

COSMESTON

Phase 1 and Phase 2 Ground Investigation Report

February 2018

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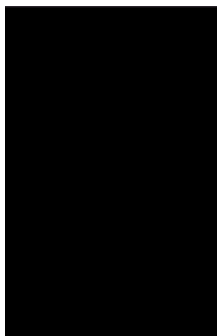
Phase 1 and Phase 2 Ground Investigation Report

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This report dated February 2018 has been prepared for Welsh Government (the "Client") in accordance with the terms and conditions of appointment dated September 2015 (the "Appointment") between the Client and **Arcadis Consulting (UK) Limited** ("Arcadis") for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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1 INTRODUCTION

Arcadis Consulting (UK) Limited (Arcadis) was instructed by Welsh Government, 'the Client', in September 2015 to undertake a ground investigation at Lower Cosmeston Farm. The purpose of the investigation was to confirm the below ground conditions and establish the soil's material properties to enable a suitable design for the development of residential housing, a school, and open space.

The scope of the ground investigation was determined by Arcadis Consulting (UK) Ltd and approved by the Client.

This ground investigation report provides a factual account of the fieldwork undertaken, the strata encountered, results of *in situ* testing and the subsequent geotechnical and geo-environmental laboratory testing undertaken on samples obtained.

1.1 Limitations

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It should be noted that ground conditions between exploratory holes may vary from those identified during this ground investigation; any design should take this into consideration. It should also be noted that groundwater levels may be subject to diurnal, tidal, seasonal, climatic variations and those recorded in this report are solely dependent on the time the ground investigation was carried out and the weather before and during the investigation.

1.2 Proposed Development

The proposed development comprises residential housing, a school, and open space.

1.3 Existing Information

The following information relating to the site and the ground conditions was made available to Arcadis prior to mobilisation to the site:

- a. Ground investigation Scope and Specification – Phase 1 [1]; source Arcadis Consulting (UK) Ltd.
- b. Ground investigation Scope and Specification – Phase 2 [2]; source Arcadis Consulting (UK) Ltd.
- c. Phase 1 and Phase 2 Geo Environmental and Geotechnical Assessment Report [3]; source Arcadis Consulting (UK) Ltd.

2 SITE DETAILS

2.1 Site Location and Description

The site is situated at Lower Cosmeston Farm, approximately 2.65 km south of the centre of Penarth, and 2.50 km east of Sully. It is on the South Wales coastline approximately 0.7 km west of the Severn Estuary. The approximate NGR (National Grid Reference) is ST 17985 68928. Image 2-1 below shows the site location.

