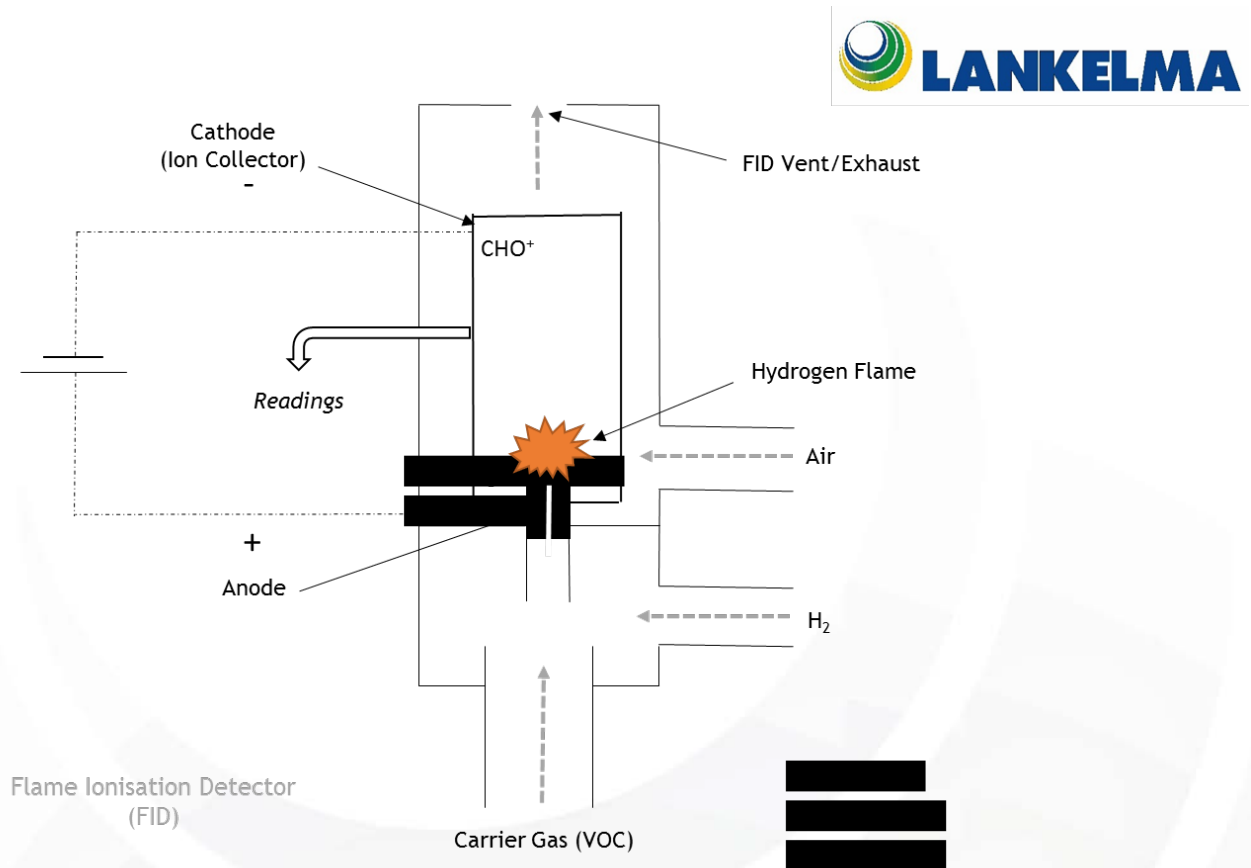


Figure 3-1. Flame Ionisation Detector (FID) process (not to scale).

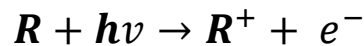
The sample (carrier gas) is introduced to a hydrogen flame within the FID oven and a thermal process ensures rapid ionisation across carbon bonded compounds to form carbon ions ( $C^+ + e^-$ ). These are then detected by a metal ion detector (high DC voltage bias). By applying positive charge to the flame tip (anode), ions are pushed towards a collection electrode (cathode) and readings of current are recorded via a live monitoring system.

The readings established from the FID, via amplifier/electrometer, are directly proportional to the concentration of hydrocarbons in the sample. Sensitivity is also proportional to the carbon chain length (carbon number) of the compound ionised (e.g. Methane << Ethane << Propane etc.). Hydrocarbon impurities, in this instance, can increase baseline noise and therefore reduce detector sensitivity. The FID is a destructive means of testing as the sample is burned during the process (see Section 3.3 for Combination FID/DELCD Process).

Generally, FID responds best to a wide range of VOC encountered. All hydrocarbons will be shown on FID if concentration is high enough. It will not however respond to any inorganic compounds e.g. Ammonia, hydrogen sulphide etc.

### 3.2 PHOTO-IONISATION DETECTOR

The Photo-Ionisation Detector (PID), also involves a process of ionisation but of both organic and inorganic compounds. It uses an ultra violet lamp to ionise a receptive species in the following equation;



Where:

R = Ionisable Compound (eV < 10.6)

hν = UV Photon with sufficient energy to ionise R

Unlike the FID, the PID is a non-destructive test. Imposing temporary photo-ionisation, post-detectors can be run downstream. The figure below represents the PID ion chamber and the action of UV photons to ionise

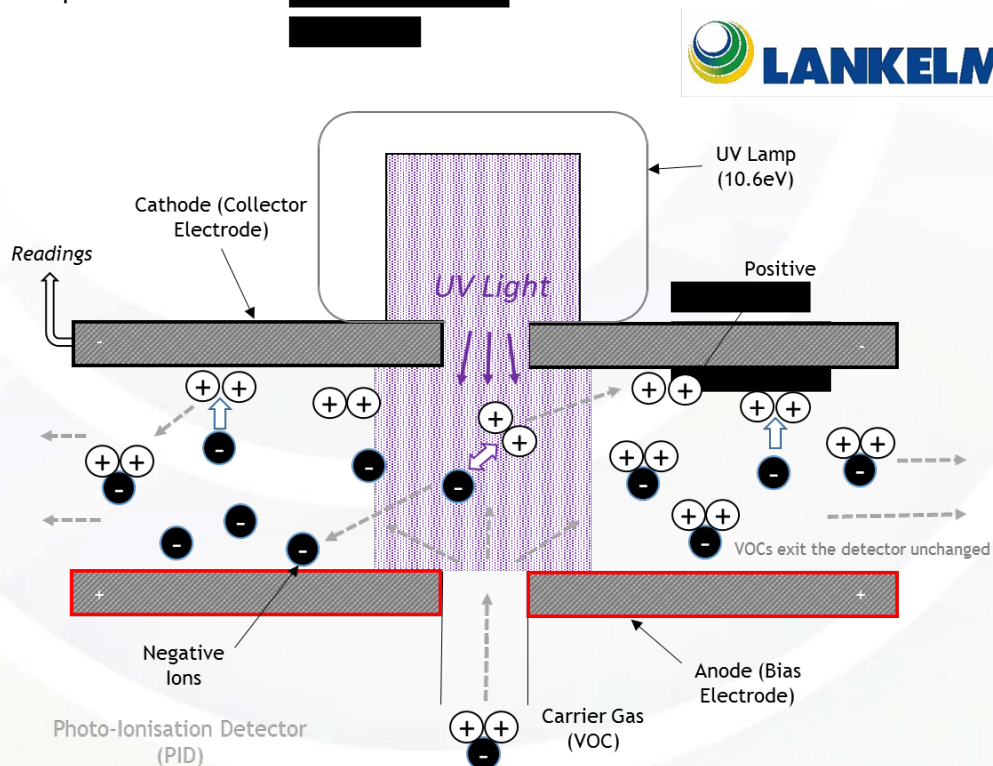


Figure 3-2. UV Ionisation using PID (not to scale).

When molecules enter the PID, in the vacuum-ultraviolet region, they absorb UV photons and eject electrons. These are collected by applying positive charge to a bias electrode (anode) and collecting readings at the collection electrode (cathode). Molecule ionisation is limited to the eV of the UV lamp (10.6eV). For example, methane (12.6eV) will not be detected from PID.

As with FID, PID readings are directly proportional to the concentration of a specific group of compounds, and towards carbon chain length. PID however, is also selective in its sensitivity across functional groups. It is 40x more sensitive than FID for aromatics, 10x more selective for alkanes and between 10-100x more sensitive generally. It will respond to any compound with an ionisation potential (eV) <10.6 e.g. Ammonia (inorganic).

### FID

Aromatics, Long-Chain Compounds >> Short-Chain Compounds >> Halogenated-Compounds

### PID

Aromatics, Iodine-Compounds >> Amines, Ethers, Ketones, Olefins, Sulphur-Compounds >> Chlorinated Aliphatics, Ethane >> Methane (No Sensitivity)

Figure 3-3. FID vs PID selectivity/sensitivity (adapted from RAE Systems – The PID Handbook).

The lamp used throughout testing was of 10.6eV capacity. This specification is seen as the most common, strongest and longest-lived although other capacity lamps can be used. The transmission of UV photons is dependent on lamp crystal thickness, quality and age. It is therefore possible to obtain some low-responses from a sample with an eV higher than that of the lamp. Additionally, with age, the lamp can become solarised or corroded and may not be able to ionise some compounds near the upper limit of the lamp's nominal capacity. A new 10.6ev lamp was used for this project so the above factors are unlikely to be significant.

The sensitivity of PID to a range of functional groups will vary as explained above. The response of PID using a 10.6eV lamp should, in theory, respond to the following;

- All hydrocarbons, whose chemical names end in the letters -ane, -ene or -yne;
  1. Except methane, ethane, propane, and acetylene.
  2. Except some names with chloro-, fluoro- or bromo-.
- All alcohol's whose chemical names end in -ol;
  1. Except methanol.
  2. Except some names with chloro-, fluoro- or bromo-.
- All aldehydes, whose names end in aldehyde;
  1. Except formaldehyde.
  2. Except some names with chloro-, fluoro- or bromo-.
- All ketones, whose chemical names end in -one;
  1. Except rarely if the name includes chloro-, fluoro- or bromo-.
- All esters, whose names end in -ate;
  1. Except rarely if the name includes chloro-, fluoro- or bromo-.
- All amines, sulphides.

Entry adsorption, in the PID inlet, can lead to slower response time for low-volatility samples.

### 3.3 DRY ELECTROLYTIC CONDUCTIVITY DETECTOR

Unlike the Wet Electrolytic Conductivity Detector (ELCD), the DELCD does not use a solvent and VOCs are detected in a gaseous phase. It also is specific in the detection of oxygenated halogen species. The DELCD, in this instance, is used in combination with FID. DELCD measurements are obtained from the remnants of ionisation from hydrogen flame;

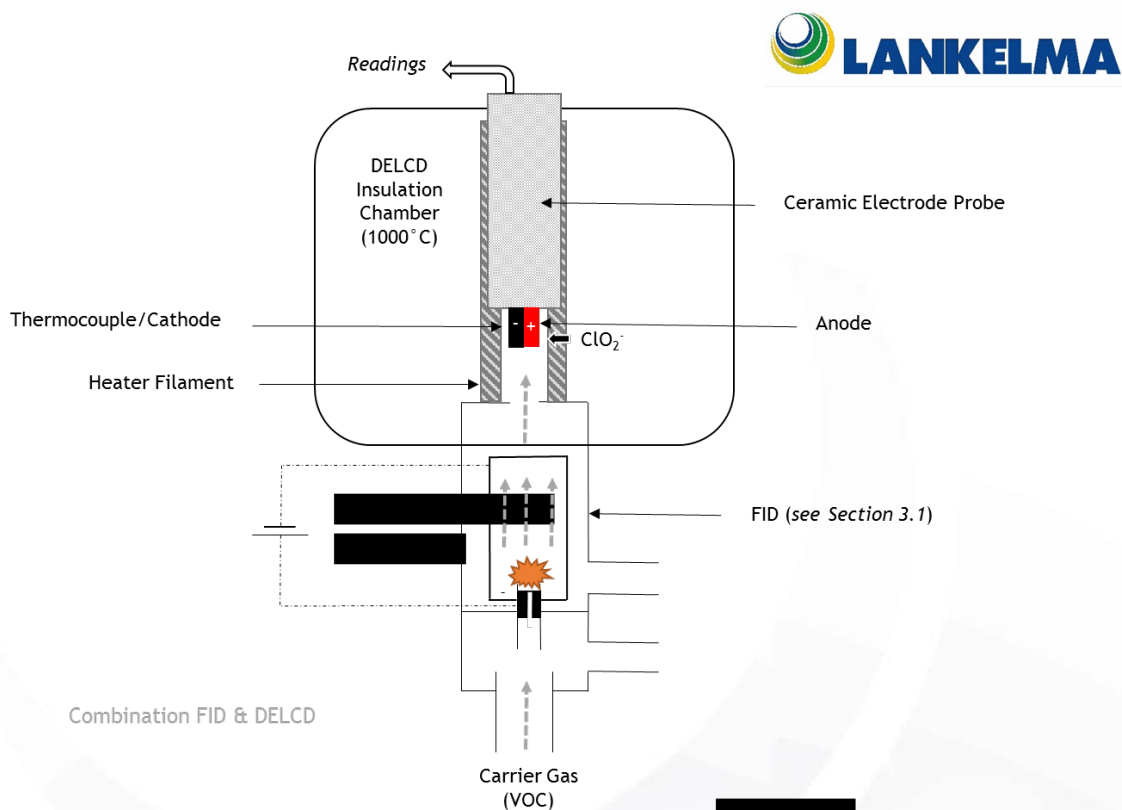


Figure 3-4. Combination FID/DELCD (not to scale)

As the FID collector electrode has a small identification capacity, it acts as a restrictor and splits gas to the exhaust to about  $\frac{1}{2}$  the flow. The remaining pass through to the DELCD. Oxidisation of halogens occur ( $\text{ClO}_2\cdot^- / \text{BrO}_2\cdot^-$ ) and this is detected at the DELCD stage.

The combination FID/DELCD will allow for reliable identification of hydrocarbon peaks and whether compounds are halogenated or not. The system can also be decoupled to run DELCD or FID independently. Cl/Br atoms are 100x more inclined to react with hydrogen from FID combustion than oxygen. Sensitivity can therefore be increased with decoupling.

Due to the high baseline voltage fluctuation (up to  $\approx 200\text{mV}$ ), and sensitivity, a positive response on the DELCD is generally identified by a corresponding strong FID and/or PID response. Therefore, any fluctuation that does not have a clear corresponding response on the FID may be discounted as evidence of halogenated compounds without additional testing and confirmation.



### 3.4 VOC DETECTION FROM COMBINATION GAS CHROMATOGRAPHY

The order of detection of VOCs is crucial to the GC process as multiple methods of detection are used, some being destructive. As a destructive combination FID/DELCD is used, the first GC process will be always be PID.

Examples of the detection of VOCs and their detector responses are shown in the figures below;

Compound	Formula	eV	Density (g/cm <sup>3</sup> )	Boiling Point (° C)	Detector Responses		
					FID	PID	DELCD
Acetic Acid	CH <sub>3</sub> COOH	10.69**	1.05	118	+	-	-
Acetone	C <sub>3</sub> H <sub>6</sub> O	9.69	0.79	56	++	++	-
Ammonia	NH <sub>3</sub>	10.2*	0.00073	-33	-	+	-
Benzene	C <sub>6</sub> H <sub>6</sub>	9.25	0.88	80	++	+++	-
Bromomethane	CH <sub>3</sub> Br	10.53*	1.73	4	+	+	+
Butene	C <sub>4</sub> H <sub>8</sub>	9.58	0.62	-7	+++	+++	-
Diesel	C <sub>12</sub> H <sub>23</sub>	Unknown	0.83	149	+++	++	-
Ethane	C <sub>2</sub> H <sub>6</sub>	11.65**	0.0014	-89	+	-	-
Ethanol	C <sub>2</sub> H <sub>6</sub> O	10.47*	0.79	78	+	+	-
Hydrogen Sulphide	H <sub>2</sub> S	10.46*	0.0013	-60	-	+	-
Methane	CH <sub>4</sub>	12.60**	0.00066	-161	+	-	-
TCAA	C <sub>2</sub> HCl <sub>3</sub> O <sub>2</sub>	9.47	1.63	197	+	-	+++
TCE	C <sub>2</sub> HCl <sub>3</sub>	9.32	1.46	87	+	+++	+++
Vinyl Chloride	C <sub>2</sub> H <sub>3</sub> Cl	10.00	0.91	-13	+	+	+

Table 3-5. Typical detector responses to a range of contaminants (assuming Combination FID/DELCD).

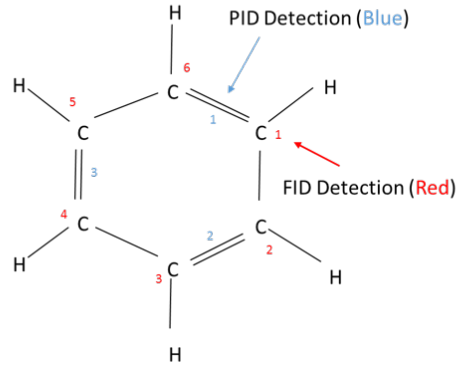
Where:

Detector Sensitivity; +++ = High, ++ = Medium, + = Low, - = Not detectable  
 eV = Chemical ionisation potential (ionisation energy)

\* = 10.6 > eV > 10 (high eV) compounds are detectable but hard to manage and obtain reliable data although a small positive peak will be present.

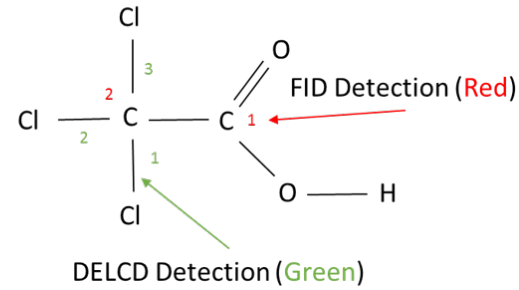
\*\* = eV too high to for accurate detection using 10.6eV lamp and a negative peak in PID can be established.

VOC Detection Examples from Gas Chromatograph



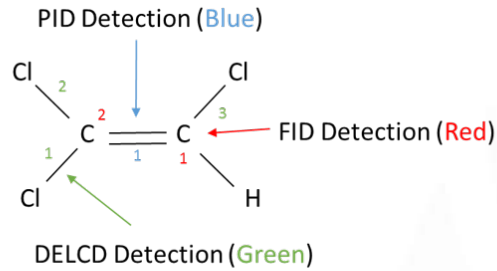
FID = ++ (Medium Sensitivity)  
 PID = +++ (High Sensitivity)  
 DELCD = - (No Sensitivity)

Benzene  
 (C<sub>6</sub>H<sub>6</sub>)



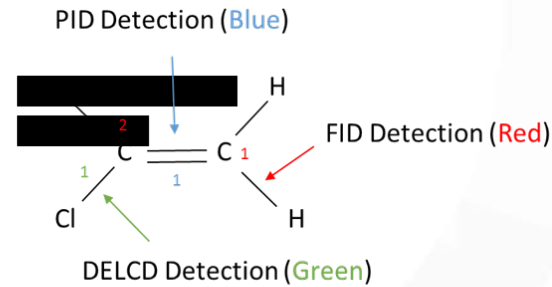
FID = + (Low Sensitivity)  
 PID = - (No Sensitivity)  
 DELCD = +++ (High Sensitivity)

Trichloroacetic Acid (TCAA)  
 (C<sub>2</sub>HCl<sub>3</sub>O<sub>2</sub>)



FID = + (Low Sensitivity)  
 PID = +++ (High Sensitivity)  
 DELCD = +++ (High Sensitivity)

Trichloroethylene  
 (TCE) (C<sub>2</sub>HCl<sub>3</sub>)



FID = + (Low Sensitivity)  
 PID = + (Low Sensitivity, High eV)  
 DELCD = + (Low Sensitivity)

Vinyl Chloride (VC)  
 (C<sub>2</sub>H<sub>3</sub>Cl)

CP 2016

Figure 3-6. VOC detection examples from GC.

## 4 MIP INTERPRETATIVE DATA

### 4.1 BASIC SOIL TYPE FROM ELECTRICAL CONDUCTIVITY

A basic soil type can be calculated from dipole measurements on the membrane interface probe as outlined by Grisso *et al.* (2006) and presented in the table below;

Electrical Conductivity (EC) (mS/m)	Basic Soil type
0.2-1.1	SAND
1.2-10	SILT
11-1000	CLAY

Table 4-1. Basic soil type from electrical conductivity (adapted from Grisso *et al.* 2006).

Basic soil type approximated by EC can be used to identify soil layers. It should be noted that many factors, including pH, can have an effect on the EC of the soil tested and that this determination should only be used a rough guide to understanding the underlying soil.

Electrical conductivity (EC), in log scale, and basic soil type are presented in Appendices B & C.

## 5 MIP DATA REDUCTION AND PRESENTATION

The microvolt response of each detector is presented against depth. The rate of penetration is also plotted to indicate the depth at which the 45 second penetration pauses were performed. The results are presented in Appendix B. The baseline values for each detector were calculated by taking an average reading for the first 45 seconds of the pre-response test. If there was a gap of less than 45 minutes between soundings, a pre-response test was not carried out and the post-response test from the previous test was applied. Alternatively, if the pre-test showed a constant response decay, the first detector response of the MIP test was used for a better estimation of baseline level. The baseline levels for each detector, at each sounding, are recorded in Table 1.

Treated MIP test results with the baseline values removed are presented in Appendix C. The MIP response tests are also presented in Appendix D. Response tests for FID, PID and DELCD are all presented against time. The results for all the response tests gives an indication of the potential error associated with quantifying MIP data as presented in Appendix E. The equation, for linear regression, has the following form:

$$y = mx + c$$

Where;

m = gradient of the slope

c = y axis intercept

Due to the absence of inclinometers within the probe, the penetration length is not corrected for inclination. Typically, the error in depth measurement will be <2%.

## 6 MIP DATA INTERPRETATION NOTES

Provided below is an inexhaustive set of cautionary notes on interpretation of the acquired MIP data with reference to examples within the dataset where appropriate. The interpretation and observations contained herein represent Lankelma's opinion on the data, and do not constitute exhaustive interpretation or recommendations.

Further technical information on the MIP and data interpretation may be found at <http://geoprobe.com/mip-membrane-interface-probe>.

### ***NOTE ON INTERPRETATION OF RESULTS***

The MIP is principally intended to identify the presence (or absence) of VOCs, and may be used in a semi-quantitative way to assess the relative magnitude of contamination across a site and for specific soil formations. Interpretation of concentrations from the results should be done in conjunction with sampling and measurement of actual contamination levels and appreciation of the large number of variables that can affect GC detector responses under testing conditions. The range in magnitude of the response tests provides an indication of the measurement uncertainty under ideal conditions. In addition to factors already discussed, other factors that can influence the results include;

- Variation in contaminant flux across the membrane due to different excess or hydrostatic pressures;
- Membrane condition;
- Soil permeability;
- Trunkline condensation (see below).

### ***TRUNKLINE CONDENSATION (TC)***

Trunkline condensation (TC) occurs when gaseous compounds condense within the MIP carrier trunkline, leading to reduced flow. TC may occur for tests that encounter zones of very high contamination concentration, or contaminants with high boiling points, for a sustained period of penetration.

Results affected this are generally recognised by a gradual decay in the FID signal during a period of recovery or a stepwise increase at penetration pause. Condensation can also be indicated by high, post-test, baseline readings. The majority of the residual contaminants within the system can generally be purged during penetration through less contaminated ground. During the 0.33 m interval test pauses, any significant peak or stepped increase in the signal can be assumed to originate from VOCs within the current soil being tested. Therefore, where the signal is suspected to be influenced by TC, the presence of ground contamination may still be confirmed by the presence of GC signal peaks at the 0.33 m interval penetration pause depths.

## 7 REFERENCES

- British Standards Institution (2003) BS 8422:2003, Force measurement - Strain gauge load cell systems - Calibration method. London: British Standards Institution.
- Bronders, J., Van Keer, I., Touchant, K., Vanermen, G., Wilczek, D (2008). Application of the Membrane Interphase Probe (MIP): an evaluation". Soils, Sec 3 - REM & Management of Contaminated Lands - Research Article. Springer-Verlag 2008.
- Driscoll, J., (2004) "PID Analysers - Gas Chromatography in Environmental Analysis". Environmental Instrumentation & Analysis Handbook. Wiley, Interscience, NY, 2004, Ch 8.
- Einarson, M. D., Schirmer, M., Pezeshkpour, P., Mackay, D. M., Wilson, R. D. (1998). Comparison of Eight Innovative Site Characterization Tools Used to Investigate an MTBE Plume at Site 60, Vandenberg Air Force Base, California". University of Waterloo, Department of Earth Sciences, Waterloo, Ontario, Canada.
- Grisso, R., Alley, W. G., Holshouser, D., Thomason, W. (2006) "Soil Electrical Conductivity" Virginia Cooperative Extension, Virginia Tech. Publication 442-508.
- Lunne, T., Robertson, P.K. and Powell, J.J.M. (1997) "Cone Penetration Testing in Geotechnical Practice" Blackie Academic, New York 1997.
- Mayne, P.W. (2007) "Cone Penetration Testing - A Synthesis of Highway Practice". NCHRP Synthesis 368, Transportation Research Board, Washington, D.C.
- Mulhern, T., Strohecker, J (2013). "The PID Handbook - Theory and applications of direct Reading Photoionization Detectors". RAE Systems by Honeywell. Third edition, 2013.
- Neuhaur, M (2007). "In-Situ Investigation of [REDACTED] and Groundwater with MIP and ROST™-CPT". Italian Journal of Engineering Geology and Environment. Sp [REDACTED] 2007.
- Thomas, M., Christy, P. E., (1996) "A Permeable Membrane Sensor for the Detection of Volatile Compounds in Soil". Geoprobe Systems, 6001 N. Broadway, Salina, KS. National Ground Water Association's Outdoor Action Conference, Las Vegas, Nevada.
- Trick, J. K., Allen, D., Shaw, R., Wealthall, G. P (2011). "Rapid Site Characterisation Using MIP integrated with a GC-MS - Field Trial". British Geological Survey. Environment & Health Programme, Internal Report OR/08/005. NERC, 2001.
- "Photo-Ionization Detection (PID) Technology." - Application Note TSI-147, 2013 TSI Incorporated. [http://www.tsi.com/uploadedFiles/\\_Site\\_Root/Products/Literature/Application\\_Notes/TSI-147\\_Photo\\_Ionization\\_Detection\\_Technology.pdf](http://www.tsi.com/uploadedFiles/_Site_Root/Products/Literature/Application_Notes/TSI-147_Photo_Ionization_Detection_Technology.pdf) [accessed 13/06/2016].
- [http://goodforgas.com/wp-content/uploads/2013/12/TN2004\\_PID\\_gas\\_table\\_01\\_16\\_09.pdf](http://goodforgas.com/wp-content/uploads/2013/12/TN2004_PID_gas_table_01_16_09.pdf). "Chemical Ionization Potential (eV) and 10.6eV PID Correction Factors (CF)" [accessed 06/06/2016].
- "Selective Detectors for Gas Chromatography". OI Analytical. [REDACTED] Publication 31670416. <http://www.oico.com/default.aspx?id=product&productid=52> [accessed 07/06/2016].

## SUMMARY TABLES

Table 1 MIP Test Summary

TEST ID	FINAL DEPTH (mBGL)	CPT RIG	PREDRILLED (m)	REFUSAL FACTOR	DATE OF TEST	PRE-TEST BASELINE VALUE (mV)			Remarks
						FID	PID	DELCD	
CELMIP001	10.52	UK17	0.40	Total reaction load	08/08/16	0.00	684.03	314.02	FID zero levels set on GC.
CELMIP002	9.66	UK17	0.40	Total reaction load	08/08/16	207.35	701.26	134.66	
CELMIP003	10.99	UK17	0.40	Total reaction load	09/08/16	18.09	571.69	131.92	
CELMIP004	9.33	UK17	0.40	Total reaction load	09/08/16	207.29	684.85	115.59	
CELMIP005	9.17	UK17	0.40	Total reaction load	09/08/16	148.57	640.78	88.59	
CELMIP006	9.99	UK17	0.40	Target depth	10/08/16	24.06	487.54	109.34	
CELMIP007	7.73	UK17	0.40	Total reaction load	10/08/16	94.21	635.26	136.09	New membrane used.
CELMIP008	8.66	UK17	0.40	Total reaction load	10/08/16	91.08	560.41	67.53	
CELMIP009	9.82	UK17	0.40	Total reaction load	11/08/16	7.58	457.07	111.90	
CELMIP010	9.49	UK17	0.40	Total reaction load	11/08/16	54.27	521.47	56.34	
CELMIP011	7.55	UK17	0.15	Total reaction load	11/08/16	69.52	573.44	50.91	
CELMIP012	7.99	UK17	0.40	Total reaction load	12/08/16	0.84	465.89	76.96	No EC conductivity.
CELMIP013	0.00	UK17	0.40	Dummy push refusal	12/08/16	-	-	-	"Benzene area". No data acquired.
CELMIP014	3.23	UK17	0.40	Lateral support	12/08/16	75.78	648.20	71.57	Pre Response CELTMIP013 used. No EC conductivity.

MIP Test Plots are presented in Appendices B & C

## APPENDIX A GENERAL INFORMATION

### LIST OF FIGURES

<b>Description</b>	<b>Pages Included</b>
Data Sheet: 31.0 Tonne Wheeled CPT Unit (UK17)	1

# UK17 WHEELED RIG



UK17 is Lankelma's heaviest rig; it can be ballasted to 33 T making it perfect for penetrating hard ground with our dummy cone tip. This technique allows us to continue testing in material beneath.

Our wheeled rig is suitable for hard standing ground conditions. The spacious interior is ideal for housing our MIP equipment for environmental testing.

## Performance Rates

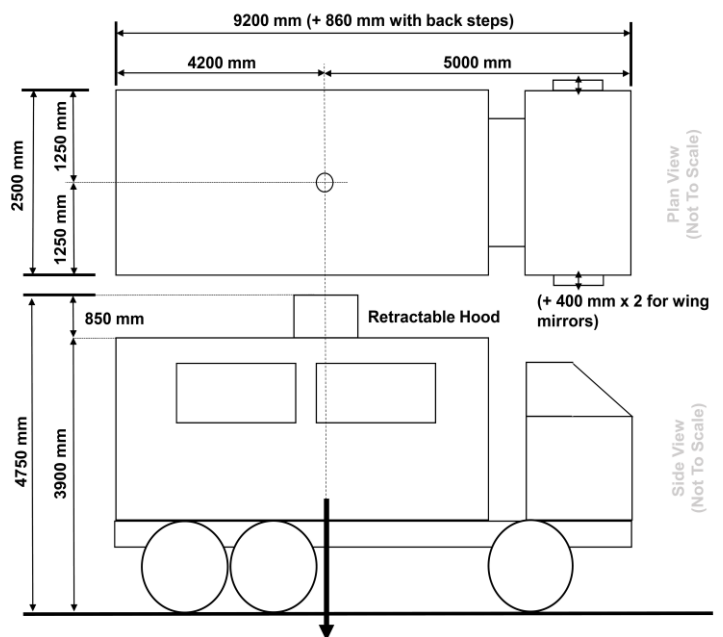
An expected 120 to 150 m of standard CPTu testing can be executed in a day (dependent on site conditions and access).

## Applications

- Specialist testing
  - Seismic
  - Pressuremeter
  - Magnetometer
  - Video cone
  - Wing cone
  - Membrane Interface Probe (MIP)
- Installations
  - VWP
  - Piezometer
  - Inclinator
  - Grouting
- Sampling
  - MOSTAP
  - Shelby

## TECHNICAL DETAILS

Rig Weight	31 T
Maximum Operating Ram Capacity	27 T
Maximum Travelling Speed	86 km/h
Drive System	6X6 wheel drive (rear axle steer)
Jack Plate Dimensions	260 mm $\Phi$
Jack Arrangements	4 nr. jacks total
Maximum Ground Clearance On Jacks	0.39 m
Maximum Ground Bearing Pressure	Tracking / Pushing – 239 kPa Pulling – 479 kPa
Maximum Gradient	15 degrees
Maximum Traversing Gradient	20 degrees (operator assessed)
Noise Output at 2 m	Testing – 79 dBA Driving – 84 dBA
Clamp Arrangement	36-60 mm hydraulic clamp
Ram Stroke	1.24 m
Maximum Casing Size	60 mm



[www.lankelma.com](http://www.lankelma.com)

Tel: +44 (0)1797 280050

Fax: +44 (0)1797 280195

Email: [info@lankelma.com](mailto:info@lankelma.com)

Lankelma Limited, Cold Harbour Barn, Cold Harbour Lane, Iden, East Sussex. TN31 7UT

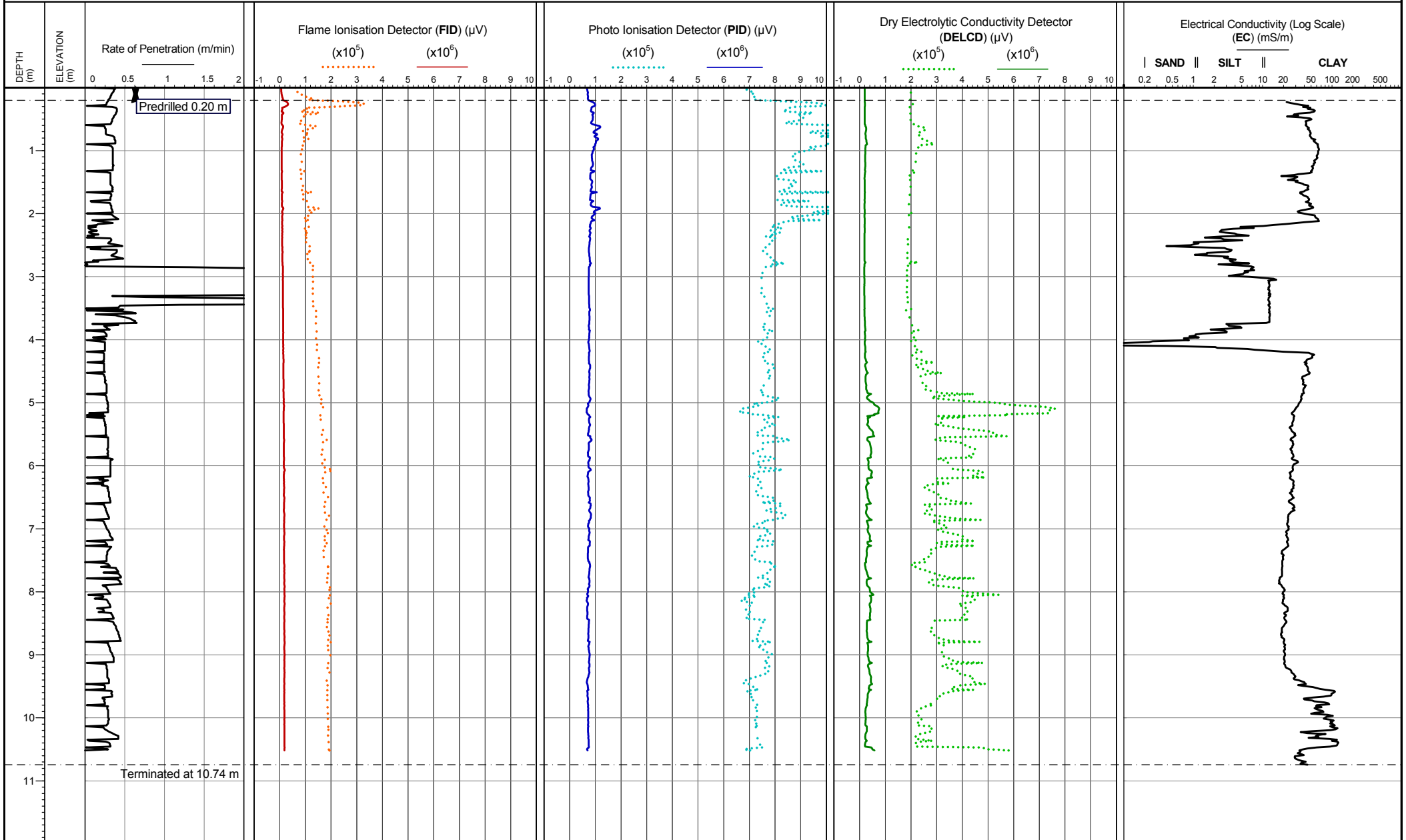


## APPENDIX B      MEMBRANE INTERFACE PROBE RESULTS

### RAW DATA – TEST RESULTS

#### LIST OF FIGURES:

<b>Test ID</b>	<b>Pages included</b>	
Membrane Interface Probe Test	CELMIP001	1
Membrane Interface Probe Test	CELMIP002	1
Membrane Interface Probe Test	CELMIP003	1
Membrane Interface Probe Test	CELMIP004	1
Membrane Interface Probe Test	CELMIP005	1
Membrane Interface Probe Test	CELMIP006	1
Membrane Interface Probe Test	CELMIP007	1
Membrane Interface Probe Test	CELMIP008	1
Membrane Interface Probe Test	CELMIP009	1
Membrane Interface Probe Test	CELMIP010	1
Membrane Interface Probe Test	CELMIP011	1
Membrane Interface Probe Test	CELMIP012	1
Membrane Interface Probe Test	CELMIP014	1



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 08/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:

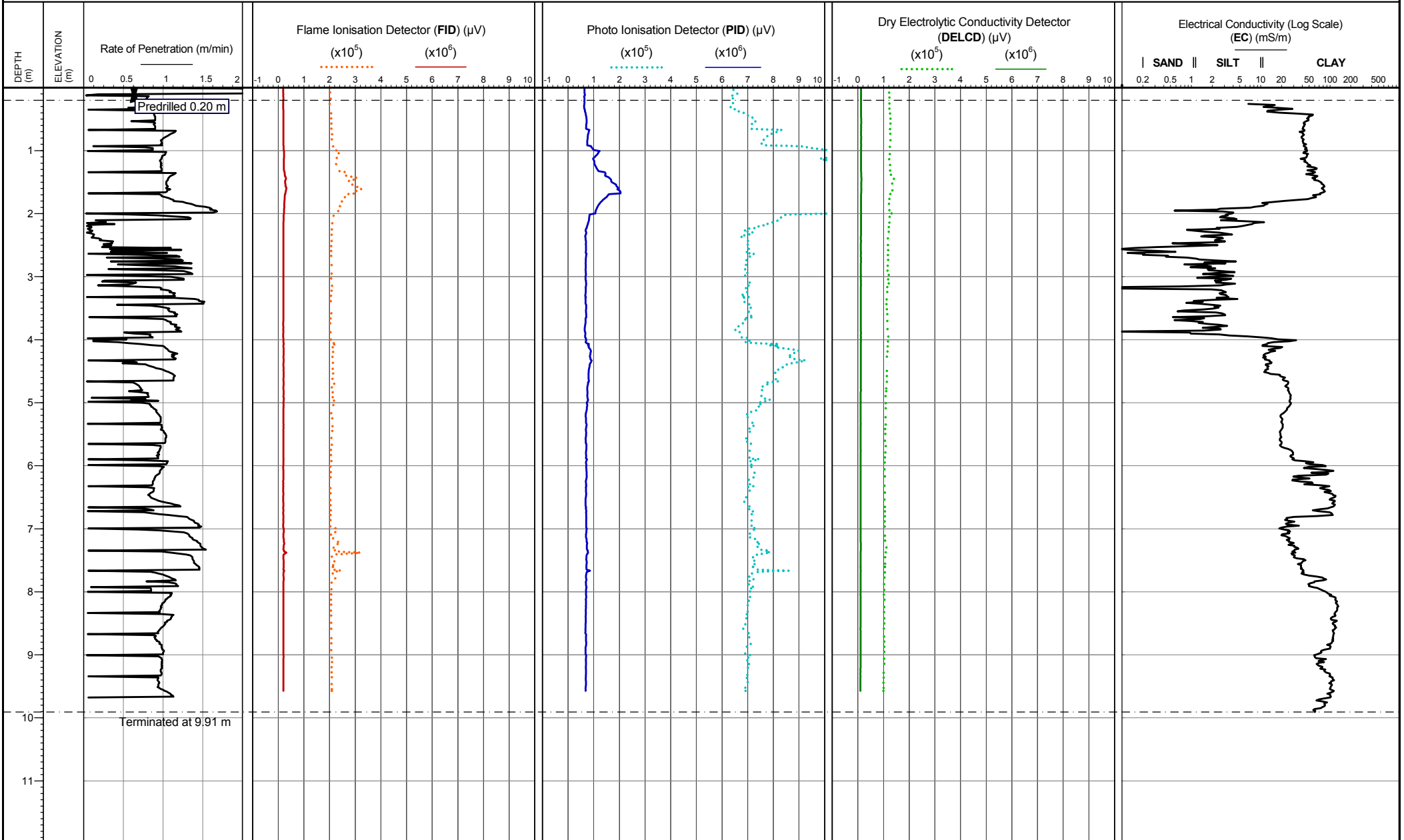
Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6

Checked by:  
 Chris Player

**TEST ID: CELTMIP001**



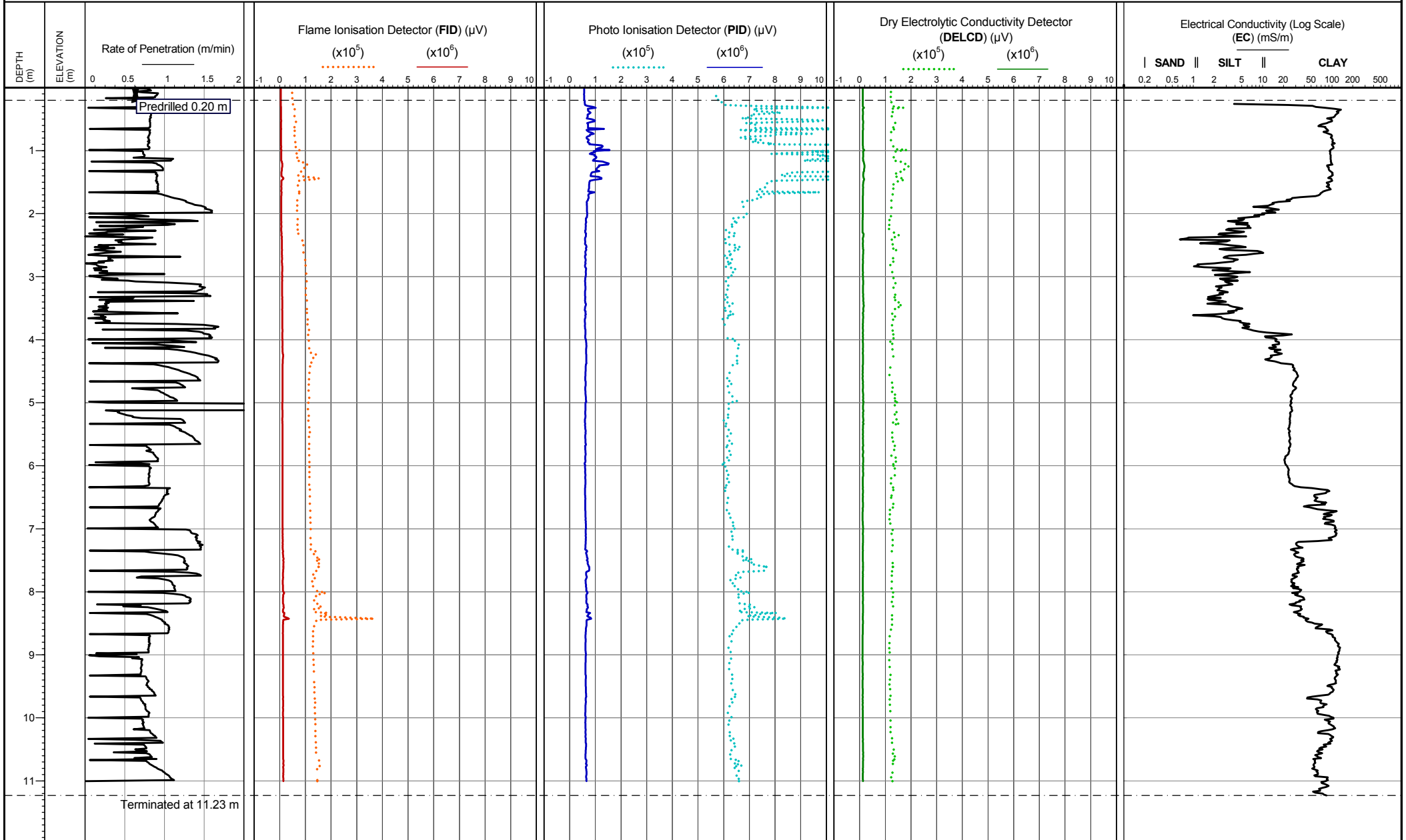
Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 08/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 09/08/2016

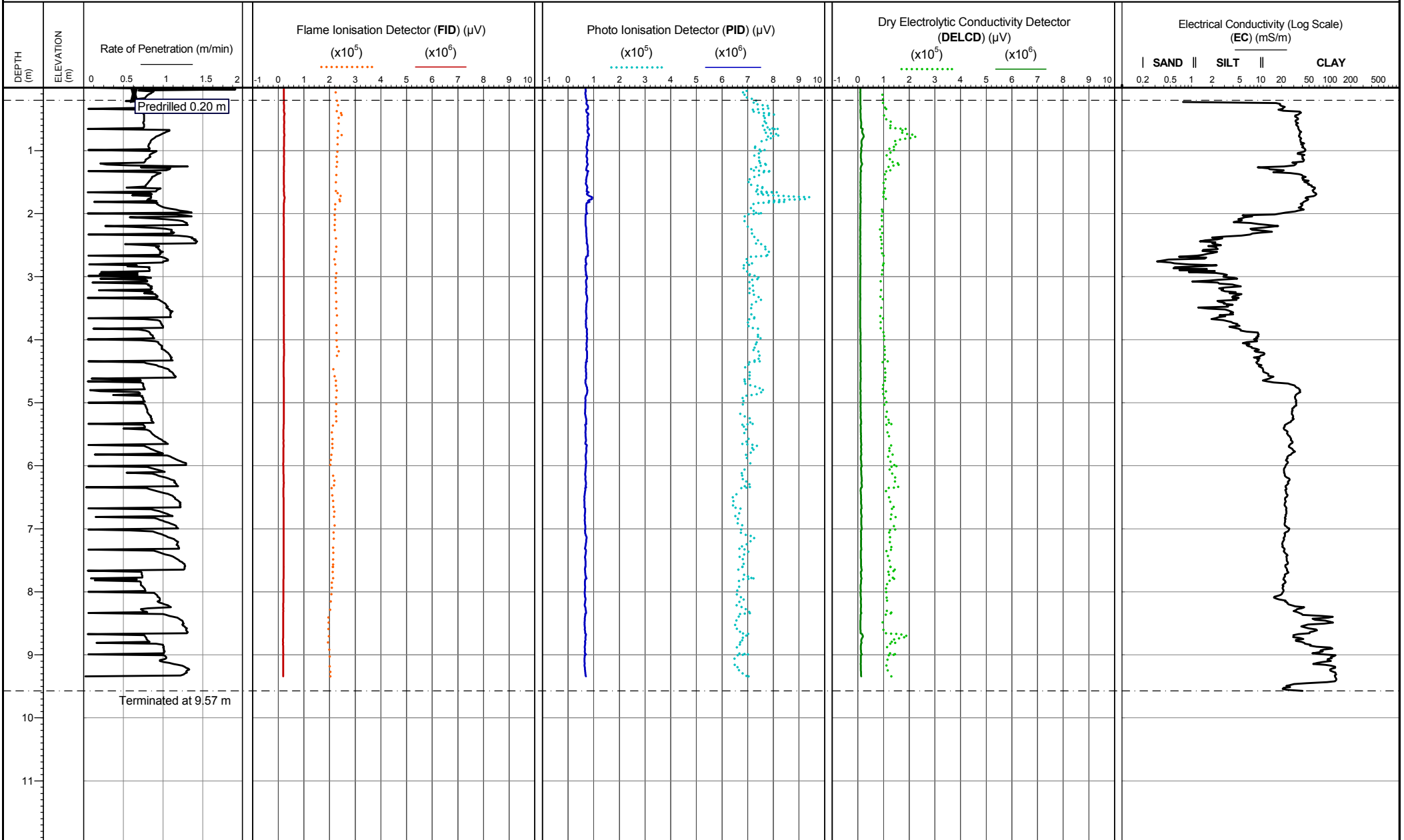
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

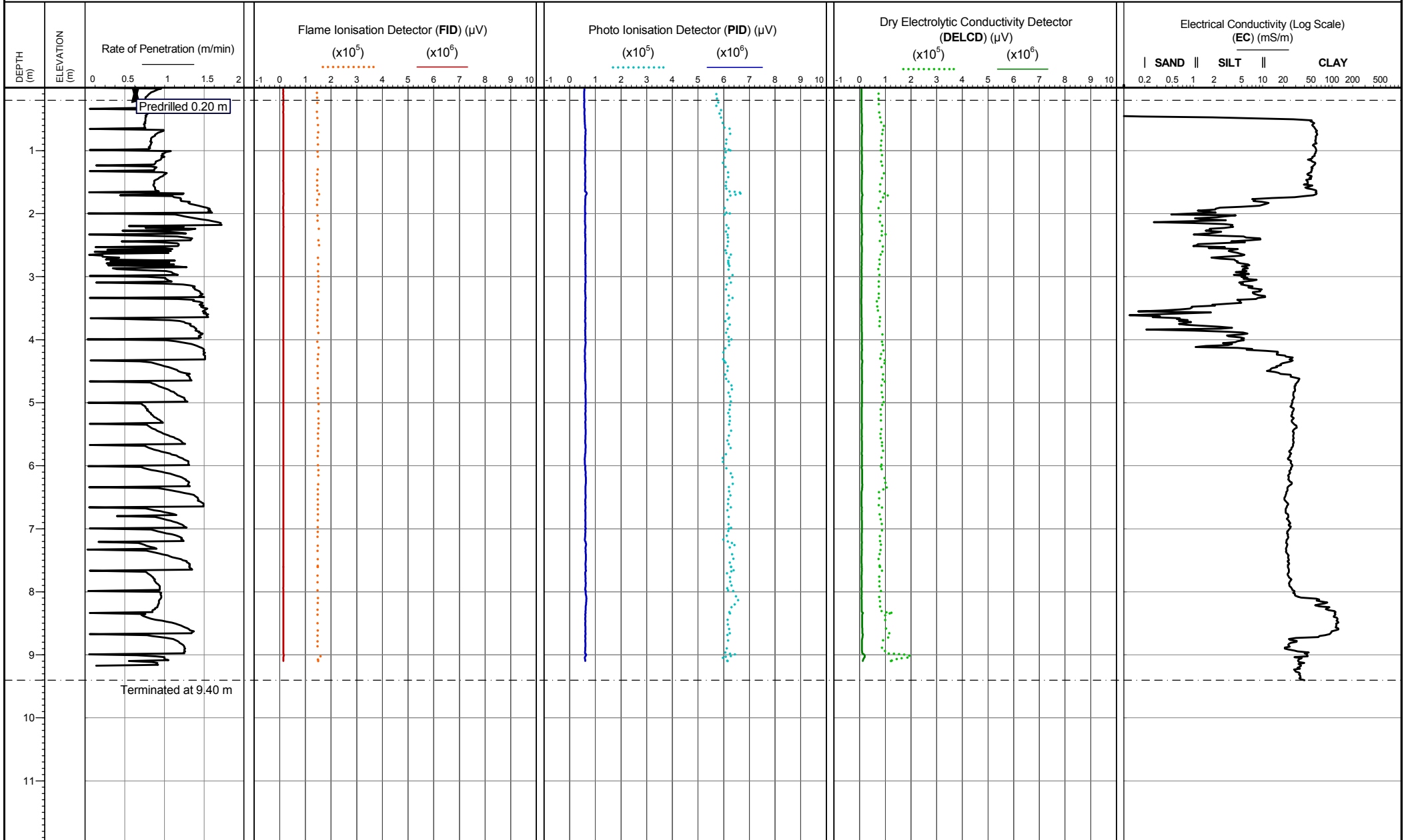
Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP003**  
 Page 1 of 1



<p>Cone area (mm<sup>2</sup>):1500                  ConeID: Geoprobe-MIP01                  Operator: Gary Connor                  Rig Used: UK17                  Date of test: 09/08/2016</p>	<p>Location: Lee-on-Solent, UK                  Coordinates: ,                  Elevation:                  Coordinate system:</p>	<p>Remarks:                   Termination Remark:                  Total reaction load</p>	<p>Date of plot: 17-08-16                  Lankelma Project Ref: P-106456-6                  Checked by: Chris Player</p>	<p><b>TEST ID: CELTMIP004</b>                  Page 1 of 1</p>
---	--	--	---	--

See report section 'MIP Interpretive Data' for methods of interpretation.



Cone area (mm<sup>2</sup>): 1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 09/08/2016

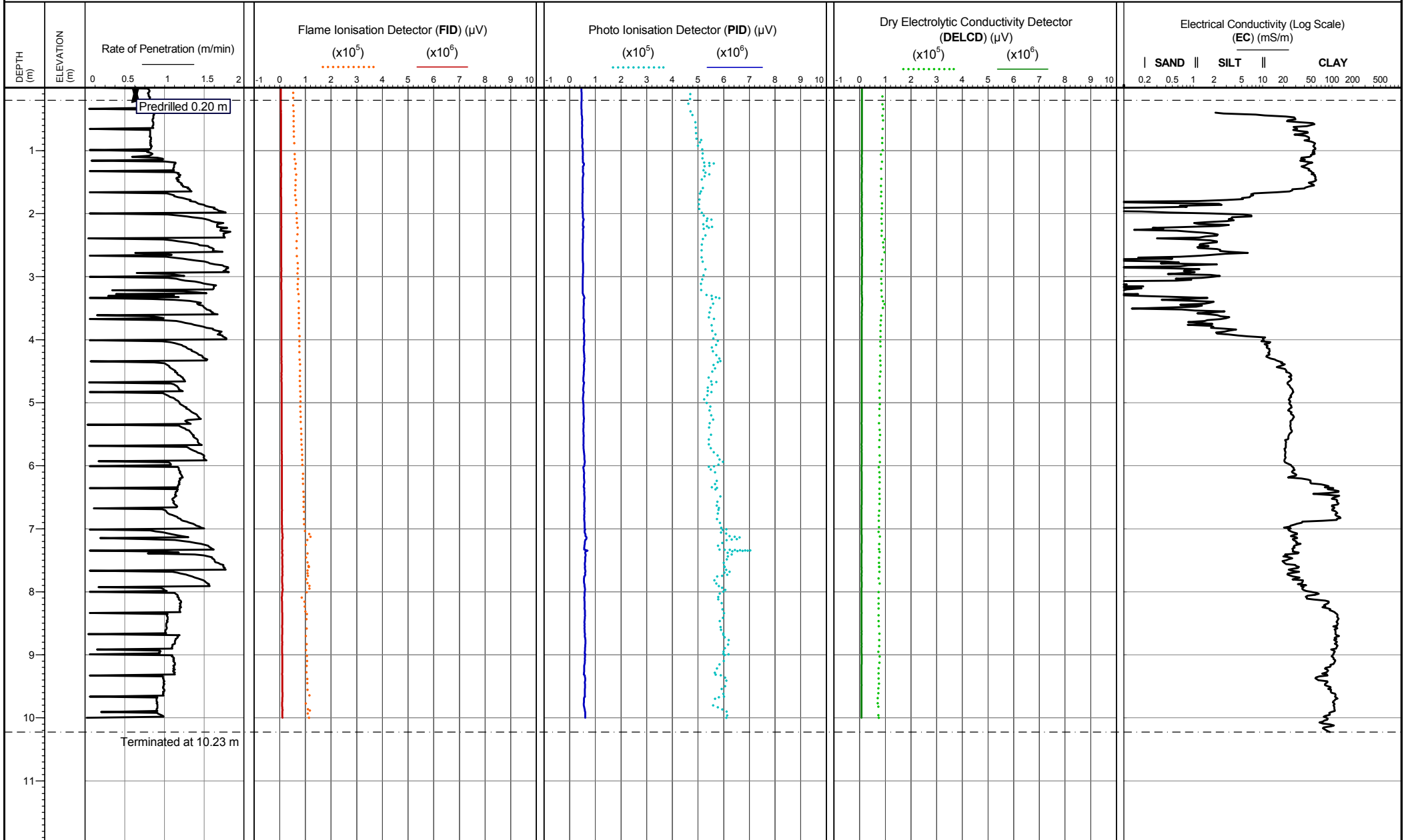
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP005**  
 Page 1 of 1



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 10/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:

Termination Remark:  
 Target depth

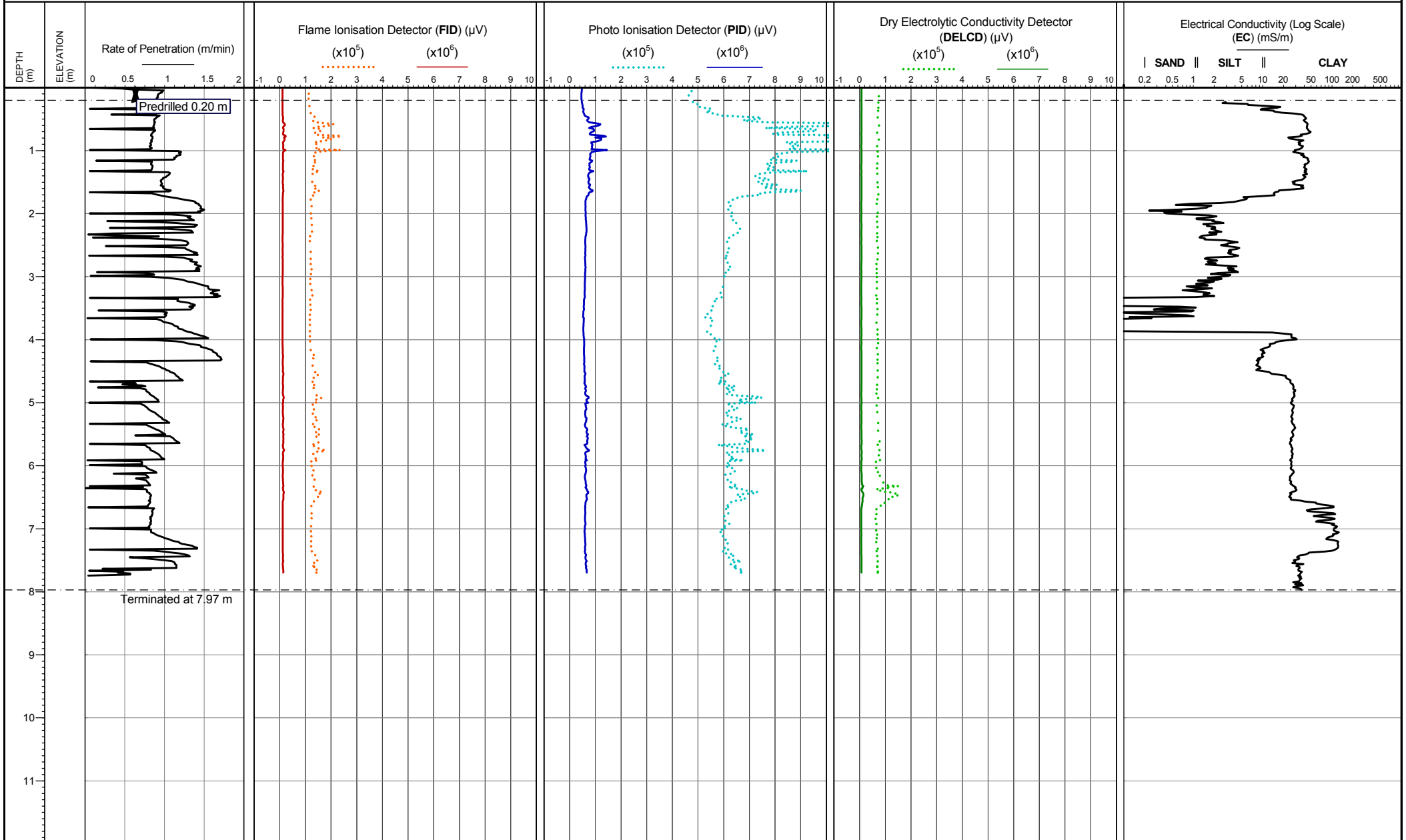
See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6