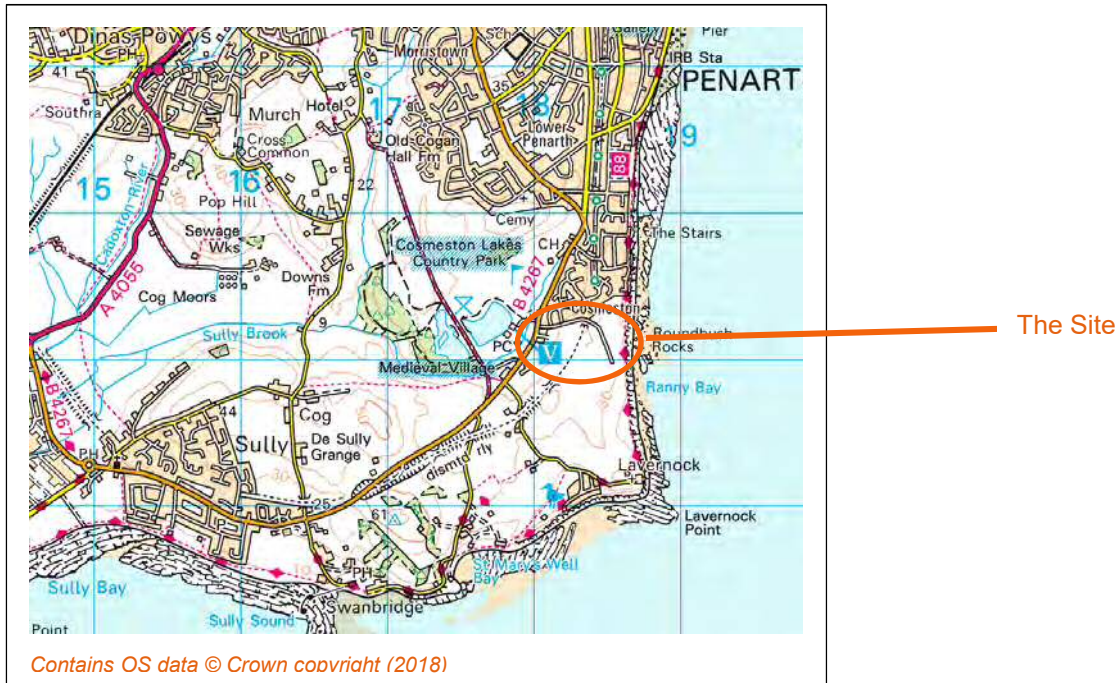


Image 2-1: Site Location

The site is accessed from the B4267 Lavernock Road to the west of the site and comprises six large pastures in the northern area of the site and smaller paddocks to the south. The six paddocks comprise two winter paddocks in the north-western area of the site, two summer paddocks in the north-eastern area of the site and two fields used for arable crops in the extreme north-eastern area of the site.

The site is undulating and gradually slopes from east to west across the farm, with the most eastern crop field at a height of 30 mAOD, and the lower winter paddocks to the west at 14 mOAD [17]. The total site area measures approximately 0.65 km (east to west) by 0.7 km (north to south).

Access between the horse paddocks can be obtained by using an unpaved farm track from the farm courtyard and winter paddocks to the summer paddocks in the north-east and the smaller fields to the south. The crop fields can be accessed via an unpaved farm track immediately north of the site. The site is bound to the north by residential housing, to the east by the Severn Estuary, the south by farmland and the west by the B4267 Lavernock Road beyond which is Cosmeston Country Park. The park has a number of designated Sites of Special Scientific Interest in and around the lakes to protect a rare plant known as Starry Stonework [17].

A section of land within the upper summer paddock is recorded as an historic landfill site named 'Cosmeston No.1 – Old Tip', which received inert, industrial, commercial and household waste from 1977 to 1994 [16].

2.2 Geology

The published 1:50 000 scale British Geological Survey (BGS) map of the area incorporating the site, Sheet 263 Cardiff [1], and the BGS online GeolIndex [15] indicate the site is predominantly underlain by the solid geology of the St Mary's Well Bay Member of the Blue Lias Group. Superficial deposits are not recorded on the published mapping. The general distribution of the strata at the site is shown in Image 2-2.