Checked by:  
 Chris Player

**TEST ID: CELTMIP006**

Page 1 of 1



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 10/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

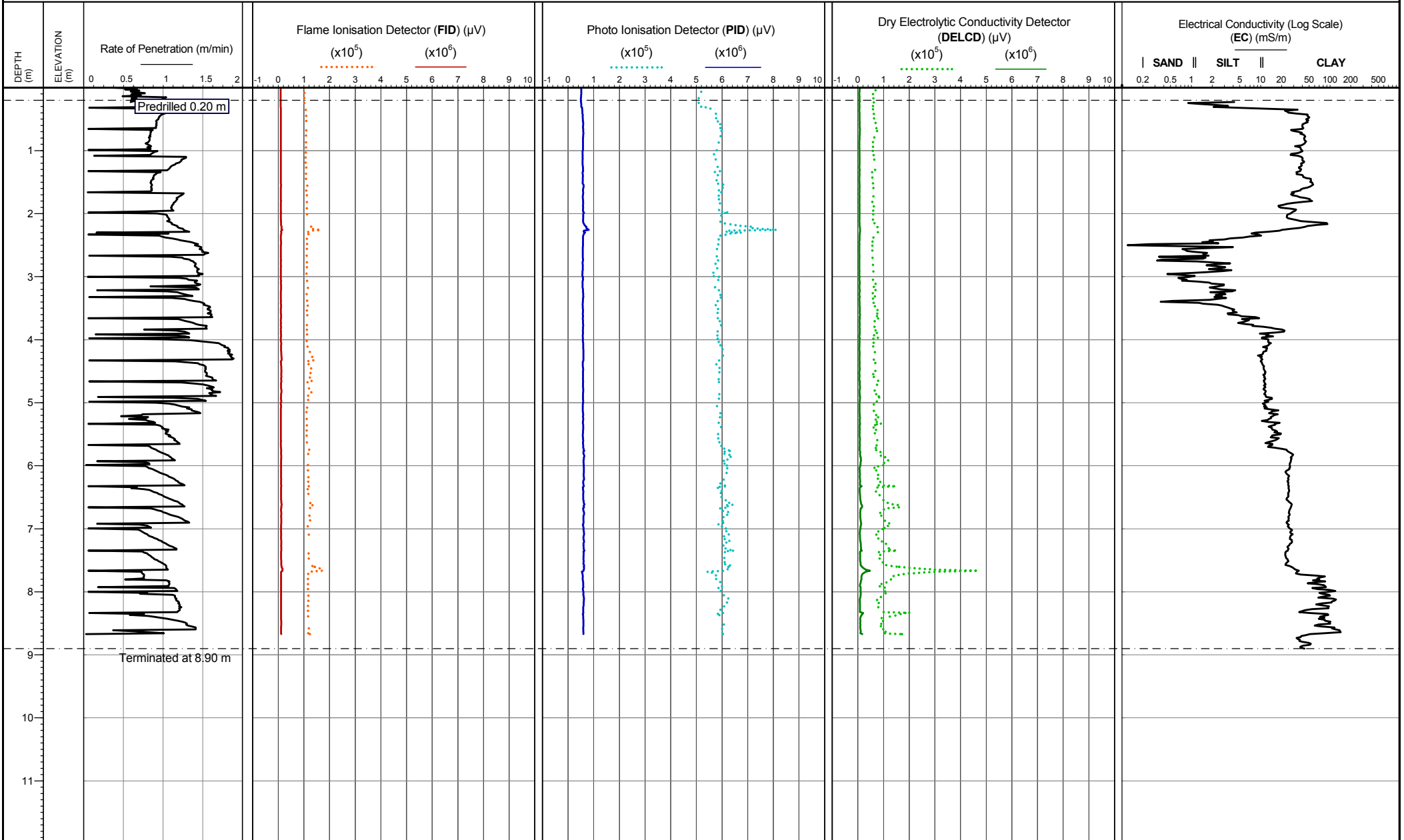
Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP007**  
 Page 1 of 1





Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 10/08/2016

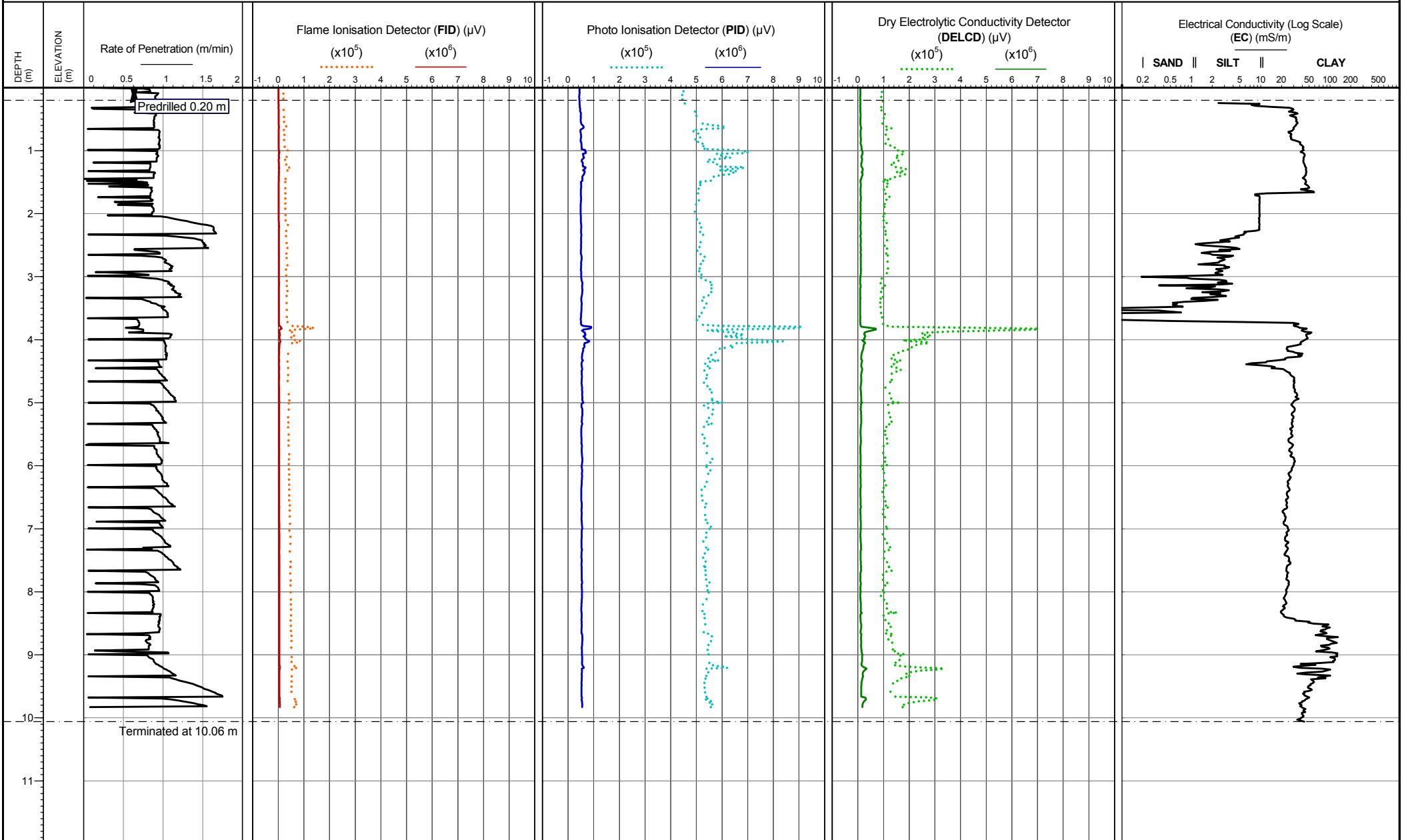
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP008**  
 Page 1 of 1



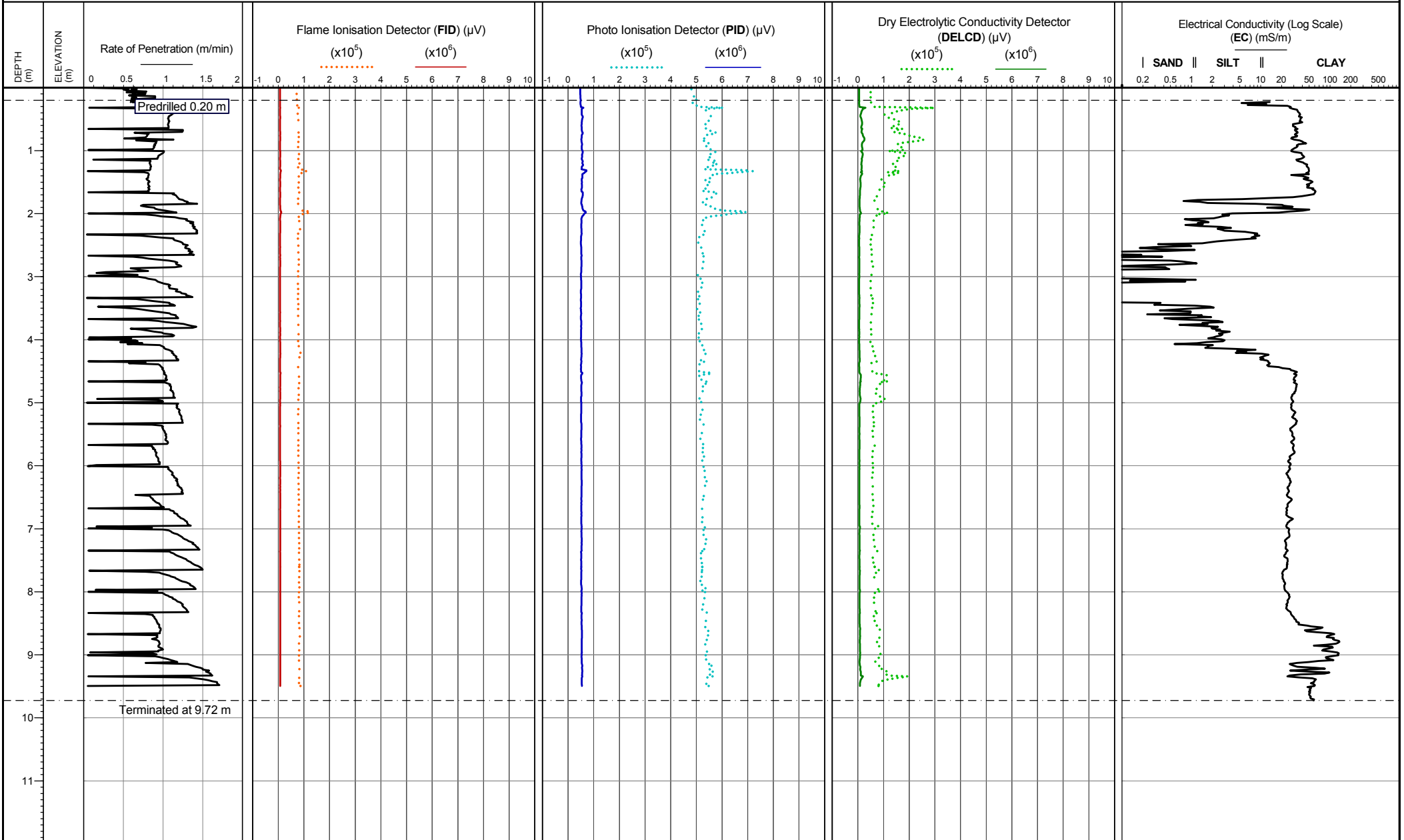
Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 11/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



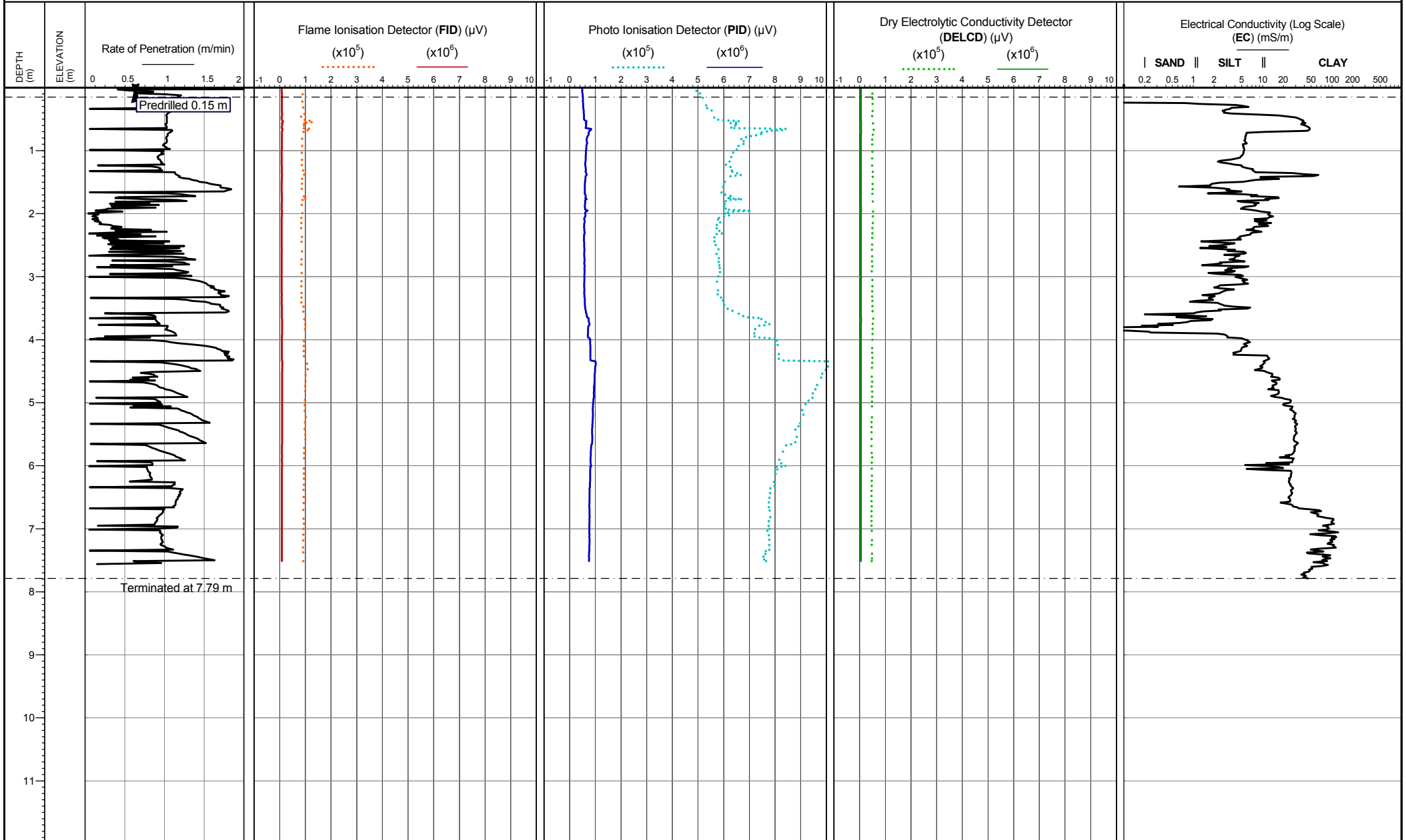
Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 11/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 11/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks:

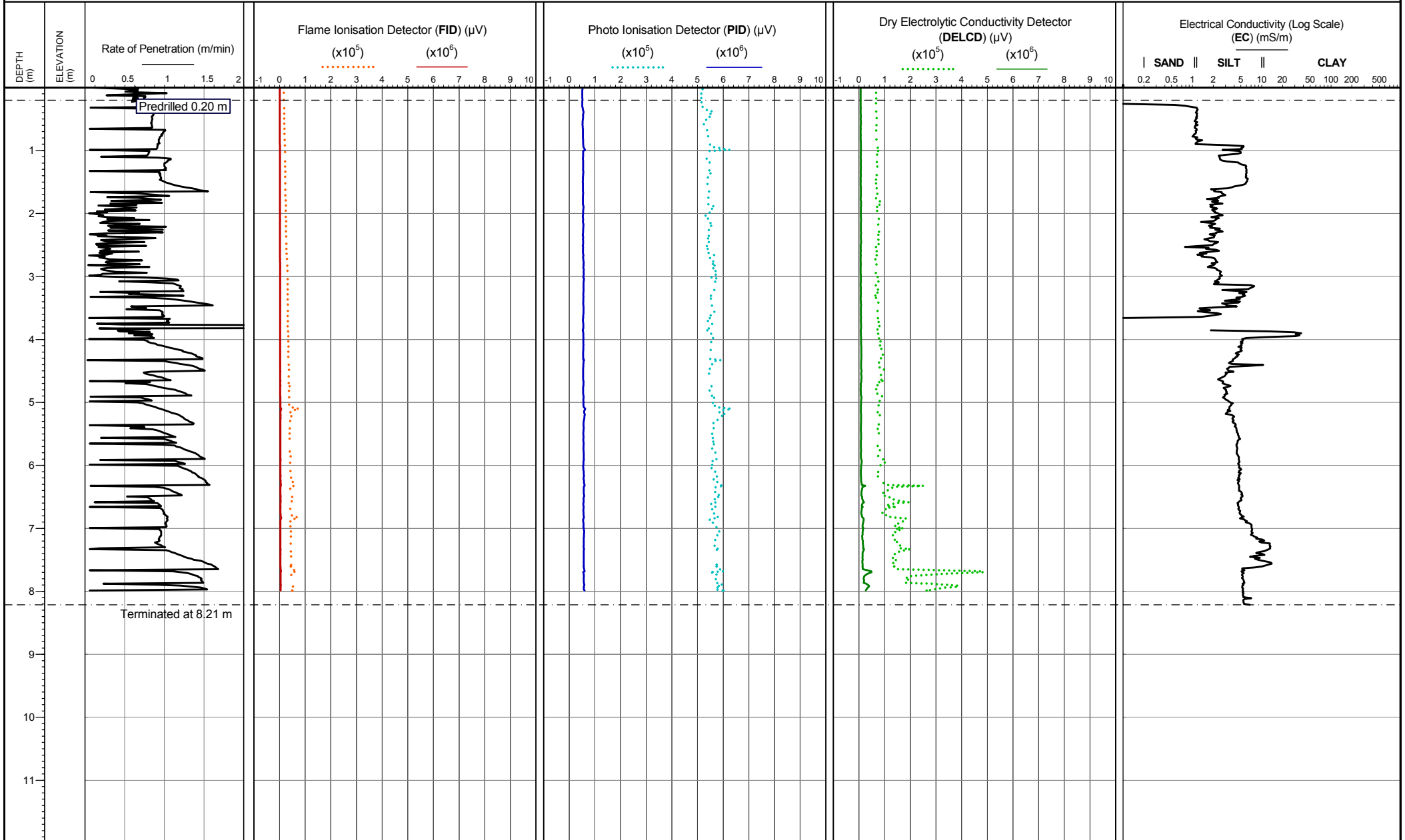
Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data'  
 for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6

Checked by:  
 Chris Player

**TEST ID: CELTMIP011**



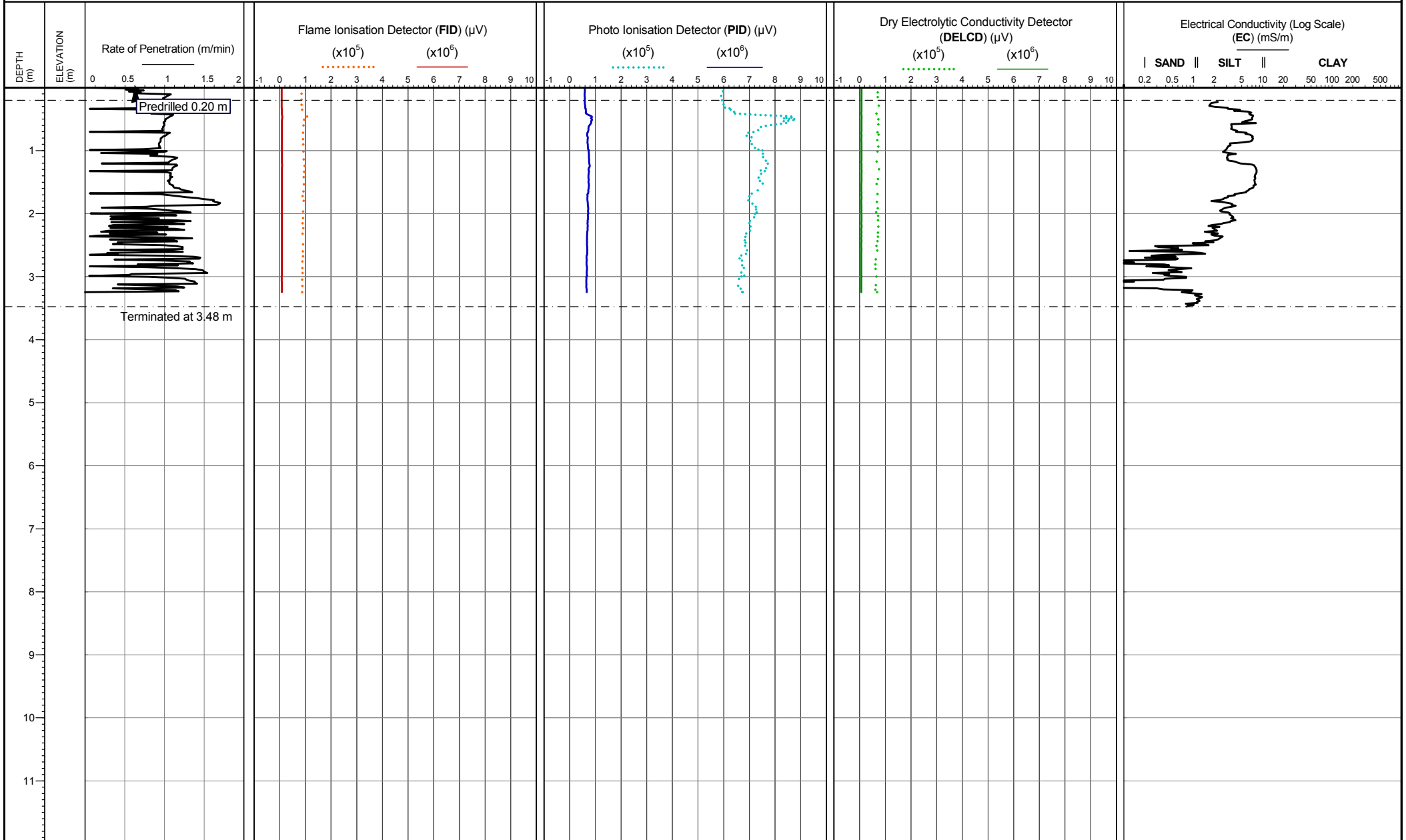
Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 12/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks: Poor electrical conductivity..  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 12/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Remarks: Poor electrical conductivity..  
 Termination Remark:  
 Lateral support

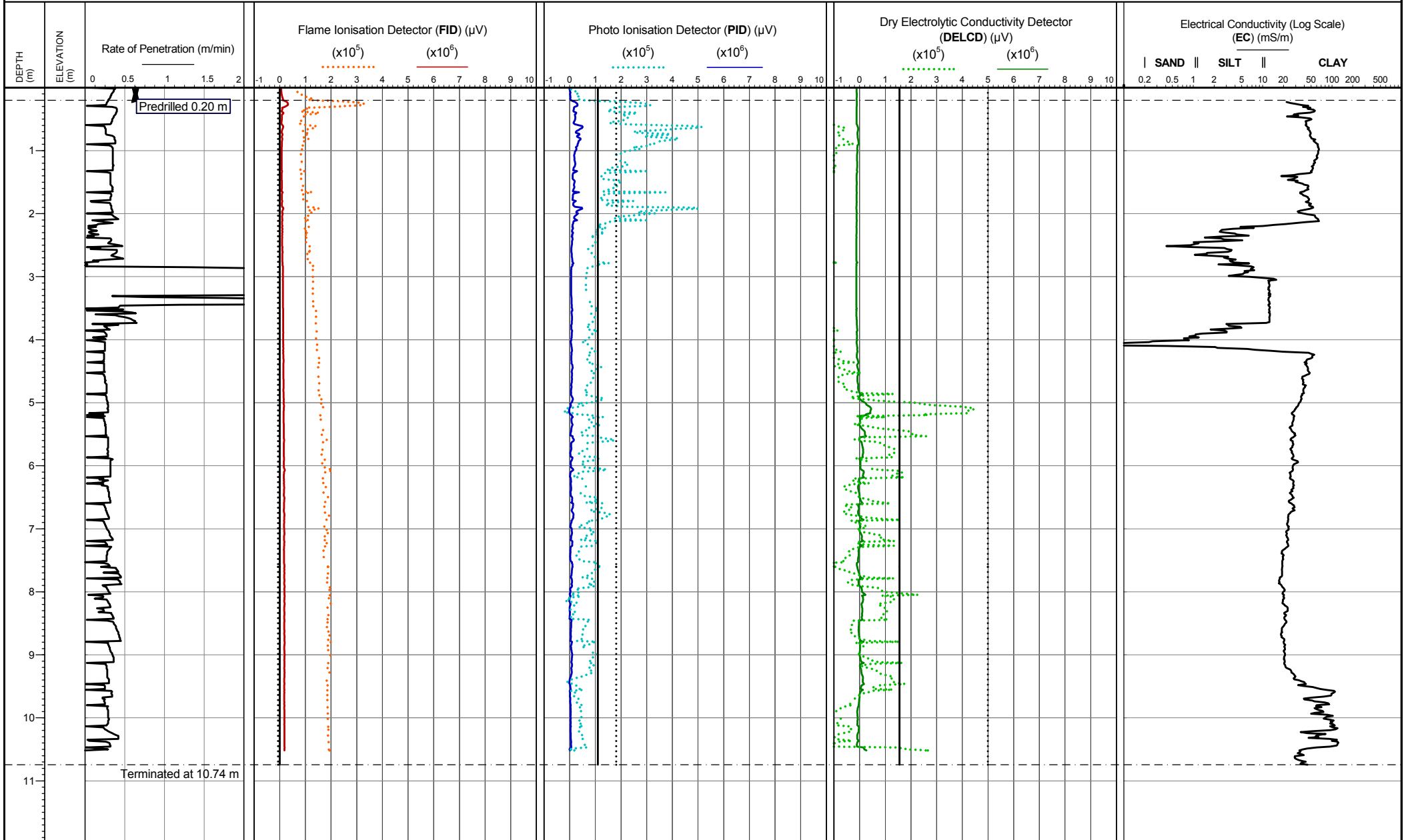
See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP014**  
 Page 1 of 1

**APPENDIX C      MEMBRANE INTERFACE PROBE RESULTS****TREATED PLOTS - BASELINE LEVELS REMOVED****LIST OF FIGURES:**

<b>Test ID</b>		<b>Pages included</b>
Membrane Interface Probe Test	CELMIP001	1
Membrane Interface Probe Test	CELMIP002	1
Membrane Interface Probe Test	CELMIP003	1
Membrane Interface Probe Test	CELMIP004	1
Membrane Interface Probe Test	CELMIP005	1
Membrane Interface Probe Test	CELMIP006	1
Membrane Interface Probe Test	CELMIP007	1
Membrane Interface Probe Test	CELMIP008	1
Membrane Interface Probe Test	CELMIP009	1
Membrane Interface Probe Test	CELMIP010	1
Membrane Interface Probe Test	CELMIP011	1
Membrane Interface Probe Test	CELMIP012	1
Membrane Interface Probe Test	CELMIP014	1



Cone area (mm<sup>2</sup>): 1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 08/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

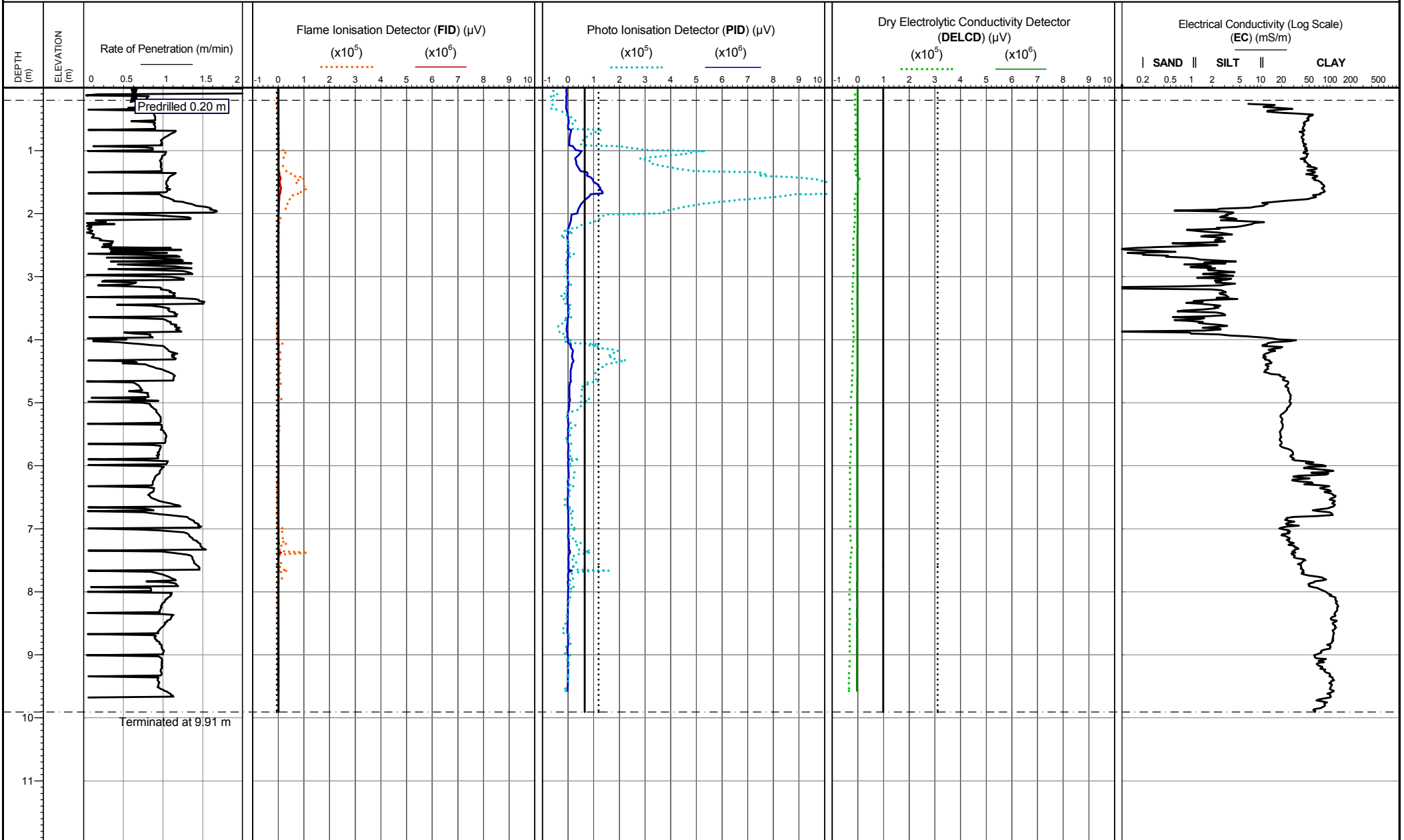
Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark: Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player





Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 08/08/2016

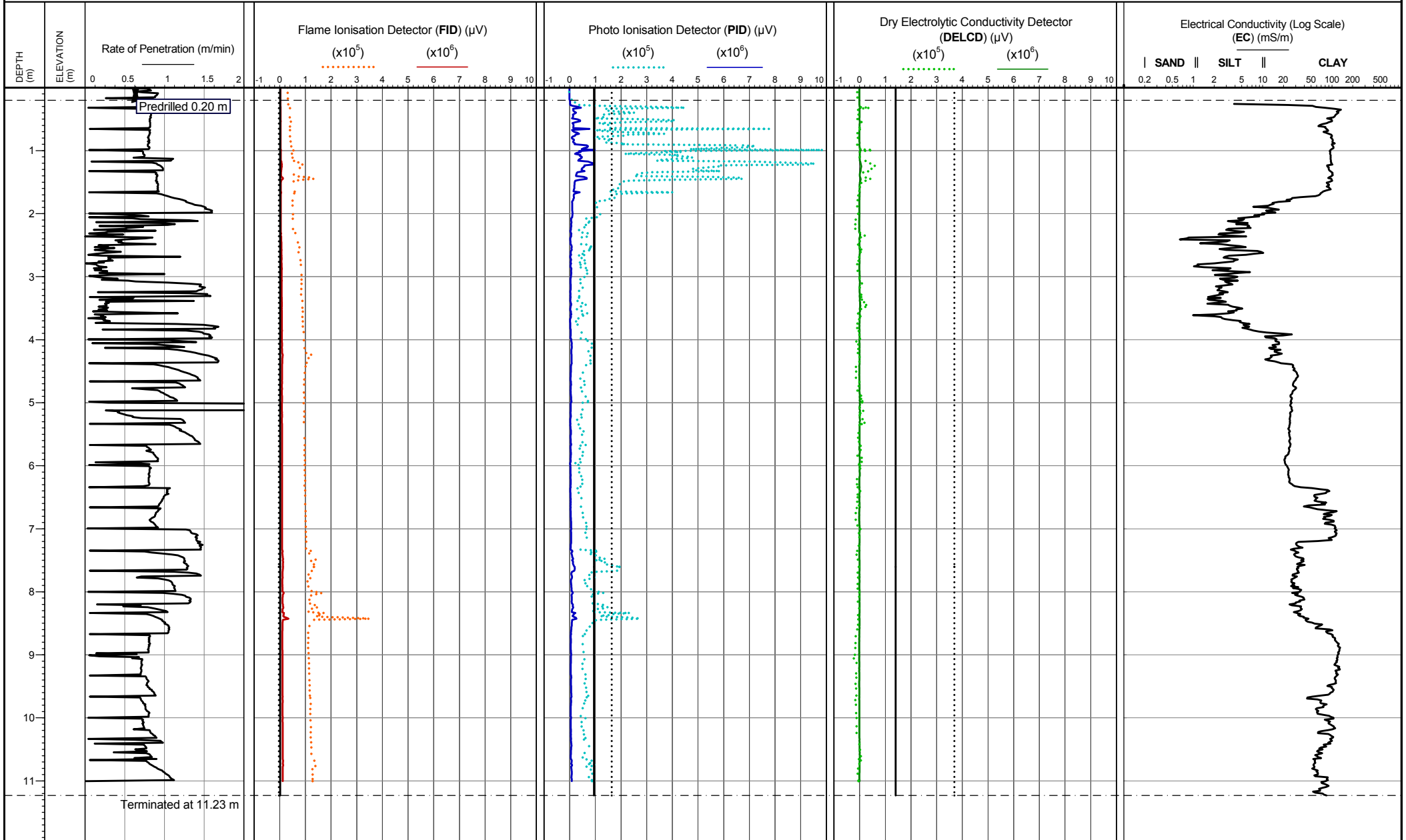
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm2):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 09/08/2016

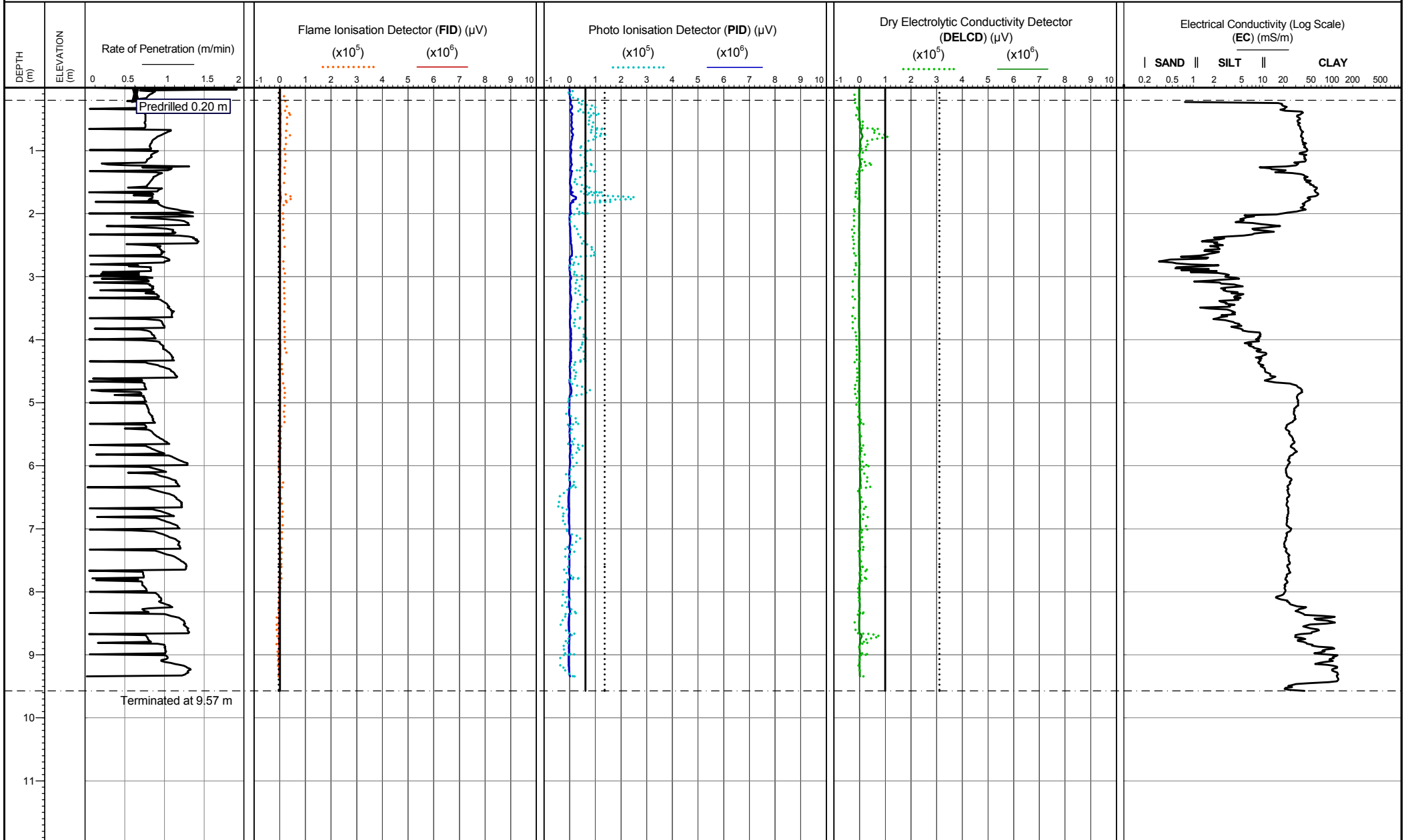
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark: Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm2):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 09/08/2016

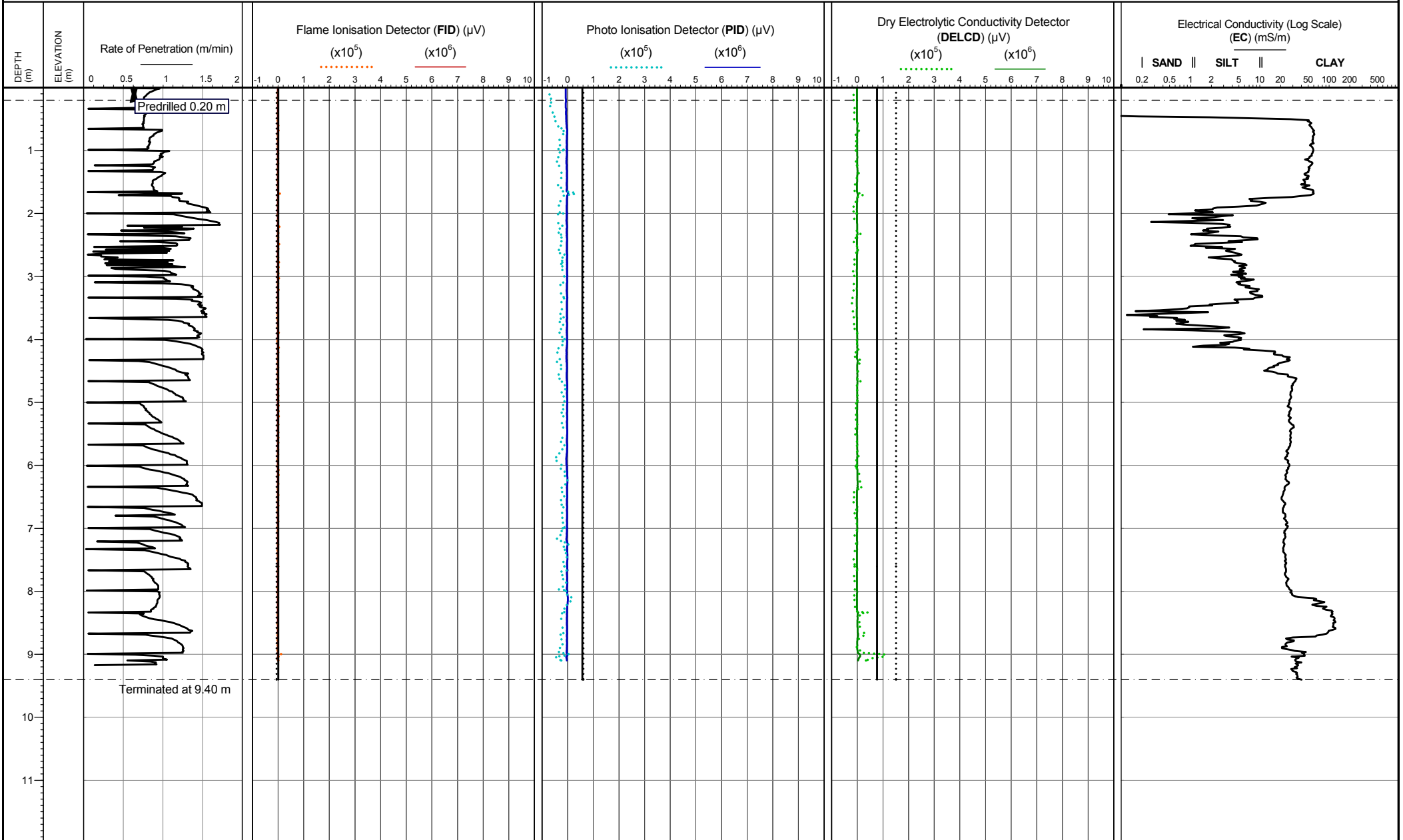
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark: Total reaction load

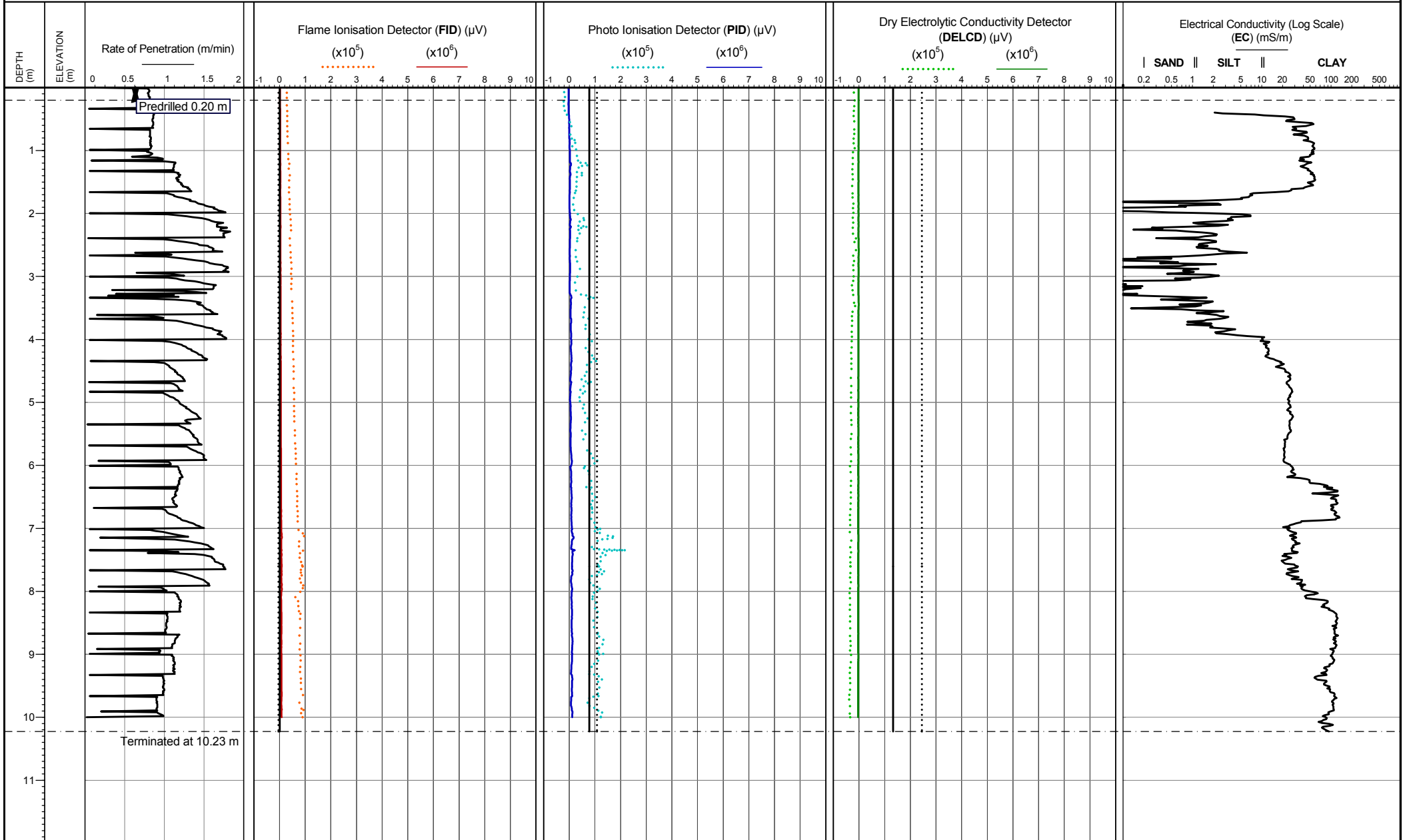
See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm <sup>2</sup> ): 1500 ConeID: Geoprobe-MIP01 Operator: Gary Connor Rig Used: UK17 Date of test: 09/08/2016	Location: Lee-on-Solent, UK Coordinates: , Elevation: Coordinate system:	Pre-response test concentration index: Test Compound: Trichloroethylene (TCE) 10 ppm (10 <sup>5</sup> Scale) = ..... 100 ppm (10 <sup>6</sup> Scale) = _____	Remarks:  Termination Remark: Total reaction load	Date of plot: 17-08-16 Lankelma Project Ref: P-106456-6 Checked by: Chris Player	<b>TEST ID: CELTMIP005</b> Page 1 of 1
---	---	---	--	--	---

See report section 'MIP Interpretive Data' for methods of interpretation.



Cone area (mm<sup>2</sup>): 1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 10/08/2016

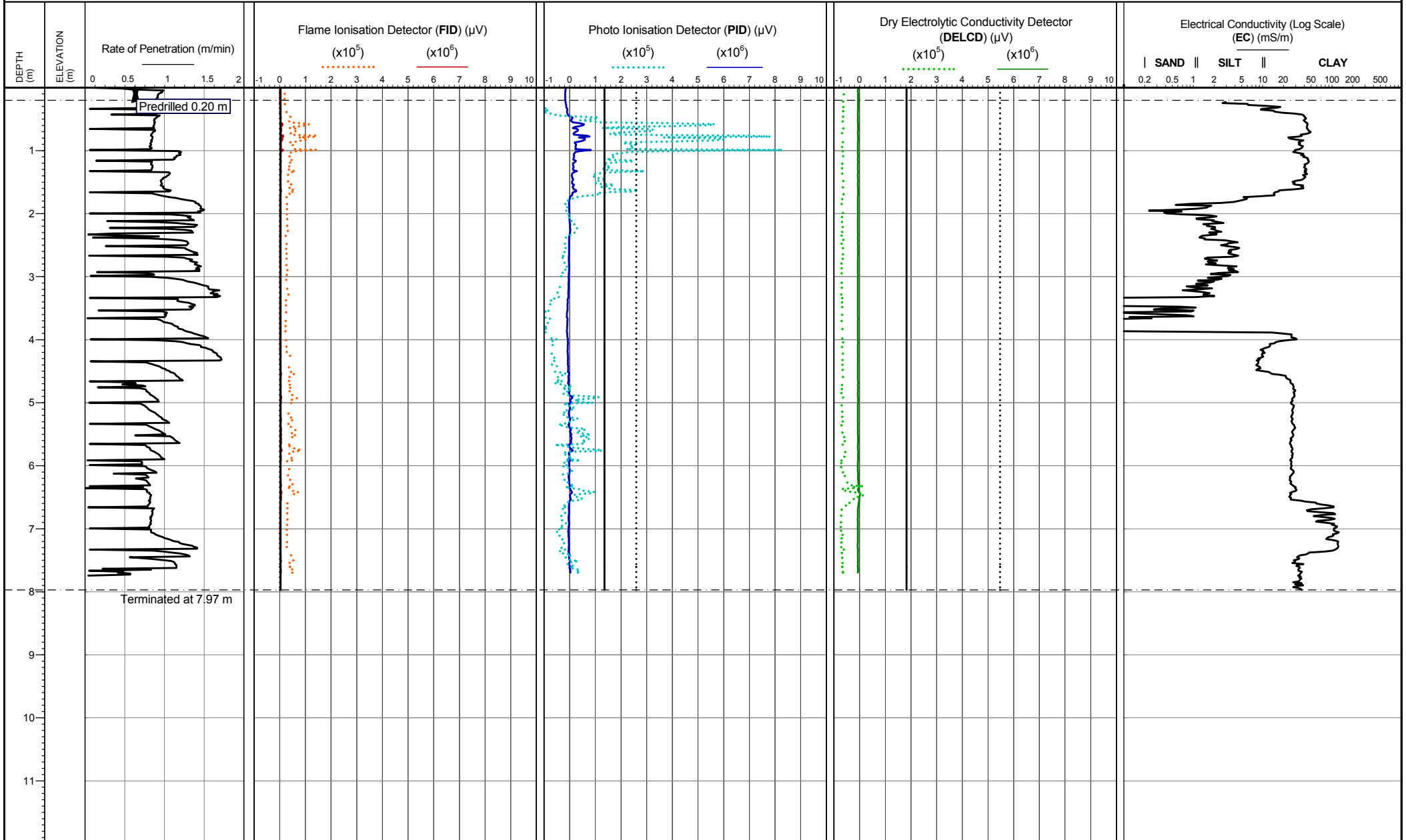
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

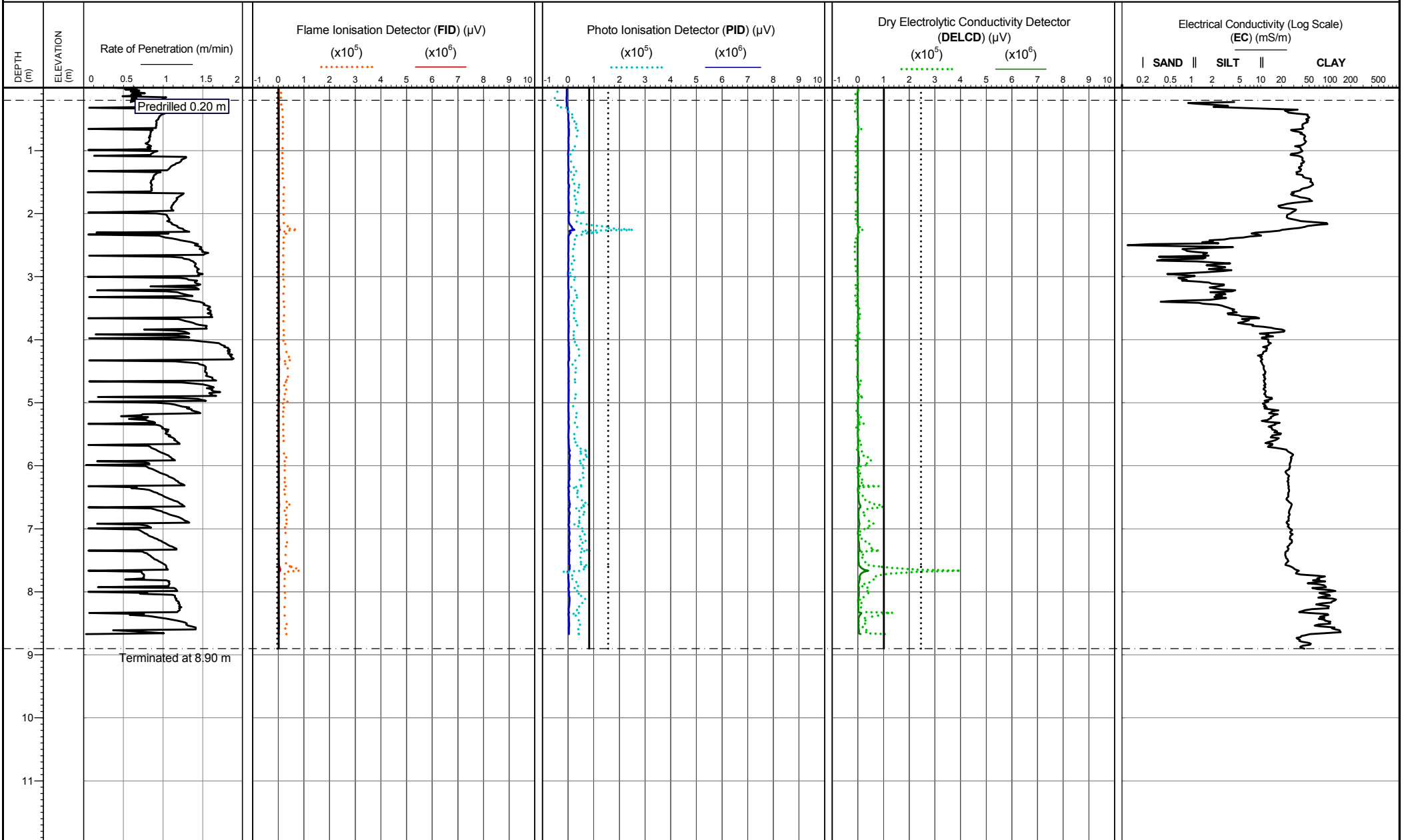
Remarks:  
 Termination Remark: Target depth

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm <sup>2</sup> ): 1500 ConeID: Geoprobe-MIP01 Operator: Gary Connor Rig Used: UK17 Date of test: 10/08/2016	Location: Lee-on-Solent, UK Coordinates: , Elevation: Coordinate system:	Pre-response test concentration index: Test Compound: Trichloroethylene (TCE) 10 ppm (10 <sup>5</sup> Scale) = ..... 100 ppm (10 <sup>6</sup> Scale) = _____	Remarks:  Termination Remark: Total reaction load  See report section 'MIP Interpretive Data' for methods of interpretation.	Date of plot: 17-08-16 Lankelma Project Ref: P-106456-6 Checked by: Chris Player	<p><b>TEST ID: CELTMIP007</b></p> <p>Page 1 of 1</p>
---	---	---	--	--	--



Cone area (mm2):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 10/08/2016

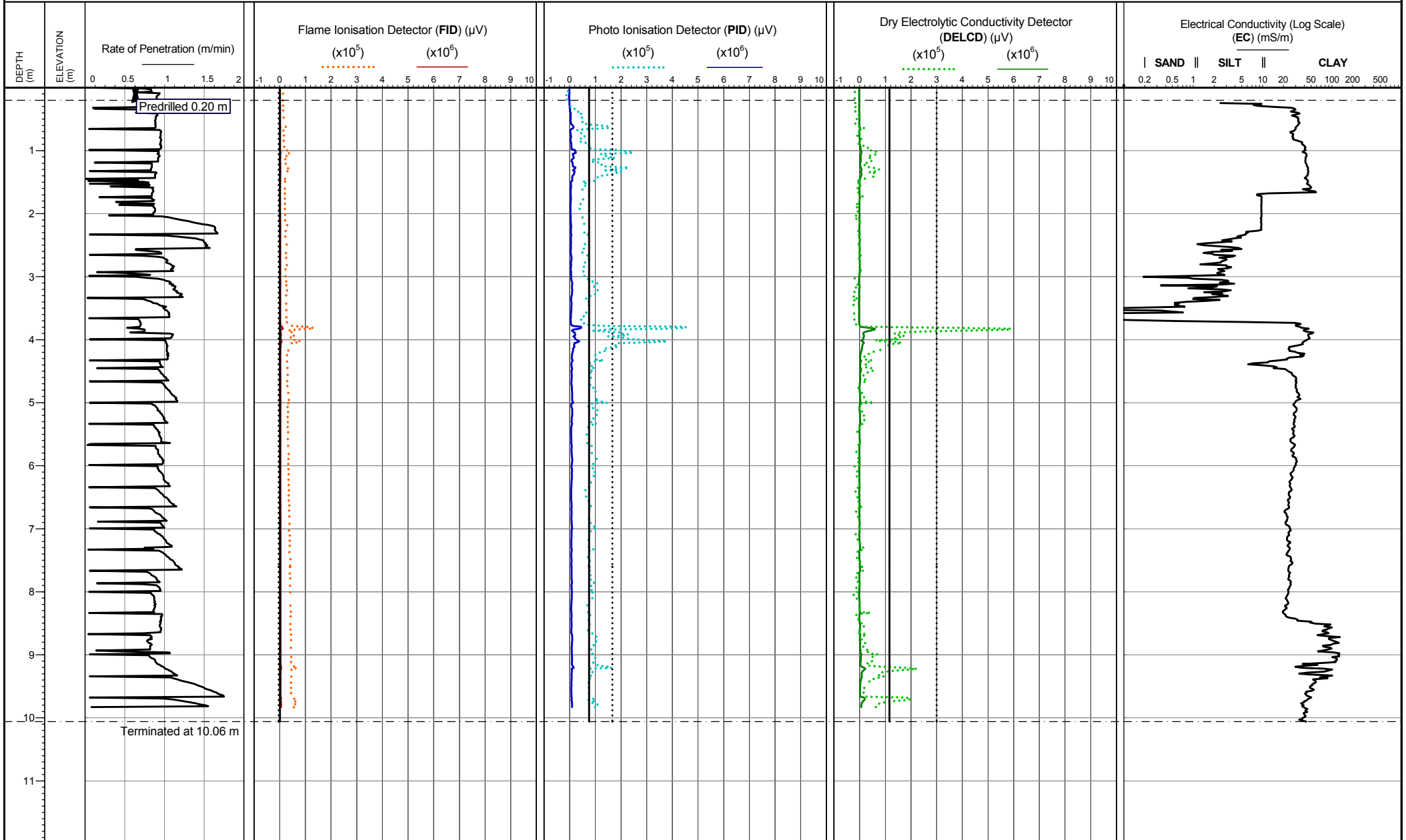
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark: Total reaction load  
 See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player

**TEST ID: CELTMIP008**  
 Page 1 of 1



Cone area (mm<sup>2</sup>): 1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 11/08/2016

Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

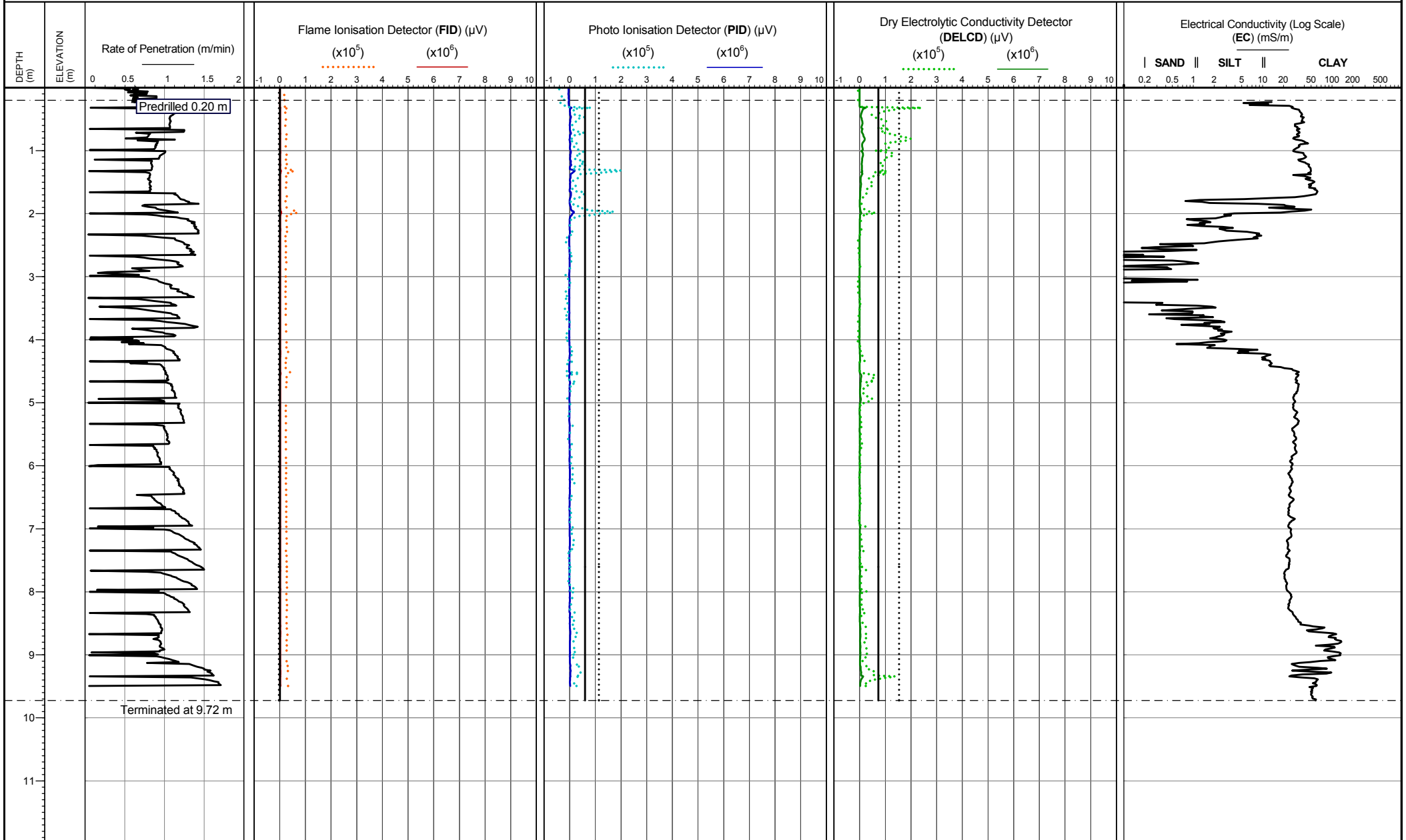
Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

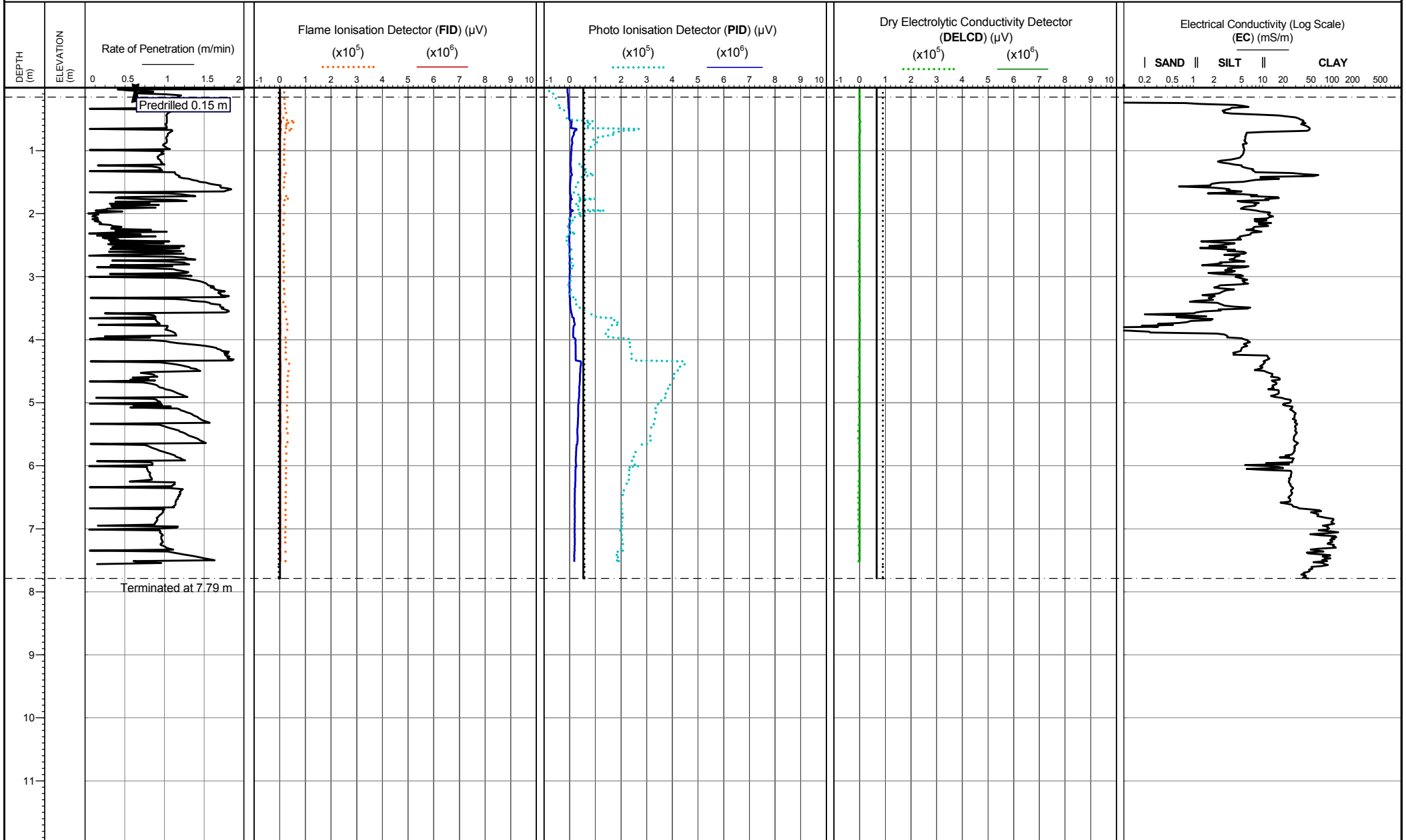
Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player







Cone area (mm<sup>2</sup>): 1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 11/08/2016

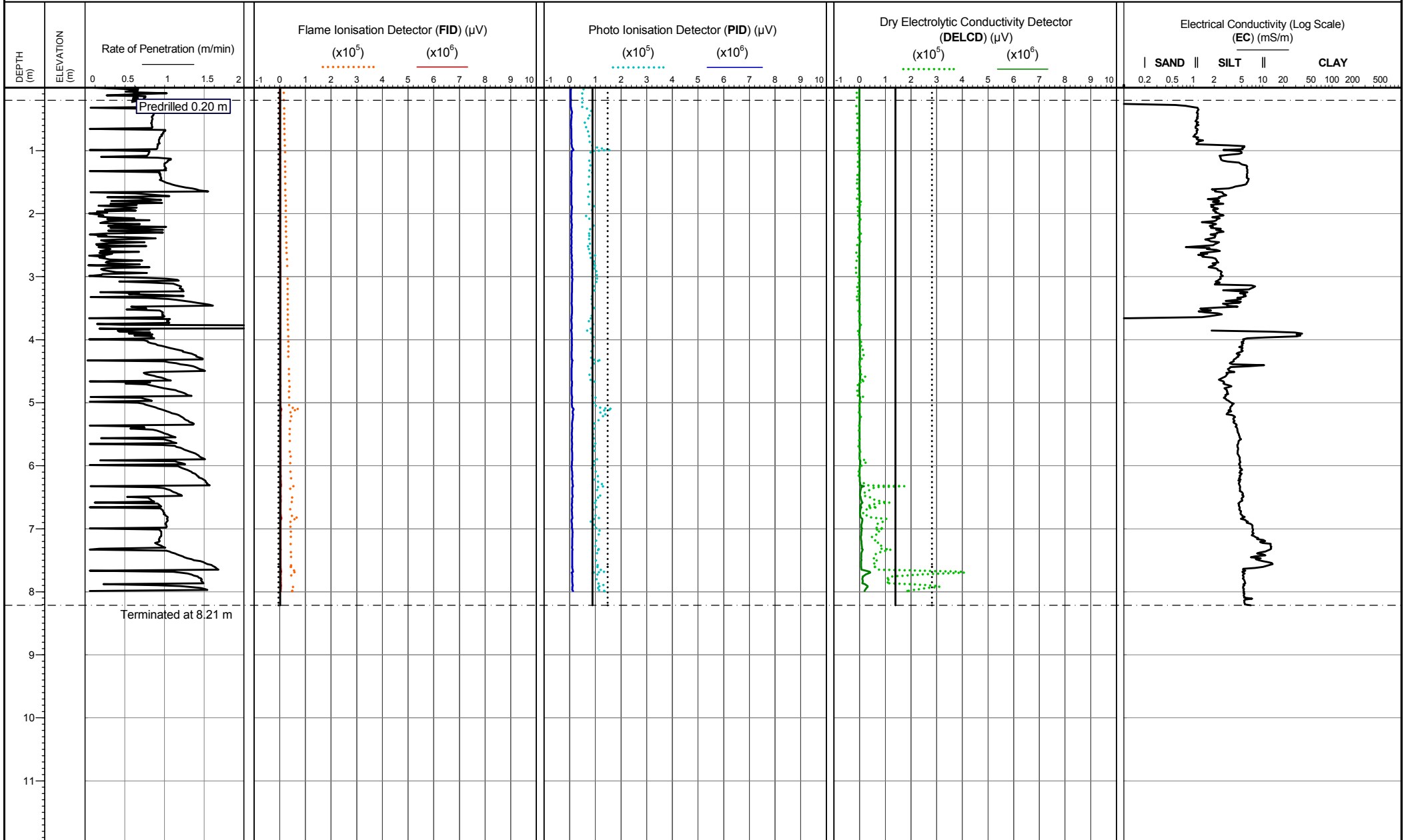
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks:  
 Termination Remark:  
 Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



Cone area (mm<sup>2</sup>):1500  
 ConeID: Geoprobe-MIP01  
 Operator: Gary Connor  
 Rig Used: UK17  
 Date of test: 12/08/2016

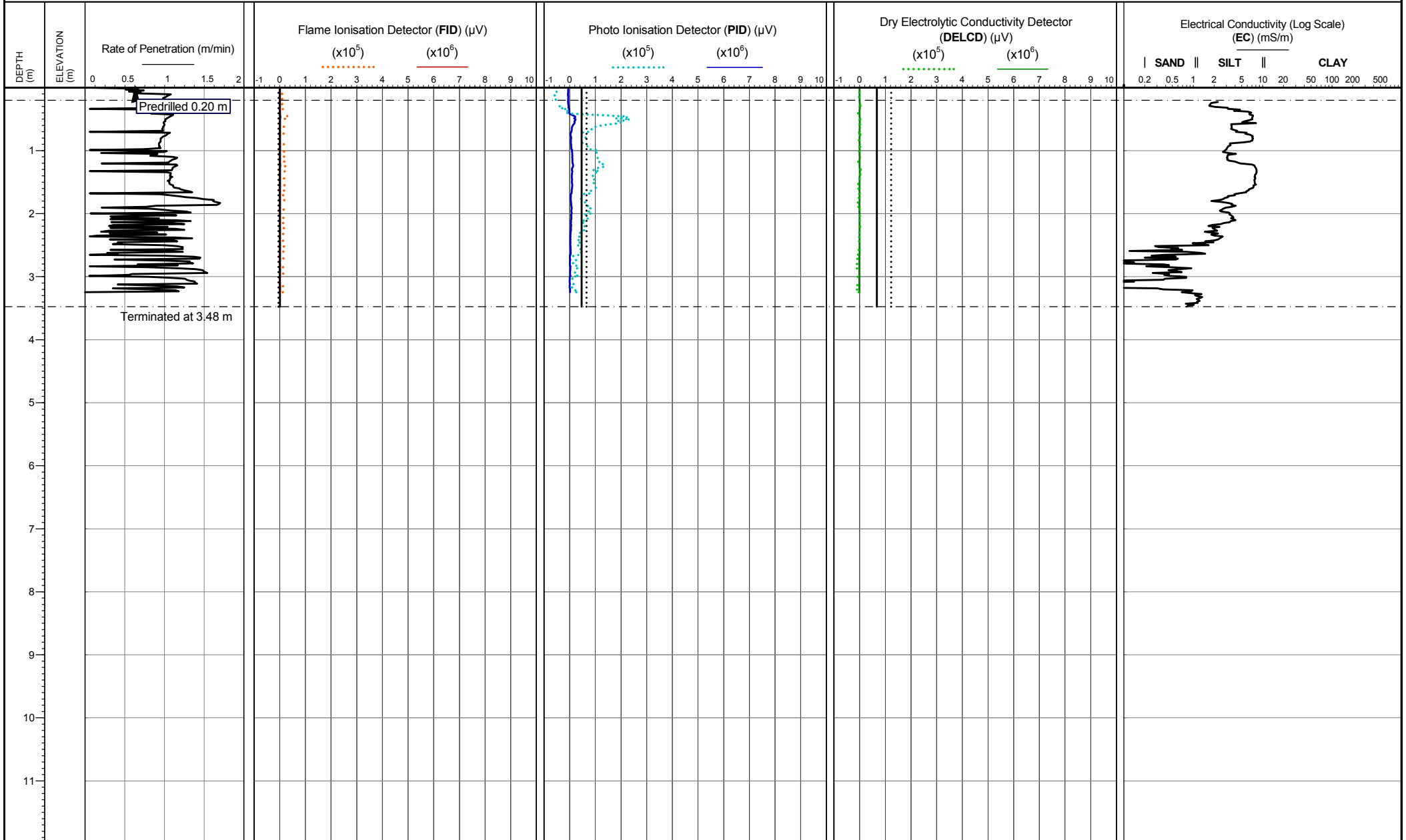
Location: Lee-on-Solent, UK  
 Coordinates: ,  
 Elevation:  
 Coordinate system:

Pre-response test concentration index:  
 Test Compound: Trichloroethylene (TCE)  
 10 ppm (10<sup>5</sup> Scale) = .....  
 100 ppm (10<sup>6</sup> Scale) = \_\_\_\_\_

Remarks: Poor electrical conductivity..  
 Termination Remark: Total reaction load

See report section 'MIP Interpretive Data' for methods of interpretation.

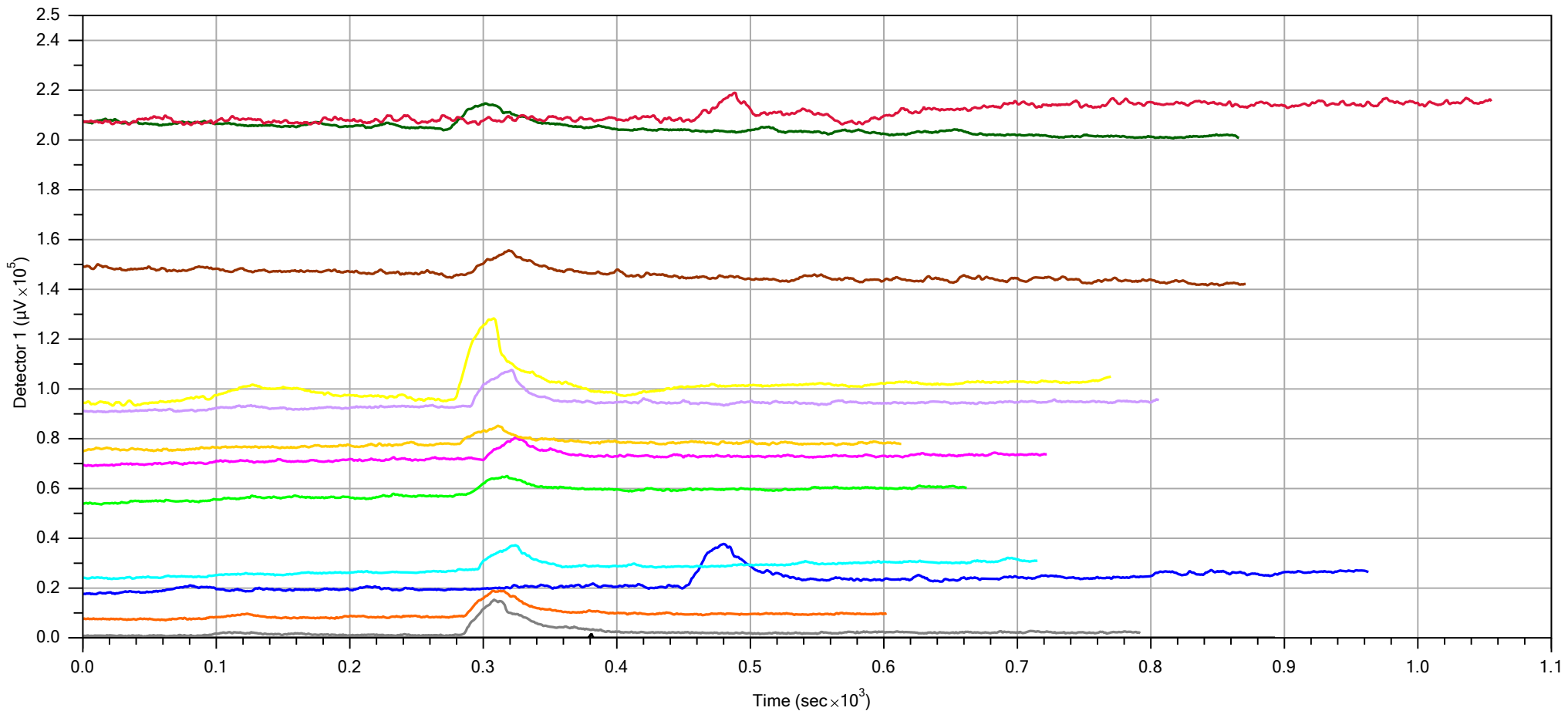
Date of plot: 17-08-16  
 Lankelma Project Ref: P-106456-6  
 Checked by: Chris Player



<p>Cone area (mm<sup>2</sup>):1500                  ConeID: Geoprobe-MIP01                  Operator: Gary Connor                  Rig Used: UK17                  Date of test: 12/08/2016</p>	<p>Location: Lee-on-Solent, UK                  Coordinates: ,                  Elevation:                  Coordinate system:</p>	<p>Pre-response test concentration index:                  10 ppm (10<sup>5</sup> Scale) = .....                  100 ppm (10<sup>6</sup> Scale) = _____</p>	<p>Test Compound:                  Trichloroethylene (TCE)</p>	<p>Remarks: Poor electrical conductivity..                   Termination Remark:                  Lateral support</p>	<p>See report section 'MIP Interpretive Data' for methods of interpretation.</p>	<p>Date of plot: 17-08-16                  Lankelma Project Ref: P-106456-6                   Checked by:                  Chris Player</p>	<p><b>TEST ID: CELTMIP014</b>                  Page 1 of 1</p>
---	--	--	--	---	--	---	--

**APPENDIX D      MEMBRANE INTERFACE PROBE RESULTS****DETECTOR RESPONSE TESTS - OVERLAY PLOTS****LIST OF FIGURES:**

<b>Test ID</b>			<b>Pages included</b>
Membrane Interface Probe Test	All Tests	FID: Detector 1	1
Membrane Interface Probe Test	All Tests	PID: Detector 2	1
Membrane Interface Probe Test	All Tests	DELCD: Detector 3	1

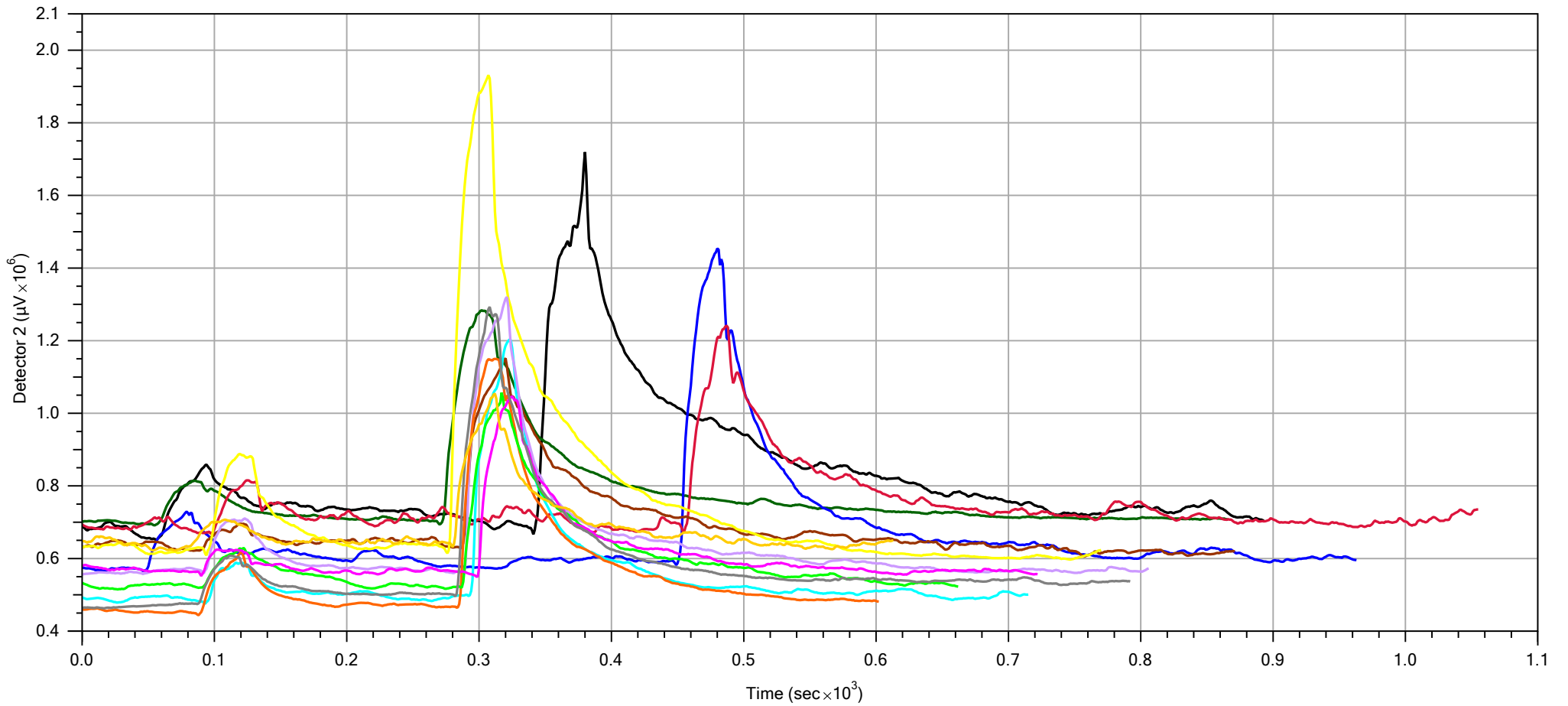


Filename	Date
P-106456-6 - CELTMIP001 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP002 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP003 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP004 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP005 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP006 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP007 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP008 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP009 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP010 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP011 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP012 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP013 PRE RESPONSE.PRE.TIM	—



FID

Company:	LANKELMA	Operator:	CP
Project ID:	P-106456-6	Client:	CELTIC LTD.

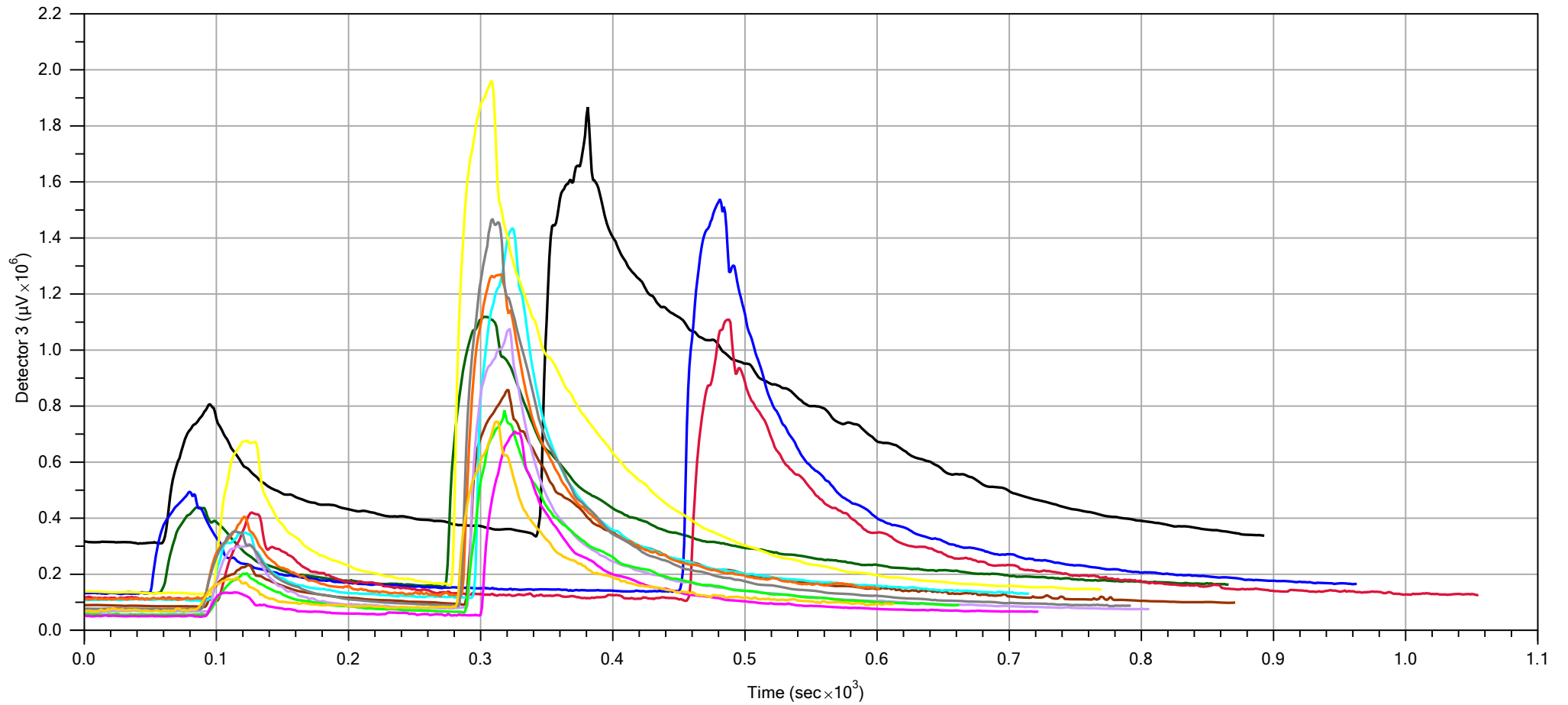


Filename	Date
P-106456-6 - CELTMIP001 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP002 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP003 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP004 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP005 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP006 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP007 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP008 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP009 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP010 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP011 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP012 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP013 PRE RESPONSE.PRE.TIM	—



PID

Company:	LANKELMA	Operator:	CP
Project ID:	P-106456-6	Client:	CELTIC LTD.



Filename	Date
P-106456-6 - CELTMIP001 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP002 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP003 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP004 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP005 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP006 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP007 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP008 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP009 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP010 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP011 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP012 PRE RESPONSE.PRE.TIM	—
P-106456-6 - CELTMIP013 PRE RESPONSE.PRE.TIM	—



DELCD

Company:	LANKELMA	Operator:	CP
Project ID:	P-106456-6	Client:	CELTIC LTD.



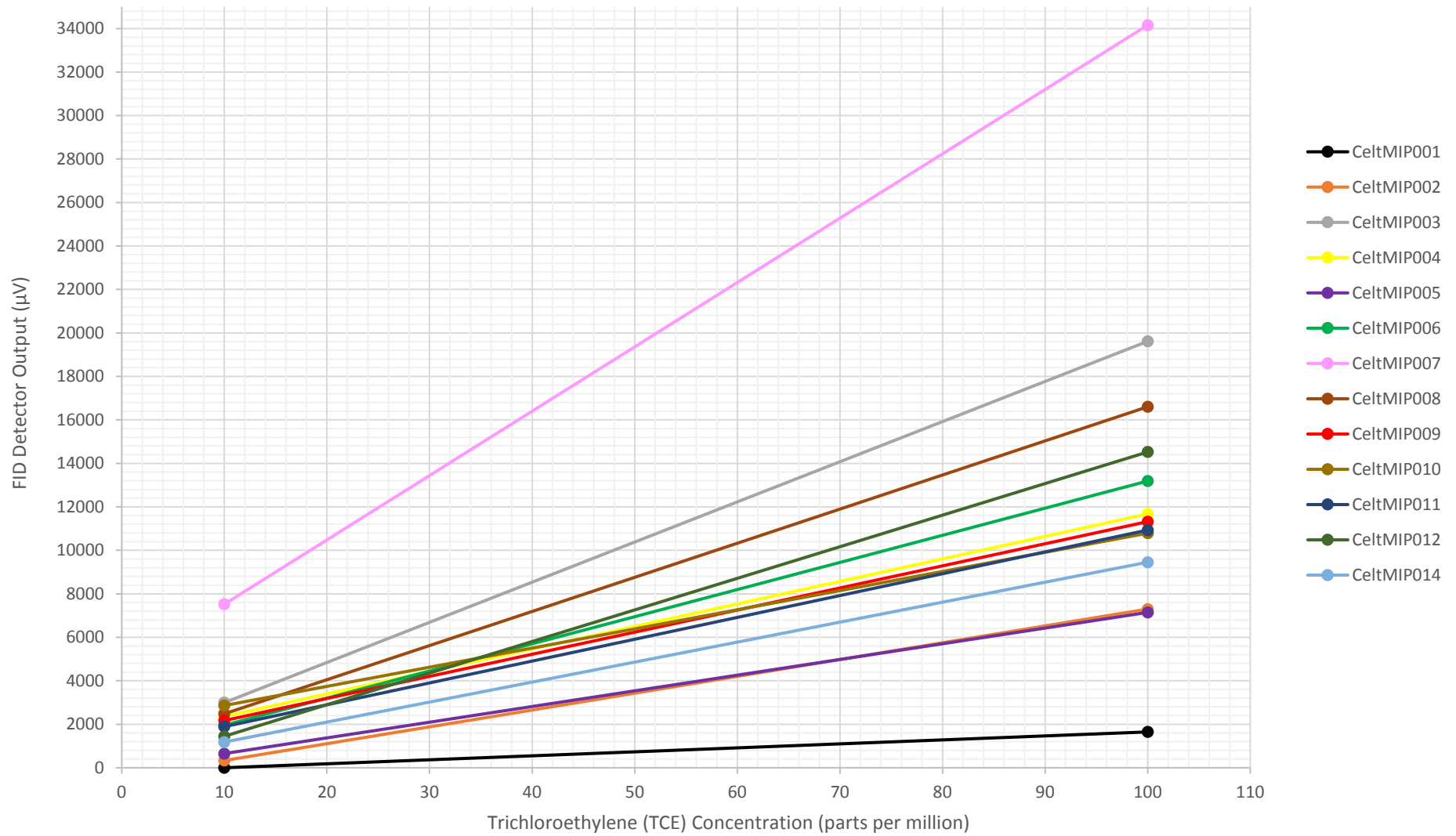
**APPENDIX E      MEMBRANE INTERFACE PROBE RESULTS****PRE-RESPONSE TEST EXTRAPOLATED PLOTS**

**Detector response ( $\mu\text{V}$ ) at known TCE concentrations (parts per million)**

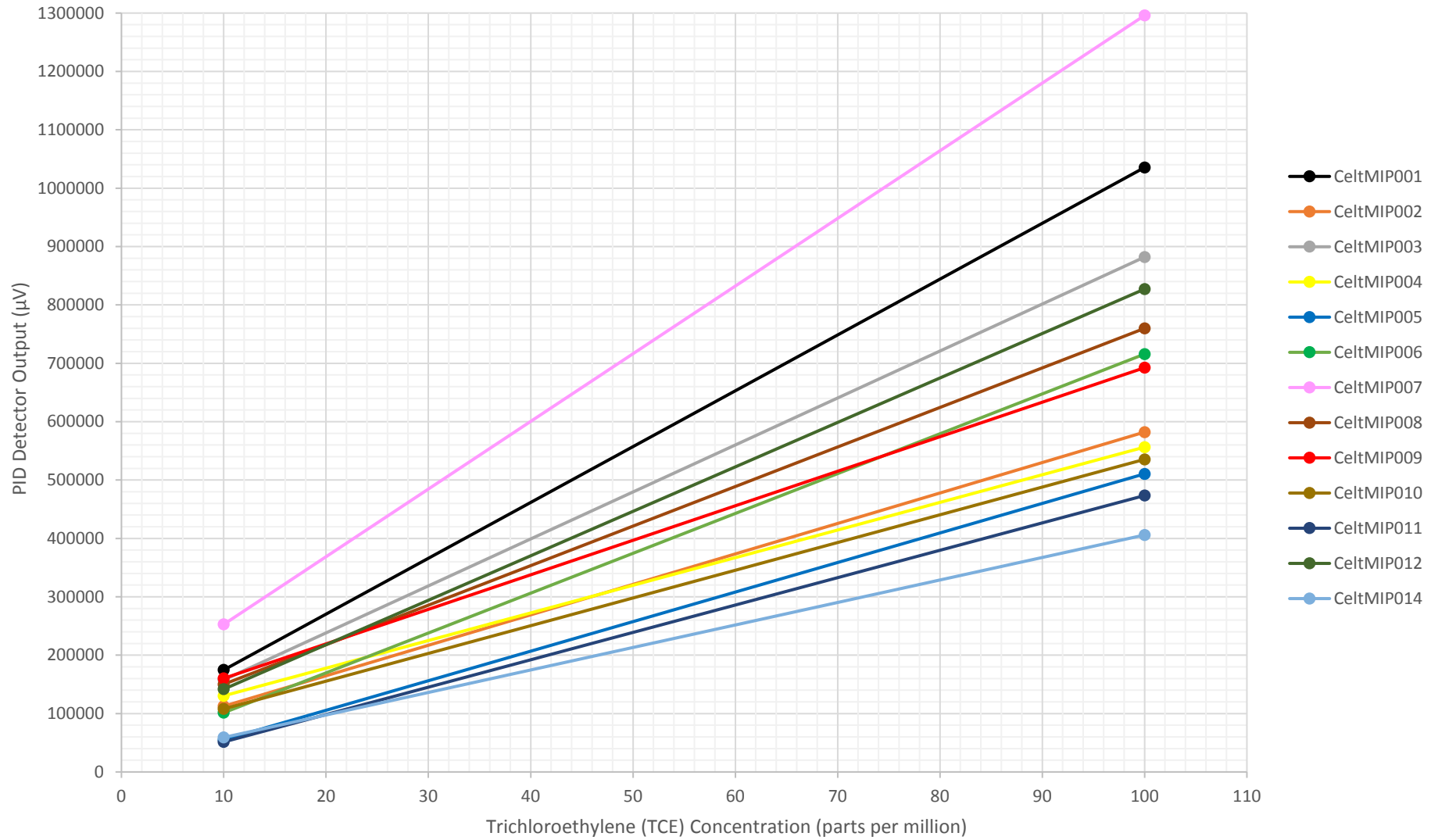
**LIST OF FIGURES:**

<b>Test ID</b>			<b>Pages included</b>
Membrane Interface Probe Test	All Tests	FID: Detector 1	1
Membrane Interface Probe Test	All Tests	PID: Detector 2	1
Membrane Interface Probe Test	All Tests	DELCD: Detector 3	1

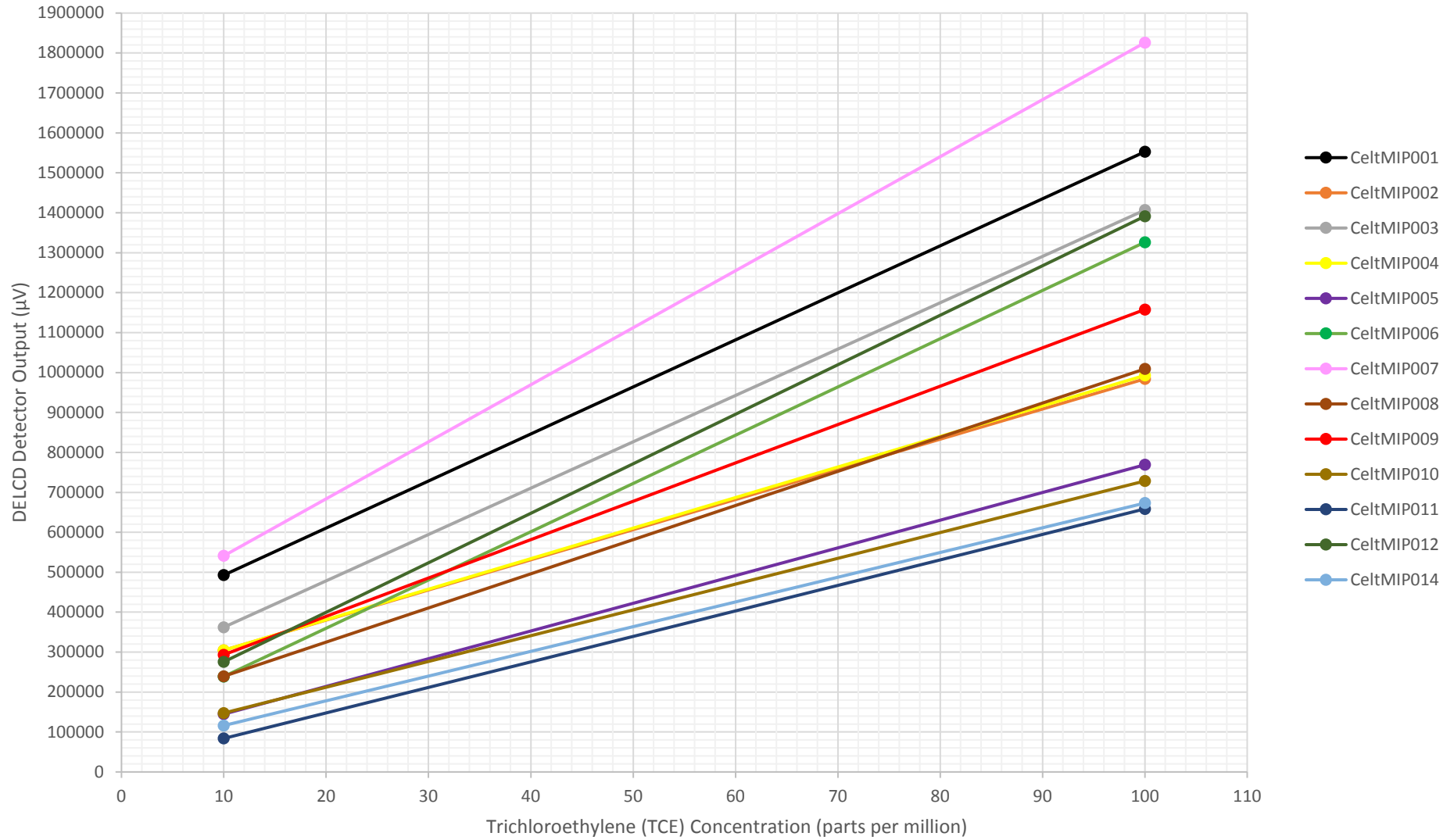
# FID - Pre-Response Test - Trichloroethylene (TCE) at 10ppm & 100ppm



# PID - Pre-Response Test - Trichloroethylene (TCE) at 10ppm & 100ppm

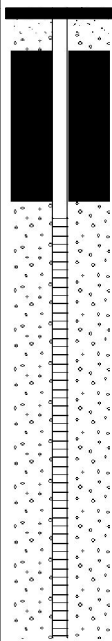



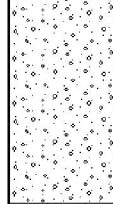
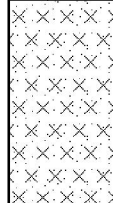


### DELCD - Pre-Response Test - Trichloroethylene (TCE) at 10ppm & 100ppm



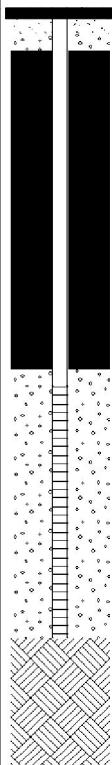

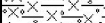

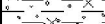
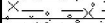

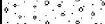
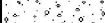
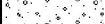
**APPENDIX D – CELTIC BOREHOLE LOGS**

Project No: C1696	Date: 12 Aug 2016	Easting: 455963.470
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101369.540
Client: Homes and Communities Agency	Method: WS	Datum: 8.048m
	Hole Diameter: 200mm	Screen Position: 2.50 - 7.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					Concrete (cored) prior to drilling	0.20		7.848
					Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional clinker	0.50		7.548
				ESCELBHMIP11A / 2.00m	Firm orange brown slightly silty slightly gravelly CLAY	1.50		6.548
				ESCELBHMIP11A / 3.50m	(Dense) orange brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse mostly fine. Visual contamination at 4.0m with gravels			
				ESCELBHMIP11A / 4.50m				
				ESCELBHMIP11A / 5.00m	(Dense) orange brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse mostly fine. Visual contamination at 4.0m within gravels	5.00		3.048
					End of Borehole	7.50		0.548

Comments: Dynamic sampled to 4.50m Rotary open holed from 4.50-7.50m

Project No: C1696	Date: 4 Aug 2016	Easting: -
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: -
Client: Homes and Communities Agency	Method: WS	Datum: 8.540m
	Hole Diameter: 200mm	Screen Position: 4.50 - 7.50m

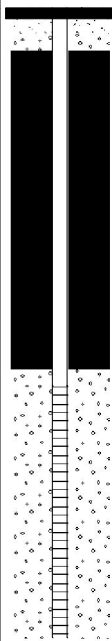

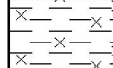

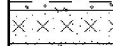
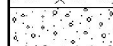

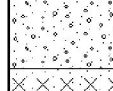
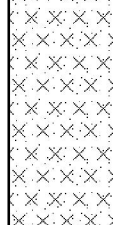
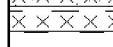
WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					Concrete (cored) prior to drilling	0.20		8.340
					Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional clinker (Made Ground)	0.50		8.040
					Firm to stiff brown slightly gravelly clayey SILT. Gravel is fine to coarse of flint	1.10		7.440
					Firm to stiff brown silty slightly gravelly CLAY. Gravel is fine to coarse of flint	2.00		6.540
					(Dense) orange brown sandy GRAVEL. Sand is coarse. Gravel is angular to sub angular fine to coarse mostly fine. 2.0-2.50m slightly clayey sandy GRAVEL.	5.00		3.540
					(Dense) greenish grey silty SAND. Sand is fine. Slightly gravelly SAND 5.50-6.45mbgl.	6.45		2.090
		ES		CELBH01 / 7.00m	Firm dark grey laminated silty CLAY. Frequent shell fragments and laminations of silt and clay.	7.40		1.140
					(Dense) dark grey silty slightly gravelly SAND. Gravel is fine angular of shell fragments.	8.80		-0.260
					Firm to Stiff dark grey silty CLAY	9.00		-0.460
					End of Borehole			

Comments: Dynamic sampled to 9.0m (no flush)



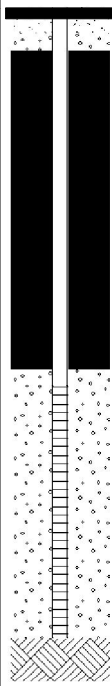
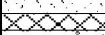


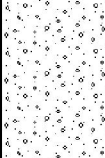




Project No: C1696	Date: 8 Aug 2016	Easting: 455937.650
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101369.800
Client: Homes and Communities Agency	Method: WS	Datum: 8.084m
	Hole Diameter: 200mm	Screen Position: 4.50 - 7.50m

WATER		WELL		SAMPLING/TESTING		SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)	
					Ashphalt	0.10		7.984	
					Soft gravelly silt. Gravel fine to coarse mostly coarse of brick and concrete.	0.40		7.684	
					Soft orangish brown slightly silty CLAY	1.40		6.684	
					Soft to firm orangish brown slightly gravelly silty CLAY. Gravel is fine to coarse of flint	1.90		6.184	
					(Dense) Greenish brown slightly silty SAND	2.30		5.784	
					Firm brown silty CLAY	2.40		5.684	
					(Dense) light brown sandy GRAVEL. Gravel is fine to coarse angular to sub rounded of flint and pebbles. 3.30-4.0m becoming less sandy.	4.20		3.884	
			ES	CELBH03 / 5.00m	(Dense) light brown slightly silty SAND. SAND is mostly fine				
					Firm to stiff dark grey slightly gravelly very silty CLAY. Gravel is fine angular of shell fragments.	7.20		0.884	
					End of Borehole	7.50		0.584	

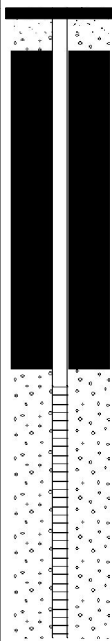
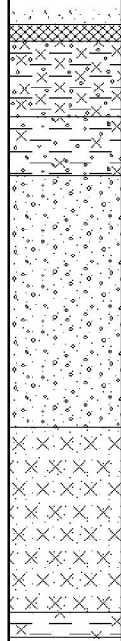
Comments: Dynamic sampled to 7.5m (no flush)

Project No: C1696	Date: 8 Aug 2016	Easting: 455903.620
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101374.760
Client: Homes and Communities Agency	Method: RO	Datum: 7.990m
	Hole Diameter: 200mm	Screen Position: 4.50 - 7.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					Concrete (cored prior to drilling)	0.20		7.790
					Soft gravelly silt. Gravel fine to coarse mostly coarse of brick and concrete.	0.40		7.590
					Soft orangish brown slightly clayey slightly gravelly SILT. Gravel is flint	1.50		6.490
			ES	CELBH04 / 3.00m	(Dense) light brown sandy GRAVEL. Gravel is fine to coarse angular to sub rounded of flint and pebbles.	4.20		3.790
			ES	CELBH04 / 5.00m	(Dense) light brown slightly silty SAND. SAND is mostly fine	7.20		0.790
			ES	CELBH04 / 7.30m	Firm to stiff dark grey slightly gravelly very silty CLAY. Alternating Laminations of silt/ clay. Gravel is fine angular of shell fragments	8.00		-0.010
					End of Borehole			

Comments: Rotary open holed to 7.50m depth Dynamic sampled to 7.50- 8.00m (no flush)

Project No: C1696	Date: 9 Aug 2016	Easting: -
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: -
Client: Homes and Communities Agency	Method: RO	Datum: -
	Hole Diameter: 200mm	Screen Position: 4.50 - 7.50m

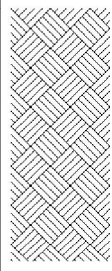
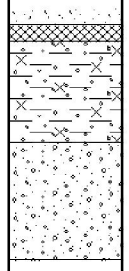
WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					<p>Concrete (cored) prior to drilling</p> <p>Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional clinker</p> <p>Firm to stiff brown slightly gravelly clayey SILT. Gravel is fine to coarse of flint</p> <p>Firm to stiff brown slight gravelly silty CLAY. Gravel is fine to coarse of flint</p> <p>(Dense) orange brown sandy GRAVEL. Sand is coarse. Gravel is angular to sub angular fine to coarse mostly fine.</p> <p>(Dense) orange brown silty SAND. Sand is fine.</p> <p>Firm dark grey laminated silty CLAY. Frequent lenses of shell fragments and laminations of silt and clay.</p> <p style="text-align: center;">End of Borehole</p>	0.20 0.40 1.30 2.00 5.00 7.20 7.50		4.20m 4.50 - 7.50m

Comments: Dynamic sampled to 1.20m Rotary open holed from 1.20-7.50m



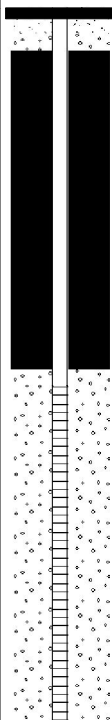
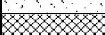

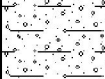
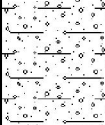
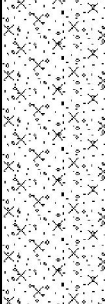
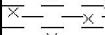


Project No: C1696	Date: 10 Aug 2016	Easting: 455917.890
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101395.910
Client: Homes and Communities Agency	Method: WS	Datum: 7.988m
	Hole Diameter: 200mm	Screen Position:

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
0					GL-0.20m concrete (cored) prior to drilling	0.20		7.788
0.40					Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional cement	0.40		7.588
1.60					Firm orange brown mottling black silty gravelly CLAY	1.60		6.388
3.00					(Dense) orange brown sandy GRAVEL. Sand is fine to coarse.	3.00		4.988
4					End of Borehole			
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

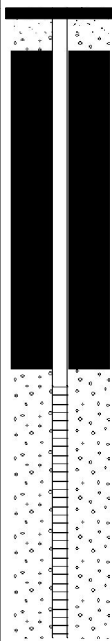


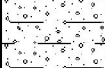



Comments: Dynamic sampled to 3.0m (no flush)

Project No: C1696	Date: 10 Aug 2016	Easting: 455874.930
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101377.870
Client: Homes and Communities Agency	Method: RO	Datum: 8.081m
	Hole Diameter: 200mm	Screen Position: 4.50 - 8.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					Concrete (cored) prior to drilling	0.20		7.881
					Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional clinker	0.50		7.581
					Firm orange brown slightly silty slightly gravelly CLAY	1.60		6.481
					(Dense) orange brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse mostly fine	4.20		3.881
▽ 4.00m		ES		CELBH08 / 4.00m	(Dense) orange brown silty slightly gravelly SAND. Gravel is fine angular of shell fragments.	8.00		0.081
					Firm dark grey laminated silty CLAY. Frequent shell fragments and laminations of silt and clay.	8.50		-0.419
					End of Borehole			

Comments: Rotary open holed to 7.50m depth Dynamic sampled to 7.50- 8.50m (no flush)

Project No: C1696	Date: 11 Aug 2016	Easting: 455894.050
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101412.470
Client: Homes and Communities Agency	Method: WS	Datum: 8.016m
	Hole Diameter: 200mm	Screen Position: 4.50 - 7.50m

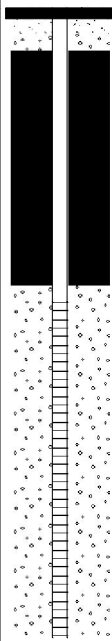
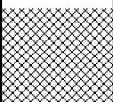

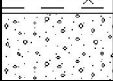




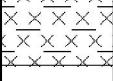

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
					Concrete (cored) prior to drilling	0.20		7.816
					Soft to firm dark brown slightly gravelly clayey SILT. Gravel is fine to coarse of brick and occasional cement	0.50		7.516
					Soft orange brown slightly silty slightly gravelly CLAY	1.50		6.516
			B	CELBH09 / 3.00m	(Dense) orange brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub angular fine to coarse mostly fine	4.20		3.816
▽ 4.00m			B	CELBH09 / 5.00m	(Dense) dark grey silty SAND..	7.00		1.016
			B ES	CELBH09 / 7.20m CELBH09 / 7.50m	Firm dark grey laminated silty CLAY. Laminations of silt and clay.	7.50		0.516
					End of Borehole			

Comments: Dynamic sampled to 7.5m (no flush) to obtain samples for soil oxygen demand trial





Project No: C1696	Date: 15 Aug 2016	Easting: 455921.930
Site Location: Daedalus - Lee on Solent	Engineer: SK	Northing: 101193.220
Client: Homes and Communities Agency	Method: RO	Datum: 8.714m
	Hole Diameter: 200mm	Screen Position: 3.50 - 7.50m

WATER	WELL	SAMPLING/TESTING			SUBSURFACE PROFILE			
Water Strike	Well Data	N Value	Sample Type	Sample Ref	DESCRIPTION OF STRATA	Depth (m bgl)	Legend	Level (m AOD)
						0		
					Soft dark brown gravelly SILT. Gravel is fine to coarse of brick, wood and occasional clinker			
					Soft light brown clayey SILT	1.20		7.514
					(Dense) orange brown sandy GRAVEL	2.20		6.514
					(Dense) dark brown silty GRAVEL. Strong hydrocarbon odour	3.00		5.714
			ES	CELBH12 / 4.00m	Soft dark brown slightly gravelly silty CLAY strong hydrocarbon odour	4.00		4.714
					Very soft silty sandy CLAY	5.00		3.714
			ES	CELBH12 / 6.00m	Soft bluish grey silty CLAY	6.00		2.714
					Firm bluish grey slightly clayey SILT	6.20		2.514
					End of Borehole	7.50		1.214
						8		
						9		
						10		
						11		
						12		
						13		
						14		
						15		
						16		

Comments: Rotary open holed to 6.0m depth Dynamic sampled to 6.0- 7.50m (no flush)

## APPENDIX E – SOIL AND GROUNDWATER ANALYSIS



2183

## Final Report

---

**Report No.:** 16-19217-1

**Initial Date of Issue:** 17-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** Daedalus C1696

**Quotation No.:** Q16-06891      **Date Received:** 11-Aug-2016

**Order No.:** 76925      **Date Instructed:** 11-Aug-2016

**No. of Samples:** 8

**Turnaround (Wkdays):** 5      **Results Due:** 17-Aug-2016

**Date Approved:** 17-Aug-2016

**Approved By:**

**Details:** Reg 13(1) Technical Manager

---



Determi nand	Accred.	SOP	Units	LOD	Chemtest Job No.:		16-19217		16-19217		16-19217		16-19217											
					Chemtest Sample ID.:	336198	CEL BH01	WATER	09-Aug-2016	336199	CEL BH02	WATER	09-Aug-2016	336200	CEL BH05	WATER	09-Aug-2016	336201	CEL BH03	WATER	10-Aug-2016	336202	CEL BH04	WATER
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50										
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0										
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0										

## 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 our Coventry 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

### 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](mailto:customerservices@chemtest.co.uk)



2183

**Chemtest Ltd.**

Depot Road

Newmarket

CB8 0AL

Tel: 01638 606070

Email: [info@chemtest.co.uk](mailto:info@chemtest.co.uk)

## Final Report

---

**Report No.:** 16-19390-1

**Initial Date of Issue:** 18-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** Daedalus C1696

**Quotation No.:** Q16-06891      **Date Received:** 12-Aug-2016

**Order No.:** 76925      **Date Instructed:** 12-Aug-2016

**No. of Samples:** 6

**Turnaround (Wkdays):** 5      **Results Due:** 18-Aug-2016

**Date Approved:** 18-Aug-2016

**Approved By:**

Reg 13(1)

**Details:**

Reg 13(1)

Laboratory Manager

---



Client: Celtic Ltd		Chemtest Job No.: 16-19390		16-19390	
Quotation No.: Q16-06881		Chemtest Sample ID.: 336988		336990	
		Client Sample ID.: CELBH07		CELBH08	
		Sample Type: WATER		WATER	
		Date Sampled: 10-Aug-2016		11-Aug-2016	
Determinand	Accred.	SOP	Units	LOD	
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	1.7
Bromochloromethane	U	1760	µg/l	5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	1.1
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	410
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0

Client: Celtic Ltd	Chemtest Job No.:	16-19390			
Quotation No.: Q16-06891	Chemtest Sample ID.:	336988			
	Client Sample ID.:	CELBH07			
	Sample Type:	WATER			
	Date Sampled:	10-Aug-2016			
		11-Aug-2016			
Determinand	Accred.	SOP	Units	LOD	
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-19757-1

**Initial Date of Issue:** 24-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** C1696 Daedalus

**Quotation No.:** Q16-06892      **Date Received:** 18-Aug-2016

**Order No.:** 76925      **Date Instructed:** 18-Aug-2016

**No. of Samples:** 10

**Turnaround (Wkdays):** 5      **Results Due:** 24-Aug-2016

**Date Approved:** 24-Aug-2016

**Approved By:** Reg 13(1)

**Details:** Reg 13(1) Technical Manager

---



The right chemistry to deliver results

Project: C1696 Daedalus

Client: Celtic Ltd		Chemtest Job No.:		16-19757	16-19757
Quotation No.: Q16-06892		Chemtest Sample ID.:		338879	338882
Order No.: 76925		Client Sample Ref.:		Round 1	Round 1
		Client Sample ID.:		CELBH12	CELBH10
		Sample Type:		WATER	WATER
		Date Sampled:		17-Aug-2016	17-Aug-2016
Determinand	Accred.	SOP	Units	LOD	
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0
Benzene	U	1760	µg/l	1.0	20
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	1.5
Dibromomethane	U	1760	µg/l	10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	110
Dibromochloromethane	U	1760	µg/l	2.0	< 2.0
1,2-Dibromoethane	U	1760	µg/l	10	< 10
Chlorobenzene	U	1760	µg/l	5.0	< 5.0
1,1,1,2-Tetrachloroethane	N	1760	µg/l	1.0	< 1.0
Ethylbenzene	U	1760	µg/l	2.0	< 2.0
m & p-Xylene	U	1760	µg/l	1.0	2.9
o-Xylene	U	1760	µg/l	1.0	3.2
Styrene	U	1760	µg/l	1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0
Bromobenzene	U	1760	µg/l	8.4	< 1.0
1,2,3-Trichloropropane	U	1760	µg/l	1.0	< 1.0
N-Propylbenzene	N	1760	µg/l	50	< 50
	U	1760	µg/l	1.0	7.0

**Project: C1696 Daedalus**

<b>Client:</b> Celtic Ltd	<b>Chemtest Job No.:</b>		16-19757	16-19757		
Quotation No.: Q16-06892	<b>Chemtest Sample ID.:</b>		338879	338882		
Order No.: 76925	<b>Client Sample Ref.:</b>		Round 1	Round 1		
	<b>Client Sample ID.:</b>		CELBH12	CELBH10		
	<b>Sample Type:</b>		WATER	WATER		
	<b>Date Sampled:</b>		17-Aug-2016	17-Aug-2016		
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>		
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	2.6	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	10	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	2.2	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-20053-1

**Initial Date of Issue:** 26-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** C1696 Daedalus

**Quotation No.:** Q16-06892      **Date Received:** 22-Aug-2016

**Order No.:** 76925      **Date Instructed:** 22-Aug-2016

**No. of Samples:** 6

**Turnaround (Wkdays):** 5      **Results Due:** 26-Aug-2016

**Date Approved:** 26-Aug-2016

**Approved By:** Reg 13(1)

**Details:** Reg 13(1) Laboratory Manager

---



**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:			16-20053	16-20053
Quotation No.: Q16-06892		Chemtest Sample ID.:			340514	340518
Order No.: 76925		Client Sample Ref.:			Round 1	Round 1
		Client Sample ID.:			BHCEL09	BHMIPIIA
		Sample Type:			WATER	WATER
		Date Sampled:			17-Aug-2016	17-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Arsenic (Dissolved)	U	1450	µg/l	1.0		< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080		0.30
Chromium (Dissolved)	U	1450	µg/l	1.0		< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0		< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50		< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0		14
Lead (Dissolved)	U	1450	µg/l	1.0		< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0		2.5
Zinc (Dissolved)	U	1450	µg/l	1.0		12
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10		< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10		10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10		230
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10		220
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10		250
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10		20
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10		< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10		< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0		730
Aromatic TPH >C5-C7	N	1675	µg/l	0.10		< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10		5.1
Aromatic TPH >C8-C10	N	1675	µg/l	0.10		33
Aromatic TPH >C10-C12	N	1675	µg/l	0.10		53
Aromatic TPH >C12-C16	N	1675	µg/l	0.10		37
Aromatic TPH >C16-C21	N	1675	µg/l	0.10		< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10		3.7
Aromatic TPH >C35-C44	N	1675	µg/l	0.10		< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0		130
Total Petroleum Hydrocarbons	N	1675	µg/l	10		870
Naphthalene	U	1700	µg/l	0.10		< 0.10
Acenaphthylene	U	1700	µg/l	0.10		< 0.10
Acenaphthene	U	1700	µg/l	0.10		< 0.10
Fluorene	U	1700	µg/l	0.10		< 0.10
Phenanthrene	U	1700	µg/l	0.10		< 0.10
Anthracene	U	1700	µg/l	0.10		< 0.10
Fluoranthene	U	1700	µg/l	0.10		< 0.10
Pyrene	U	1700	µg/l	0.10		< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10		< 0.10
Chrysene	U	1700	µg/l	0.10		< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10		< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10		< 0.10

**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:			16-20053	16-20053
Quotation No.: Q16-06892		Chemtest Sample ID.:			340514	340518
Order No.: 76925		Client Sample Ref.:			Round 1	Round 1
		Client Sample ID.:			BHCEL09	BHMIPIIA
		Sample Type:			WATER	WATER
		Date Sampled:			17-Aug-2016	17-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Benzo[a]pyrene	U	1700	µg/l	0.10		< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10		< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10		< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10		< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0		< 2.0
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	3.8
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	1.7
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	7.1
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0

**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:			16-20053	16-20053
Quotation No.: Q16-06892		Chemtest Sample ID.:			340514	340518
Order No.: 76925		Client Sample Ref.:			Round 1	Round 1
		Client Sample ID.:			BHCEL09	BHMIPIIA
		Sample Type:			WATER	WATER
		Date Sampled:			17-Aug-2016	17-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	1790	µg/l	0.50		< 0.50
Phenol	N	1790	µg/l	0.50		< 0.50
2-Chlorophenol	N	1790	µg/l	0.50		< 0.50
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50		< 0.50
1,3-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50
1,4-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50
1,2-Dichlorobenzene	N	1790	µg/l	0.50		< 0.50
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50		< 0.50
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50		< 0.50
Hexachloroethane	N	1790	µg/l	0.50		< 0.50
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50		< 0.50
4-Methylphenol	N	1790	µg/l	0.50		< 0.50
Nitrobenzene	N	1790	µg/l	0.50		< 0.50
Isophorone	N	1790	µg/l	0.50		< 0.50
2-Nitrophenol	N	1790	µg/l	0.50		< 0.50
2,4-Dimethylphenol	N	1790	µg/l	0.50		< 0.50
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50		< 0.50
2,4-Dichlorophenol	N	1790	µg/l	0.50		< 0.50
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50		< 0.50

**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:			16-20053	16-20053
Quotation No.: Q16-06892		Chemtest Sample ID.:			340514	340518
Order No.: 76925		Client Sample Ref.:			Round 1	Round 1
		Client Sample ID.:			BHCEL09	BHMIP1IA
		Sample Type:			WATER	WATER
		Date Sampled:			17-Aug-2016	17-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Naphthalene	N	1790	µg/l	0.50		< 0.50
4-Chloroaniline	N	1790	µg/l	0.50		< 0.50
Hexachlorobutadiene	N	1790	µg/l	0.50		< 0.50
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50		< 0.50
2-Methylnaphthalene	N	1790	µg/l	0.50		< 0.50
Hexachlorocyclopentadiene	N	1790	µg/l	0.50		< 0.50
2,4,6-Trichlorophenol	N	1790	µg/l	0.50		< 0.50
2,4,5-Trichlorophenol	N	1790	µg/l	0.50		< 0.50
2-Chloronaphthalene	N	1790	µg/l	0.50		< 0.50
2-Nitroaniline	N	1790	µg/l	0.50		< 0.50
Acenaphthylene	N	1790	µg/l	0.50		< 0.50
Dimethylphthalate	N	1790	µg/l	0.50		< 0.50
2,6-Dinitrotoluene	N	1790	µg/l	0.50		< 0.50
Acenaphthene	N	1790	µg/l	0.50		< 0.50
3-Nitroaniline	N	1790	µg/l	0.50		< 0.50
Dibenzofuran	N	1790	µg/l	0.50		< 0.50
4-Chlorophenylphenylether	N	1790	µg/l	0.50		< 0.50
2,4-Dinitrotoluene	N	1790	µg/l	0.50		< 0.50
Fluorene	N	1790	µg/l	0.50		< 0.50
Diethyl Phthalate	N	1790	µg/l	0.50		< 0.50
4-Nitroaniline	N	1790	µg/l	0.50		< 0.50
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50		< 0.50
Azobenzene	N	1790	µg/l	0.50		< 0.50
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50		< 0.50
Hexachlorobenzene	N	1790	µg/l	0.50		< 0.50
Pentachlorophenol	N	1790	µg/l	0.50		< 0.50
Phenanthrene	N	1790	µg/l	0.50		< 0.50
Anthracene	N	1790	µg/l	0.50		< 0.50
Carbazole	N	1790	µg/l	0.50		< 0.50
Di-N-Butyl Phthalate	N	1790	µg/l	0.50		< 0.50
Fluoranthene	N	1790	µg/l	0.50		< 0.50
Pyrene	N	1790	µg/l	0.50		< 0.50
Butylbenzyl Phthalate	N	1790	µg/l	0.50		< 0.50
Benzo[a]anthracene	N	1790	µg/l	0.50		< 0.50
Chrysene	N	1790	µg/l	0.50		< 0.50
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50		< 0.50
Di-N-Octyl Phthalate	N	1790	µg/l	0.50		< 0.50
Benzo[b]fluoranthene	N	1790	µg/l	0.50		< 0.50
Benzo[k]fluoranthene	N	1790	µg/l	0.50		< 0.50
Benzo[a]pyrene	N	1790	µg/l	0.50		< 0.50



The right chemistry to deliver results

**Project: C1696 Daedalus**

<b>Client: Celtic Ltd</b>	<b>Chemtest Job No.:</b>				16-20053	16-20053
Quotation No.: Q16-06892	<b>Chemtest Sample ID.:</b>				340514	340518
Order No.: 76925	<b>Client Sample Ref.:</b>				Round 1	Round 1
	<b>Client Sample ID.:</b>				BHCEL09	BHMIP1IA
	<b>Sample Type:</b>				WATER	WATER
	<b>Date Sampled:</b>				17-Aug-2016	17-Aug-2016
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>		
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50		< 0.50
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50		< 0.50
Benzo(g,h,i)perylene	N	1790	µg/l	0.50		< 0.50
4-Nitrophenol	N	1790	µg/l	0.50		< 0.50
Total Phenols	U	1920	mg/l	0.030		< 0.030

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-17703-1

**Initial Date of Issue:** 01-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)  
[Redacted]

**Project:** C1696 Daedalus Suite 1

**Quotation No.:** Q16-06891      **Date Received:** 25-Jul-2016

**Order No.:** 76925      **Date Instructed:** 26-Jul-2016

**No. of Samples:** 7

**Turnaround (Wkdays):** 5      **Results Due:** 01-Aug-2016

**Date Approved:** 01-Aug-2016

**Approved By:** Reg 13(1)  
[Redacted]

**Details:** Reg 13(1) Laboratory Manager

---

**Project: C1696 Daedalus Suite 1**

Client: Celtic Ltd	Chemtest Job No.:				16-17703	16-17703	16-17703	16-17703	16-17703	16-17703	16-17703
Quotation No.: Q16-06891	Chemtest Sample ID.:				328277	328278	328279	328280	328281	328282	328283
Order No.: 76925	Client Sample Ref.:				WF BH 13	MGBH01	MGBH01	MGBH01( AP)	WFBH12	WFBH12	WFBH12
	Client Sample ID.:						BASE			BASE	AP
	Sample Type:				WATER	WATER	WATER	WATER	WATER	WATER	WATER
	Top Depth (m):					0.5			0.5		
	Date Sampled:				22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016
Determinand	Accred.	SOP	Units	LOD							
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	2.7	2.1	2.5	14	17	13
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	3.9	3.2	3.1	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	1.7	1.2	< 1.0	1.8	2.3	1.8
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	850	920	770	460	700	530
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50



**Project: C1696 Daedalus Suite 1**

Client: Celtic Ltd	Chemtest Job No.:		16-17703	16-17703	16-17703	16-17703	16-17703	16-17703	16-17703	16-17703
Quotation No.: Q16-06891	Chemtest Sample ID.:		328277	328278	328279	328280	328281	328282	328283	
Order No.: 76925	Client Sample Ref.:		WF BH 13	MGBH01	MGBH01	MGBH01( AP)	WFBH12	WFBH12	WFBH12	
	Client Sample ID.:				BASE			BASE	AP	
	Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	
	Top Depth (m):			0.5			0.5			
	Date Sampled:		22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016	22-Jul-2016
Determinand	Accred.	SOP	Units	LOD						
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

## 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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-17815-1

**Initial Date of Issue:** 29-Jul-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)  
[Redacted]

**Project:** C1696 Daedalus Suite 1

**Quotation No.:** Q16-06891      **Date Received:** 26-Jul-2016

**Order No.:** 76925      **Date Instructed:** 26-Jul-2016

**No. of Samples:** 2

**Turnaround (Wkdays):** 4      **Results Due:** 29-Jul-2016

**Date Approved:** 29-Jul-2016

**Approved By:**

Reg 13(1)  
[Redacted Signature]

**Details:** Reg 13(1) Laboratory Manager

---

**Project: C1696 Daedalus Suite 1**

Client: Celtic Ltd		Chemtest Job No.:			16-17815	16-17815
Quotation No.: Q16-06891		Chemtest Sample ID.:			329010	329011
		Client Sample ID.:			MC Drain	WFBH11
		Sample Type:			WATER	WATER
		Date Sampled:			22-Jul-2016	22-Jul-2016
Determinand	Accred.	SOP	Units	LOD		
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0

**Project: C1696 Daedalus Suite 1**

Client: Celtic Ltd		Chemtest Job No.:		16-17815	16-17815
Quotation No.: Q16-06891		Chemtest Sample ID.:		329010	329011
		Client Sample ID.:		MC Drain	WFBH11
		Sample Type:		WATER	WATER
		Date Sampled:		22-Jul-2016	22-Jul-2016
Determinand	Accred.	SOP	Units	LOD	
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



2183

## Final Report

---

**Report No.:** 16-18733-1

**Initial Date of Issue:** 11-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** C1696 Daedalus

**Quotation No.:** Q16-06891      **Date Received:** 05-Aug-2016

**Order No.:** 76925      **Date Instructed:** 05-Aug-2016

**No. of Samples:** 4

**Turnaround (Wkdays):** 5      **Results Due:** 11-Aug-2016

**Date Approved:** 11-Aug-2016

**Approved By:**

Reg 13(1)

**Details:** Reg 13(1) Technical Development  
Chemist

---

**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:		16-18733	16-18733	16-18733	16-18733
Quotation No.: Q16-06891		Chemtest Sample ID.:		333660	333661	333662	333663
		Client Sample ID.:		WFBH13	WFBH13A	WFBH03	MCBH03
		Sample Type:		WATER	WATER	WATER	WATER
		Date Sampled:		03-Aug-2016	03-Aug-2016	03-Aug-2016	03-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Dichlorodifluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Chloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	5.7
1,1,1-Trichloroethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	1.0	11	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
Toluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	1.0	< 1.0	< 1.0	110
1,3-Dichloropropane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	µg/l	1.0	1.4	< 1.0	< 1.0
o-Xylene	U	1760	µg/l	1.0	2.8	< 1.0	< 1.0
Styrene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	1760	µg/l	50	< 50	< 50	< 50
N-Propylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0



**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:		16-18733	16-18733	16-18733	16-18733
Quotation No.: Q16-06891		Chemtest Sample ID.:		333660	333661	333662	333663
		Client Sample ID.:		WFBH13	WFBH13A	WFBH03	MCBH03
		Sample Type:		WATER	WATER	WATER	WATER
		Date Sampled:		03-Aug-2016	03-Aug-2016	03-Aug-2016	03-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
1,3,5-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



2183

**Chemtest Ltd.**

Depot Road

Newmarket

CB8 0AL

Tel: 01638 606070

Email: [info@chemtest.co.uk](mailto:info@chemtest.co.uk)

## Final Report

---

**Report No.:** 16-19217-1

**Initial Date of Issue:** 17-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1) [REDACTED]

**Project:** Daedalus C1696

**Quotation No.:** Q16-06891      **Date Received:** 11-Aug-2016

**Order No.:** 76925      **Date Instructed:** 11-Aug-2016

**No. of Samples:** 8

**Turnaround (Wkdays):** 5      **Results Due:** 17-Aug-2016

**Date Approved:** 17-Aug-2016

**Approved By:**

**Details:** Reg 13(1) [REDACTED] Technical Manager

---

Client: Celtic Ltd	Chemtest Job No.:		16-19217		16-19217	
	Quotation No.: Q16-08891	Chemtest Sample ID.:	336204	CEL BH07	336205	CEL BH07
	Client Sample ID.:		SOIL		SOIL	
	Sample Type:		SOIL		SOIL	
	Top Depth (m):		5		7	
Date Sampled:		10-Aug-2016		10-Aug-2016		
Determinand	Accred.	SOP	Units	LOD	Units	LOD
Moisture	N	2030	%	0.020	16	17
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50

Client: Celtic Ltd		Chemtest Job No.:	16-19217	16-19217
Quotation No.: Q16-06881		Chemtest Sample ID.:	336204	336205
		Client Sample ID.:	CEL BH07	CEL BH07
		Sample Type:	SOIL	SOIL
		Top Depth (m):	5	7
		Date Sampled:	10-Aug-2016	10-Aug-2016
Determinand	Accred.	SOP	Units	LOD
N-Propylbenzene	U	2760	µg/kg	1.0
2-Chlorotoluene	U	2760	µg/kg	1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0
4-Chlorotoluene	U	2760	µg/kg	1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0
N-Butylbenzene	U	2760	µg/kg	1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0



## Final Report

---

**Report No.:** 16-19079-1

**Initial Date of Issue:** 16-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** C1696 Daedotus Lee-on-the-Solent

**Quotation No.:** Q16-06891

**Date Received:** 10-Aug-2016

**Order No.:** 76925

**Date Instructed:** 10-Aug-2016

**No. of Samples:** 5

**Turnaround (Wkdays):** 5

**Results Due:** 16-Aug-2016

**Date Approved:** 16-Aug-2016

**Approved By:**

Reg 13(1)

**Details:** Reg 13(1) Technical Manager

---

Determiand	Accred.	SOP	Units	LOD	Chemtest Job No.:		16-19079		16-19079		16-19079	
					Chemtest Sample ID.:	Client Sample ID.:	Sample Type:	Top Depth (m):	Date Sampled:	08-Aug-2016	08-Aug-2016	08-Aug-2016
Moisture	N	2030	%	0.020	18	5	SOIL	5	3	SOIL	5	7.3
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	335251	CELBH03	335252	CELBH04	335253	CELBH04	336254
Chloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroethane	U	2760	µg/kg	2.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	85
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10			< 10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10			< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10			< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	1500
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10			< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50			< 50	< 50	< 50	< 50	< 50

Client: Celltic Ltd		Chemtest Job No.:	16-19079	16-19078	16-19079	16-19078
Quotation No.: Q16-06891		Chemtest Sample ID.:	335251	335252	335253	335254
		Client Sample ID.:	CELBH03	CELBH04	CELBH04	CELBH04
		Sample Type:	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):	5	3	5	7.3
		Date Sampled:	08-Aug-2016	08-Aug-2016	08-Aug-2016	08-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0



## 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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-19390-1

**Initial Date of Issue:** 18-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** Daedalus C1696

**Quotation No.:** Q16-06891      **Date Received:** 12-Aug-2016

**Order No.:** 76925      **Date Instructed:** 12-Aug-2016

**No. of Samples:** 6

**Turnaround (Wkdays):** 5      **Results Due:** 18-Aug-2016

**Date Approved:** 18-Aug-2016

**Approved By:** Reg 13(1)

**Details:** Reg 13(1) Laboratory Manager

---

Client: Celtic Ltd	Chemtest Job No.:		16-19390		16-19390		16-19390	
	Quotation No.: Q16-06891	Chemtest Sample ID.:	336985	336986	336987	336988	336989	
	Client Sample ID.:		MIP7A		MIP7A		MIP7A	
	Sample Type:		SOIL		SOIL		SOIL	
	Top Depth (m):		1.5		2.0		4.0	
	Date Sampled:		10-Aug-2016		10-Aug-2016		11-Aug-2016	
Determinand	Accred.	SOP	Units	LOD				
Moisture	N	2030	%	0.020	11	5.2	8.1	18
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50

Client: Celtic Ltd	Chemtest Job No.:		16-19390		16-19390		16-19390	
	Quotation No.:	Chemtest Sample ID.:	336985	336986	336987	336989	336989	336989
Project: Daedalus C1696		Client Sample ID.:	MIPTA	MIPTA	CELBHD8	CELBHD8	CELBHD8	CELBHD8
		Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):	1.5	2.0	4.0	4.0	7.50	7.50
		Date Sampled:	10-Aug-2016	10-Aug-2016	10-Aug-2016	10-Aug-2016	11-Aug-2016	11-Aug-2016
Determinand	Accred.	SOP	Units	LOD				
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-19484-1

**Initial Date of Issue:** 19-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)

**Project:** Daedalus C1696

**Quotation No.:** Q16-06891      **Date Received:** 15-Aug-2016

**Order No.:** 76925      **Date Instructed:** 15-Aug-2016

**No. of Samples:** 2

**Turnaround (Wkdays):** 5      **Results Due:** 19-Aug-2016

**Date Approved:** 19-Aug-2016

**Approved By:**

Reg 13(1)

**Details:** Reg 13(1), Technical Manager

---

**Project: Daedalus C1696**

Client: Celtic Ltd		Chemtest Job No.:		16-19484	16-19484	
Quotation No.: Q16-06891		Chemtest Sample ID.:		337506	337507	
		Client Sample ID.:		CELBH10	CELBH10	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		9	10	
		Date Sampled:		11-Aug-2016	11-Aug-2016	
Determinand	Accred.	SOP	Units	LOD		
Moisture	N	2030	%	0.020	22	17
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50

**Project: Daedalus C1696**

Client: Celtic Ltd		Chemtest Job No.:		16-19484	16-19484
Quotation No.: Q16-06891		Chemtest Sample ID.:		337506	337507
		Client Sample ID.:		CELBH10	CELBH10
		Sample Type:		SOIL	SOIL
		Top Depth (m):		9	10
		Date Sampled:		11-Aug-2016	11-Aug-2016
Determinand	Accred.	SOP	Units	LOD	
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0



## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-19487-1

**Initial Date of Issue:** 22-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)  
[Redacted]

**Project:** Daedalus C1696

**Quotation No.:** Q16-06893      **Date Received:** 15-Aug-2016

**Order No.:** 76925      **Date Instructed:** 15-Aug-2016

**No. of Samples:** 3

**Turnaround (Wkdays):** 6      **Results Due:** 22-Aug-2016

**Date Approved:** 22-Aug-2016

**Approved By:** Reg 13(1)  
[Redacted]

**Details:** Reg 13(1), Technical Manager

---

Project: Daedalus C1696

Client: Celtic Ltd	Chemtest Job No.:				16-19487	16-19487	16-19487
Quotation No.: Q16-06893	Chemtest Sample ID.:				337517	337518	337519
Order No.: 76925	Client Sample Ref.:				BHM1P11A	BHM1P11A	BHM1P11A
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				2.0	3.5	4.5
	Bottom Depth (m):					4.0	
	Date Sampled:				12-Aug-2016	12-Aug-2016	12-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	6.5	9.8	7.7
Arsenic	U	2450	mg/kg	1.0	5.5	2.7	8.2
Cadmium	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chromium	U	2450	mg/kg	1.0	10	7.2	11
Copper	U	2450	mg/kg	0.50	3.3	2.7	4.1
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	46	47	55
Lead	U	2450	mg/kg	0.50	13	14	8.5
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	31	32	38
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	59	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	130	1.5
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	480	21
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	890	32
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	200	25
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	1800	79
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	2.2	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	70	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	550	5.4
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	370	2.9
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0	78	9.4
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	1100	18
Total Petroleum Hydrocarbons	N	2680	mg/kg	10	< 10	2800	97
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10

**Project: Daedalus C1696**

Client: Celtic Ltd	Chemtest Job No.:				16-19487	16-19487	16-19487
Quotation No.: Q16-06893	Chemtest Sample ID.:				337517	337518	337519
Order No.: 76925	Client Sample Ref.:				BHM1P11A	BHM1P11A	BHM1P11A
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				2.0	3.5	4.5
	Bottom Depth (m):					4.0	
	Date Sampled:				12-Aug-2016	12-Aug-2016	12-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Total Of 9 PAH's	U	2700	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0

**Project: Daedalus C1696**

Client: Celtic Ltd	Chemtest Job No.:				16-19487	16-19487	16-19487
Quotation No.: Q16-06893	Chemtest Sample ID.:				337517	337518	337519
Order No.: 76925	Client Sample Ref.:				BHM1P11A	BHM1P11A	BHM1P11A
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				2.0	3.5	4.5
	Bottom Depth (m):					4.0	
	Date Sampled:				12-Aug-2016	12-Aug-2016	12-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	< 1.0	67	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	190	< 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	12	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	420	< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	380	< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Phenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50

**Project: Daedalus C1696**

Client: Celtic Ltd	Chemtest Job No.:				16-19487	16-19487	16-19487
Quotation No.: Q16-06893	Chemtest Sample ID.:				337517	337518	337519
Order No.: 76925	Client Sample Ref.:				BHM1P11A	BHM1P11A	BHM1P11A
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				2.0	3.5	4.5
	Bottom Depth (m):					4.0	
	Date Sampled:				12-Aug-2016	12-Aug-2016	12-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50

**Project: Daedalus C1696**

Client: Celtic Ltd		Chemtest Job No.:		16-19487	16-19487	16-19487
Quotation No.: Q16-06893		Chemtest Sample ID.:		337517	337518	337519
Order No.: 76925		Client Sample Ref.:		BHM1P11A	BHM1P11A	BHM1P11A
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		2.0	3.5	4.5
		Bottom Depth (m):			4.0	
		Date Sampled:		12-Aug-2016	12-Aug-2016	12-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Benzo[a]anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Chrysene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)





# Final Report

---

**Report No.:** 16-19563-1

**Initial Date of Issue:** 22-Aug-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)  
[REDACTED]

**Project:** C1696 Daedalus

**Quotation No.:** Q16-06892      **Date Received:** 16-Aug-2016

**Order No.:** 76925      **Date Instructed:** 16-Aug-2016

**No. of Samples:** 3

**Turnaround (Wkdays):** 5      **Results Due:** 22-Aug-2016

**Date Approved:** 22-Aug-2016

**Approved By:**  
Reg 13(1)  
[REDACTED]

**Details:** Reg 13(1), Technical Manager

---

**Project: C1696 Daedalus**

Client: Celtic Ltd	Chemtest Job No.:				16-19563	16-19563	16-19563
Quotation No.: Q16-06892	Chemtest Sample ID.:				337990	337991	337992
	Client Sample ID.:				BHMIP11A	CECBH12	CECBH12
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				5.0	4.0	6.0
	Bottom Depth (m):				6.0		
	Date Sampled:				15-Aug-2016	15-Aug-2016	15-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Moisture	N	2030	%	0.020	14	16	17
Arsenic	U	2450	mg/kg	1.0	3.2	6.7	9.6
Cadmium	U	2450	mg/kg	0.10	< 0.10	0.20	< 0.10
Chromium	U	2450	mg/kg	1.0	8.2	19	25
Copper	U	2450	mg/kg	0.50	19	10	7.6
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	12	20	24
Lead	U	2450	mg/kg	0.50	1000	18	65
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	29	29	43
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10	< 10	< 10	< 10
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	2.6
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.69
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	3.3
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	3.2
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.4
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.9

**Project: C1696 Daedalus**

Client: Celtic Ltd	Chemtest Job No.:				16-19563	16-19563	16-19563
Quotation No.: Q16-06892	Chemtest Sample ID.:				337990	337991	337992
	Client Sample ID.:				BHMIP11A	CECBH12	CECBH12
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				5.0	4.0	6.0
	Bottom Depth (m):				6.0		
	Date Sampled:				15-Aug-2016	15-Aug-2016	15-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.4
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.97
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.3
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.78
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10	0.59
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10	1.0
Total Of 9 PAH's	U	2700	mg/kg	1.0	< 1.0	< 1.0	14
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0	19
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	< 10	< 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0

**Project: C1696 Daedalus**

Client: Celtic Ltd	Chemtest Job No.:				16-19563	16-19563	16-19563
Quotation No.: Q16-06892	Chemtest Sample ID.:				337990	337991	337992
	Client Sample ID.:				BHMIP11A	CECBH12	CECBH12
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				5.0	4.0	6.0
	Bottom Depth (m):				6.0		
	Date Sampled:				15-Aug-2016	15-Aug-2016	15-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	1.3	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	15	33	25
Bromobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	34	46	33
2-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	30
Sec-Butylbenzene	U	2760	µg/kg	1.0	57	23	23
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	48	16	17
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Phenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Isophorone	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50

Project: C1696 Daedalus

Client: Celtic Ltd	Chemtest Job No.:				16-19563	16-19563	16-19563
Quotation No.: Q16-06892	Chemtest Sample ID.:				337990	337991	337992
	Client Sample ID.:				BHMIP11A	CECBH12	CECBH12
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				5.0	4.0	6.0
	Bottom Depth (m):				6.0		
	Date Sampled:				15-Aug-2016	15-Aug-2016	15-Aug-2016
Determinand	Accred.	SOP	Units	LOD			
2-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Naphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Chloronaphthalene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Acenaphthene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fluorene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Azobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Phenanthrene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Carbazole	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50	< 0.50

**Project: C1696 Daedalus**

Client: Celtic Ltd		Chemtest Job No.:		16-19563	16-19563	16-19563
Quotation No.: Q16-06892		Chemtest Sample ID.:		337990	337991	337992
		Client Sample ID.:		BHMIP11A	CECBH12	CECBH12
		Sample Type:		SOIL	SOIL	SOIL
		Top Depth (m):		5.0	4.0	6.0
		Bottom Depth (m):		6.0		
		Date Sampled:		15-Aug-2016	15-Aug-2016	15-Aug-2016
Determinand	Accred.	SOP	Units	LOD		
Benzo[a]anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Chrysene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[b]fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[k]fluoranthene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[a]pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene	N	2790	mg/kg	0.50	< 0.50	< 0.50
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30

## 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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)



## Final Report

---

**Report No.:** 16-19722-1

**Initial Date of Issue:** 07-Sep-2016

**Client:** Celtic Ltd

**Client Address:** Unit 8  
Commerce Park  
Brunel Road  
Theale  
Berkshire  
RG7 4AB

**Contact(s):** Reg 13(1)  
[Redacted]

**Project:** Daedalus Suite 2

**Quotation No.:** Q16-06892      **Date Received:** 18-Aug-2016

**Order No.:** 76925      **Date Instructed:** 19-Aug-2016

**No. of Samples:** 2

**Turnaround (Wkdays):** 5      **Results Due:** 25-Aug-2016

**Date Approved:** 25-Aug-2016

**Approved By:**

Reg 13(1)  
[Redacted]

**Details:** Reg 13(1) Laboratory Manager

---



**Project: Daedalus Suite 2**

Client: Celtic Ltd		Chemtest Job No.:		16-19722	16-19722	
Quotation No.: Q16-06892		Chemtest Sample ID.:		338721	338722	
		Client Sample ID.:		BHCEL 01	CEL BH02	
		Sample Type:		SOIL	SOIL	
		Top Depth (m):		7.0		
		Bottom Depth (m):		7.50		
		Date Sampled:		04-Aug-2016	05-Aug-2016	
Determinand	Accred.	SOP	Units	LOD		
Moisture	N	2030	%	0.020	19	16
Dichlorodifluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Chloromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromomethane	U	2760	µg/kg	20	[B] < 20	< 20
Chloroethane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromochloromethane	U	2760	µg/kg	5.0	[B] < 5.0	< 5.0
Trichloromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1,1-Trichloroethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Benzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,2-Dichloroethane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Trichloroethene	N	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,2-Dichloropropane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Dibromomethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromodichloromethane	U	2760	µg/kg	5.0	[B] < 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	< 10
Toluene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	[B] < 10	< 10
1,1,2-Trichloroethane	U	2760	µg/kg	10	[B] < 10	< 10
Tetrachloroethene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	[B] < 10	< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0	[B] < 5.0	< 5.0
Chlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0	[B] < 2.0	< 2.0
Ethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Styrene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Isopropylbenzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0
Bromobenzene	U	2760	µg/kg	1.0	[B] < 1.0	< 1.0

**Project: Daedalus Suite 2**

Client: Celtic Ltd		Chemtest Job No.:		16-19722	16-19722
Quotation No.: Q16-06892		Chemtest Sample ID.:		338721	338722
		Client Sample ID.:		BHCEL 01	CEL BH02
		Sample Type:		SOIL	SOIL
		Top Depth (m):		7.0	
		Bottom Depth (m):		7.50	
		Date Sampled:		04-Aug-2016	05-Aug-2016
Determinand	Accred.	SOP	Units	LOD	
1,2,3-Trichloropropane	N	2760	µg/kg	50	[B] < 50 < 50
N-Propylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
2-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	[B] < 50 < 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	[B] < 2.0 < 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[B] < 1.0 < 1.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30 < 0.30

### 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:
338721		BHCEL 01	04-Aug-2016	B	Amber Glass 250ml
338721		BHCEL 01	04-Aug-2016	B	Amber Glass 60ml

## **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 our Coventry 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

### **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](mailto:customerservices@chemtest.co.uk)

## APPENDIX F – SOIL OXYGEN DEMAND TRIAL



## Jones Environmental Laboratory

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Celtic Technologies  
Columbus House  
Greenmeadow Springs  
Tongwynlais  
Cardiff  
CF15 7NE

Tel: +44 (0) 1244 833780  
Fax: +44 (0) 1244 833781

<b>Attention :</b>	Reg 13(1)
<b>Date :</b>	23rd August, 2016
<b>Your reference :</b>	C1696
<b>Our reference :</b>	Test Report 16/12949 Batch 2 & Batch 3
<b>Location :</b>	Daedalus
<b>Date samples received :</b>	12th August, 2016
<b>Status :</b>	Final report
<b>Issue :</b>	1

Twenty samples were received for analysis on 12th August, 2016 of which twenty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

Reg 13(1)

**Project Manager**

**Jones Environmental Laboratory**

**Client Name:** Celtic Technologies  
**Reference:** C1696  
**Location:** Daedalus  
**Contact:** Reg 13(1)  
**JE Job No.:** 16/12949

**Report:** Solid

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

J E Sample No.	21	26	23	24	25	22	30	31	32	33	Please see attached notes for all abbreviations and acronyms			
Sample ID	CELT-MW09 SAND DUP1	CELT-MW09 SAND DUP2	CELT-MW09 CLAY DUP1	CELT-MW09 CLAY DUP2	CELT-MW09 SAND&GRAV EL DUP1	CELT-MW09 SAND&GRAV EL DUP2	CELT-MW01 SAND DUP1	CELT-MW01 SAND DUP2	CELT-MW03 SAND DUP1	CELT-MW03 SAND DUP2				
Depth							5.00-6.00	5.00-6.00	4.50-6.00	4.50-6.00				
COC No / misc														
Containers	T	T	T	T	T	T	T	T	T	T				
Sample Date	<>	<>	<>	<>	<>	<>	<>	<>	<>	<>				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	2	2	2	2	2	2	3	3	3	3				
Date of Receipt	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	LOD/LOR	Units	Method No.	
Natural Moisture Content @105°C	22.9	23.8	25.0	24.7	5.1	5.5	25.1	23.8	23.3	24.6	<0.1	%	PM4/PM10	
Weight of Wet Soil Used in Trial	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	<0.01	g		
Volume of 7.5g/l Potassium Permanganate used made up using Daedalus site water	100	100	100	100	100	100	100	100	100	100		mls		
Soil to Water Ratio of Trial	1:2	1:2	1:2	1:2	1:2	1:2	1:2	1:2	1:2	1:2				
Permanganate Dosage Conc <sup>n</sup> in wet soil	15	15	15	15	15	15	15	15	15	15		g/kg		
Permanganate Dosage Conc <sup>n</sup> In dry soil	19.45	19.69	20.0	19.92	15.81	15.87	20.03	19.69	19.56	19.69		g/kg		
Residual Permanganate Day 0	~	~	~	~	~	~	~	~	~	~		g/l		
Residual Permanganate after 48 hrs	6.575	6.474	0.004	<0.003	6.870	6.811	6.490	6.509	6.420	6.444		g/l		

Please include all sections of this report if it is reproduced

**Jones Environmental Laboratory**

Client Name: Celtic Technologies  
 Reference: C1696  
 Location: Daedalus  
 Contact: **Reg 13(1)**  
 JE Job No.: 16/12949

Report: Solid

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

J E Sample No.	34	35	36	37	38	39	40	41	42	43	Please see attached notes for all abbreviations and acronyms			
Sample ID	CELT-MW01 CLAY DUP1	CELT-MW01 CLAY DUP2	CELT-MW03 CLAY DUP1	CELT-MW03 CLAY DUP2	CELT-MW03 SAND&GRAV EL DUP 1	CELT-MW03 SAND&GRAV EL DUP 2	CELT-MW01 SAND&GRAV EL DUP 1	CELT-MW01 SAND&GRAV EL DUP 2	Control day 0 Permanganate made with Site water (no soil)	Control day 2 Permanganate made with Site water (no soil)				
Depth	8.00	8.00	7.90	7.90	3.00-4.00	3.00-4.00	3.00-4.00	3.00-4.00						
COC No / misc														
Containers	T	T	T	T	T	T	T	T	J	J				
Sample Date	<	<	<	<	<	<	<	<	<	<				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Water	Water				
Batch Number	3	3	3	3	3	3	3	3	3	3				
Date of Receipt	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	12/08/2016	LOD/LOR	Units	Method No.	
Natural Moisture Content	26.9	27.7	25.7	24.1	7.1	6.6	9.7	10.1	-	-	<0.1	%	PM4/PM0	
Weight of Wet Soil Used in Trial	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	0	0	<0.01	g		
Volume of 7.5g/l Potassium Permanganate used made up using Daedalus site water	100	100	100	100	100	100	100	100	100	100		mls		
Soil to Water Ratio of Trial	1:2	1:2	1:2	1:2	1:2	1:2	1:2	1:2	0	0				
Permanganate Dosing Conc <sup>n</sup> in wet soil	15	15	15	15	15	15	15	15	0	0		g/kg		
Permanganate Dosing Conc <sup>n</sup> in dry soil	20.52	20.75	20.19	19.76	16.15	16.06	16.61	16.69	0	0		g/kg		
Residual Permanganate Day 0	-	-	-	-	-	-	-	-	7.366	-		g/l		
Residual Permanganate after 48 hrs	<0.003	<0.003	0.117	<0.003	6.693	6.472	6.797	6.610	-	7.201		g/l		



Client Name: Celtic Technologies  
 Reference: C1696  
 Location: Daedalus  
 Contact: [Redacted] Reg 13(1)

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 16/12949						

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

## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/12949

### SOILS

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

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

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

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

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

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

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

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

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

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

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

### WATERS

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

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

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

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

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

### SURROGATES

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

### DILUTIONS

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

### NOTE

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

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

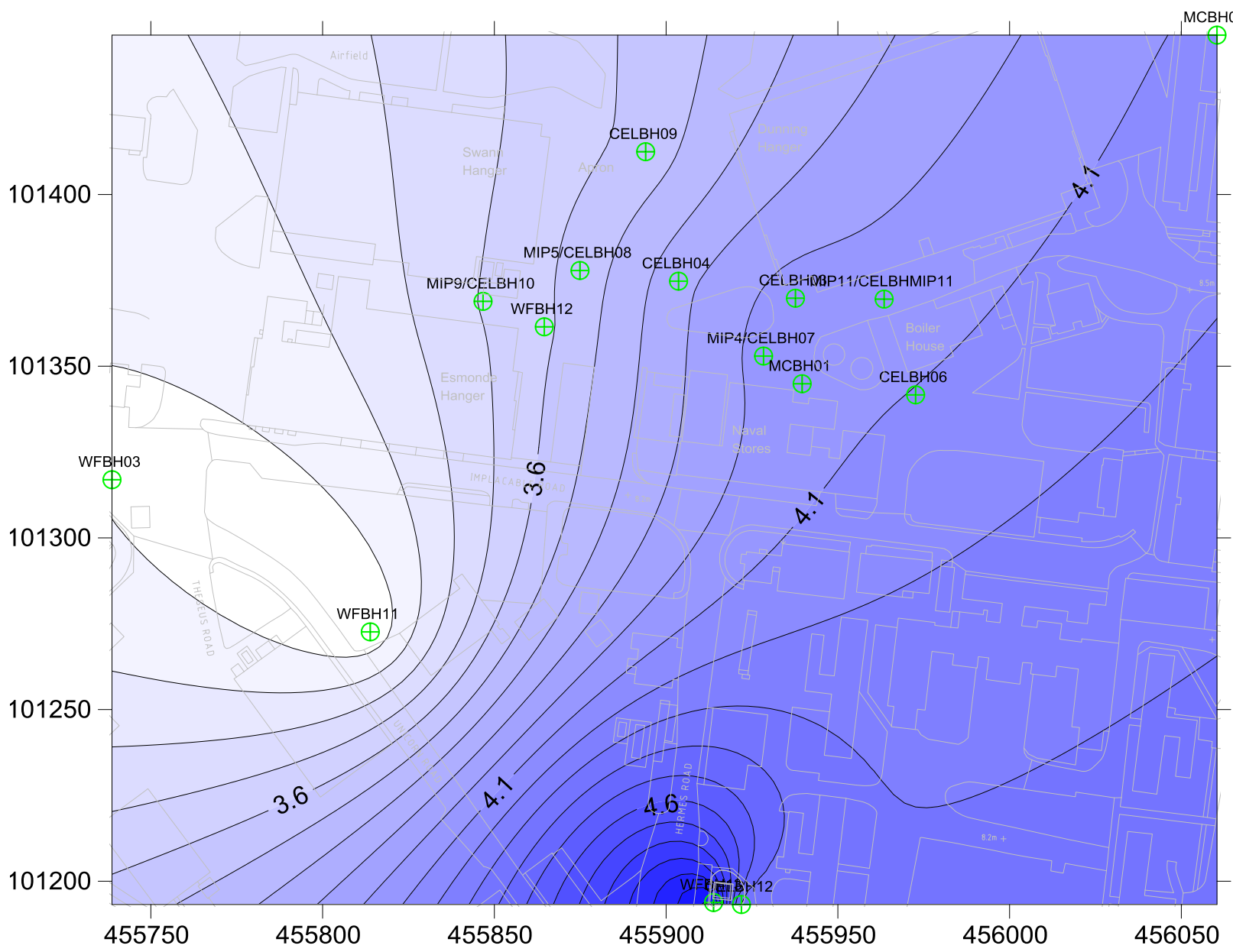
**ABBREVIATIONS and ACRONYMS USED**

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

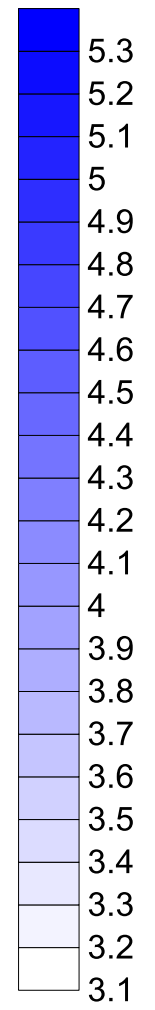
JE Job No: 16/12949

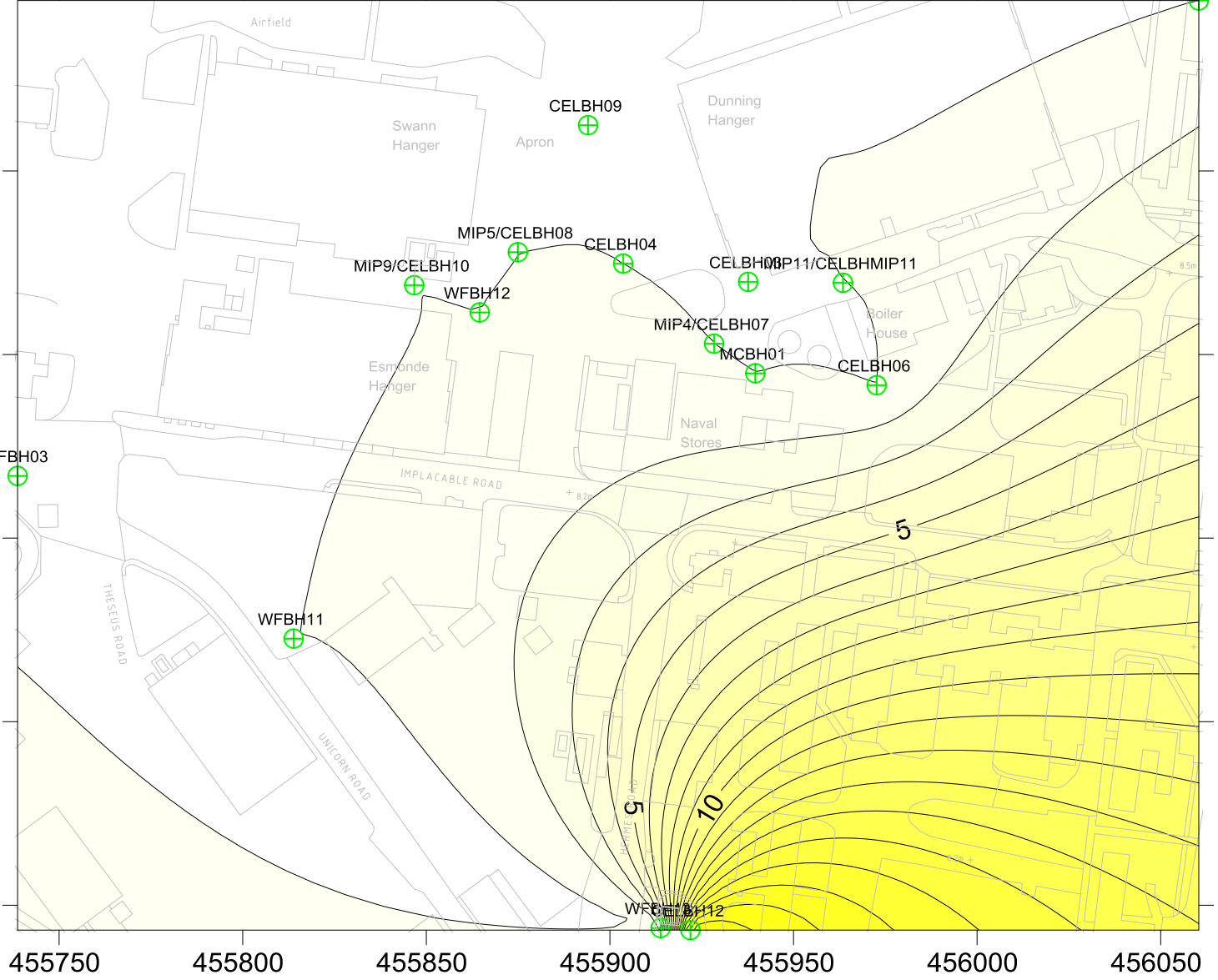
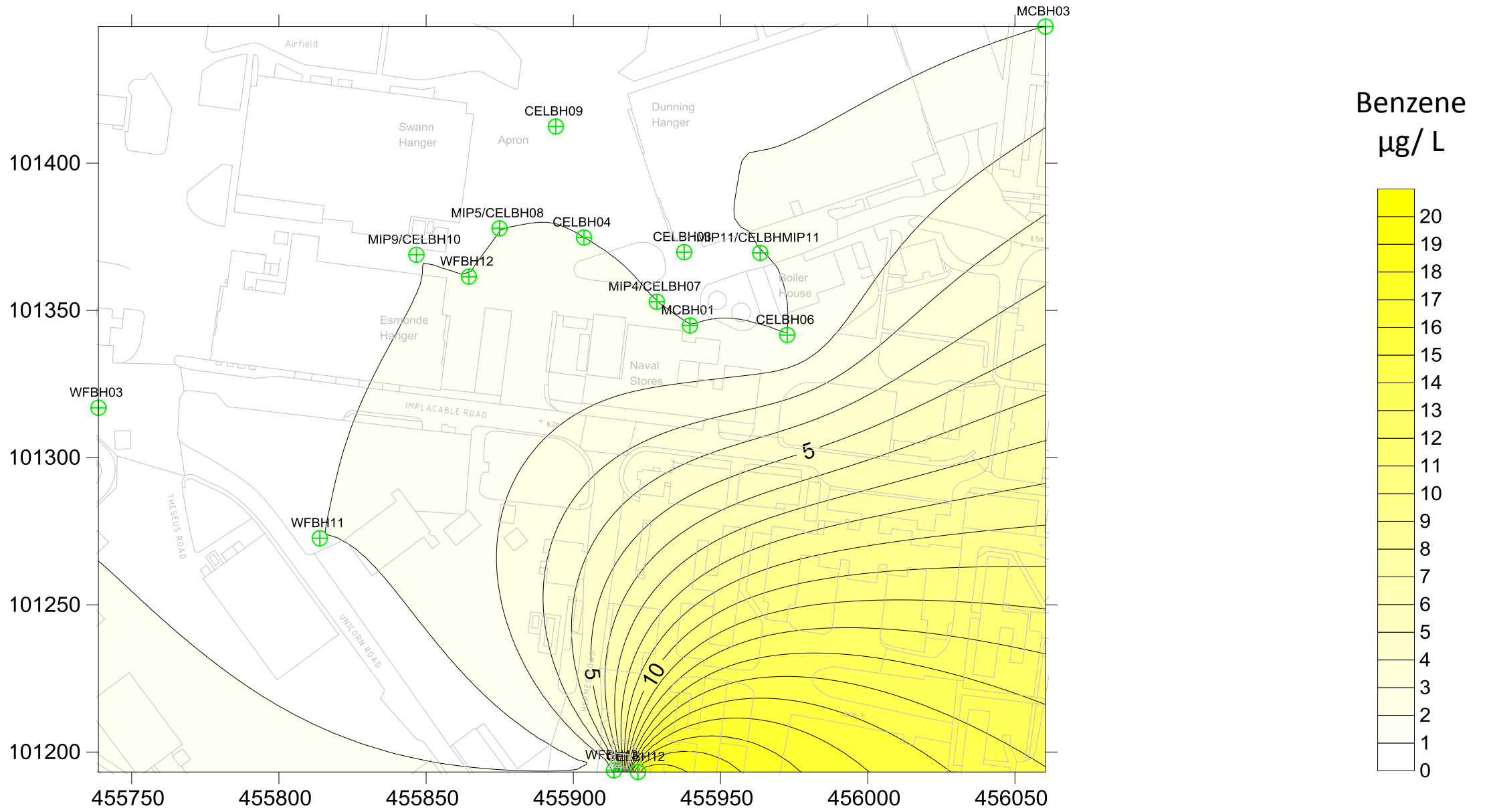
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				

## APPENDIX G – CONTOUR PLOTS



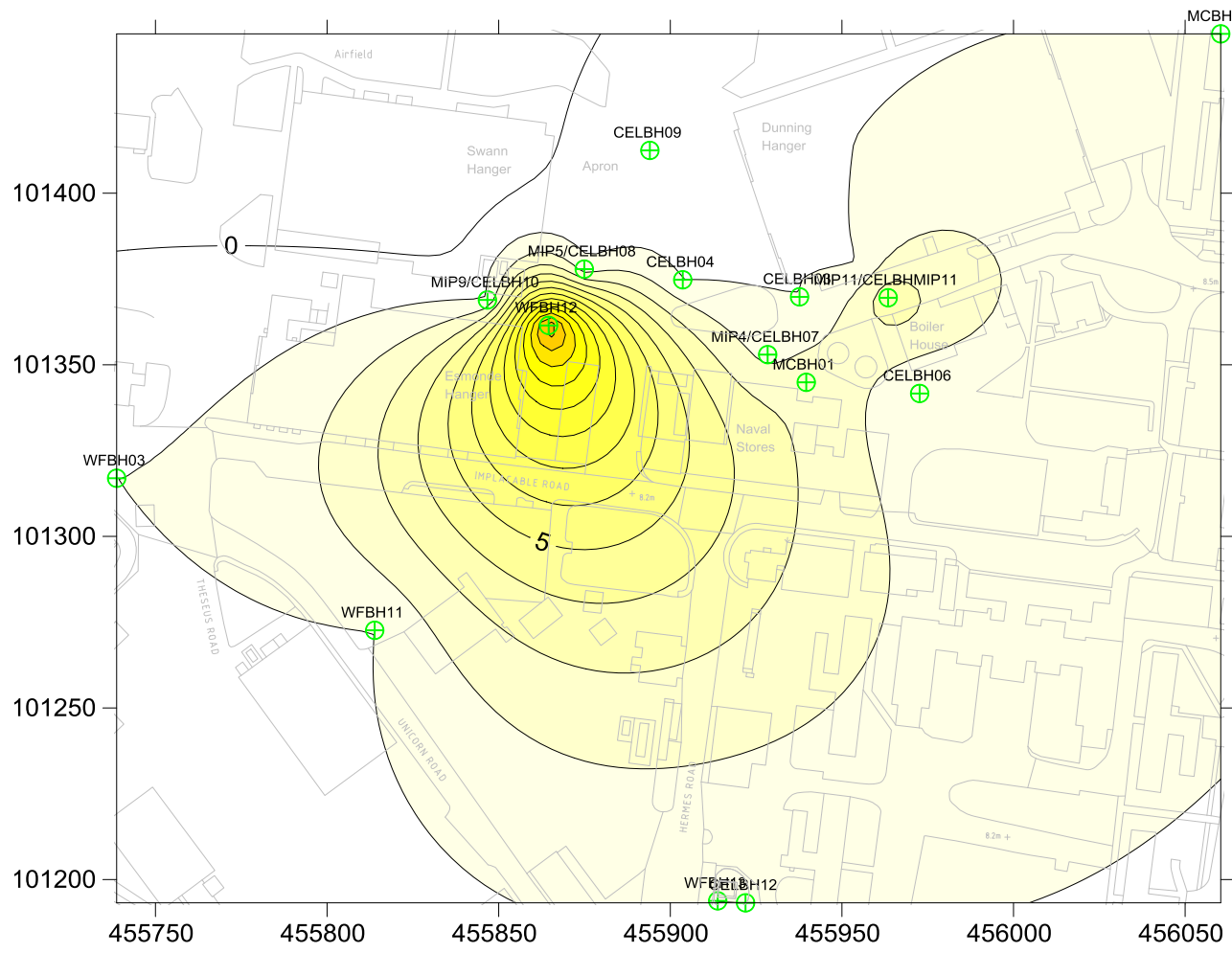
Groundwater Level (mAOD)



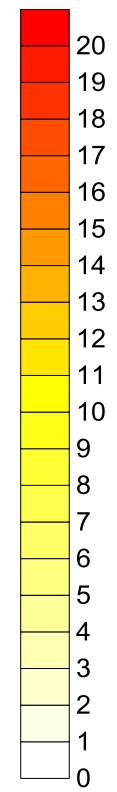


101400  
101350  
101300  
101250  
101200

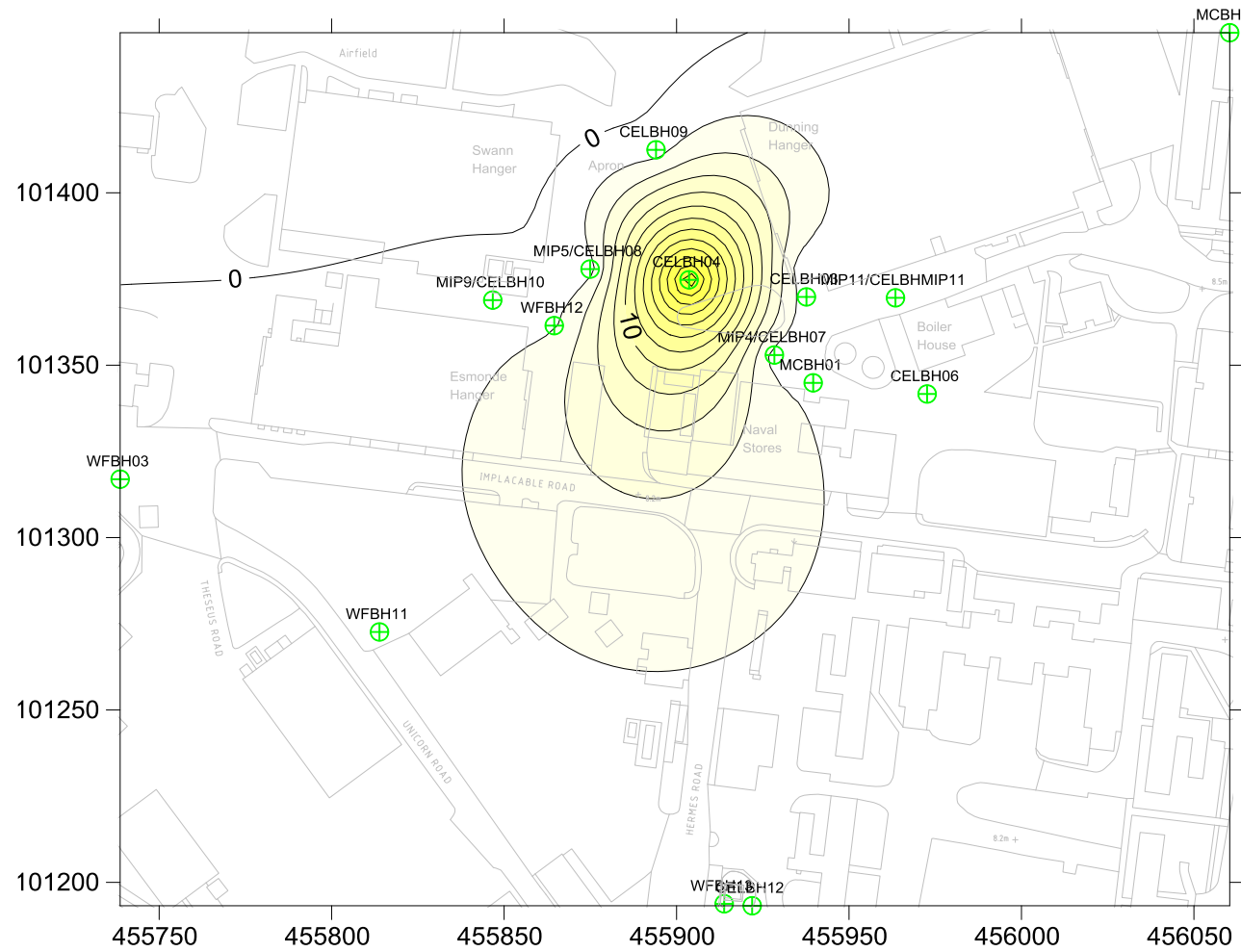
455750 455800 455850 455900 455950 456000 456050



Cis 1,2 DCE  
 $\mu\text{g/L}$







TCE  
µg/L