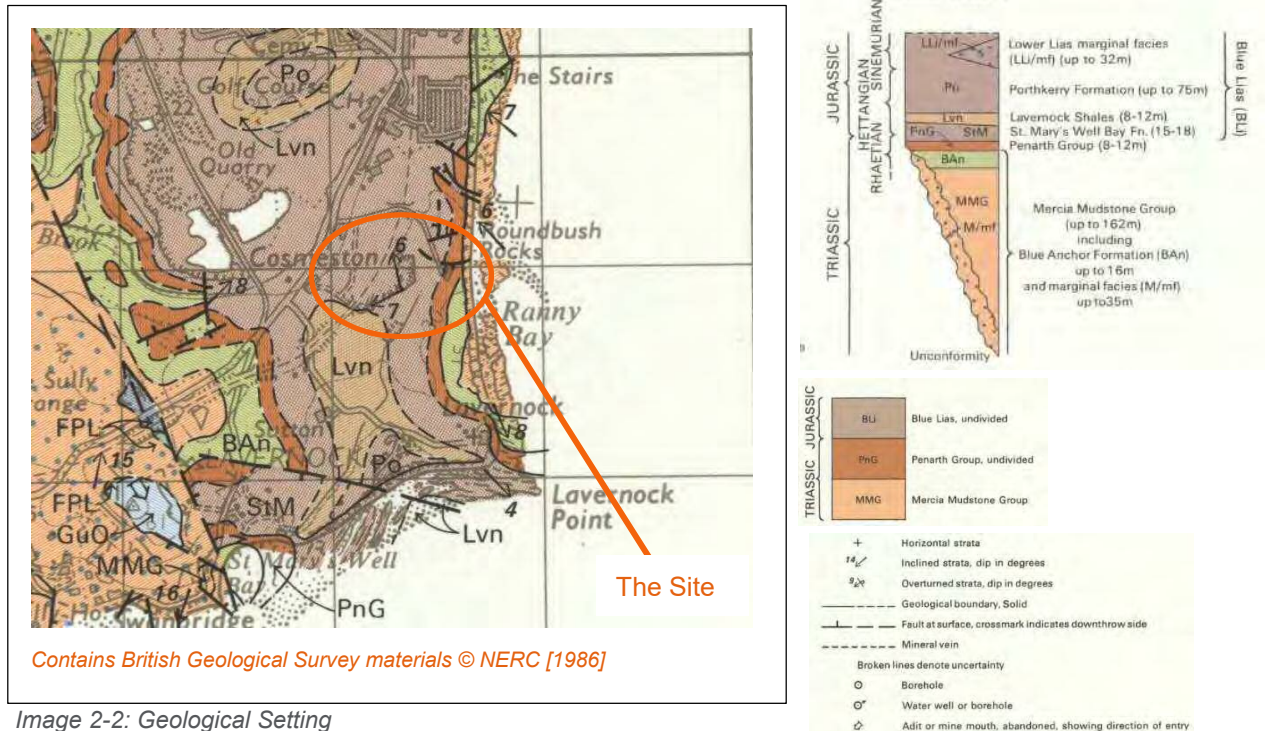


Image 2-2: Geological Setting

The bedrock geology changes from west to east across the site. The majority of the western site area is noted by the BGS as St Mary's Well Bay Member, which consists of interbedded mudstones and limestones. The St Mary's Well Bay Member is a sedimentary bedrock formed approximately 197 to 204 million years ago in the Jurassic and Triassic Periods [17]. The bedrock nearer the coastline is recorded as the Penarth Group, which consists of grey to black mudstones with subordinate limestones and sandstones. This bedrock is recorded as predominantly marine in origin. The bedrock underlying the coastline is recorded as the Mercia Mudstone Group, consisting of dominantly red, less commonly green-grey, mudstones and subordinate siltstones [17]. Thin beds of gypsum/anhydrite are recorded to be widespread within the bedrock geology.

The south-western area is recorded as being underlain by mudstones of the Lavernock Shales. The Lavernock Shales Member is noted to have formed approximately 197 to 200 million years ago during the Jurassic Period [17].

No faults are recorded within the site boundary. An inferred fault is recorded approximately 600m to the south of the site orientated north-west to south-east and downthrown to the south. The St Mary's Well Bay Member dips 6° to the northwest, and 7° to the southwest in the centre of the site.

3 FIELDWORK

3.1 General

Ground investigation works were carried out in two phases; Phase 1 between 5th September 2016 and 8th September 2016, and Phase 2 between 6th December 2017 and 18th December 2017.

The ground investigation methods were undertaken in general accordance with the principles set out in BS EN 1997-2:2005 [8] and with the general practice described in BS5930:2015 [9]. The geo-environmental aspects of the ground investigation complied with the general requirements of BS 10175:2011 [10].

3.1.1 Phase 1

The scope of the ground investigation, including the location, scheduled depth and type of exploratory hole undertaken was determined by Arcadis Consulting (UK) Ltd and is summarised in Table 3-1.

Table 3-1 Initial ground investigation scope – Phase 1

Location ID	Hole Type	Scheduled Depth (m)	Requirements
WS01 to WS07, inclusive	DS	3.00	Determine ground conditions and install ground gas and groundwater monitoring wells.
TP01 to TP21, inclusive	TP	3.50	Determine ground conditions and provide infiltration rates of the underlying strata.

Notes

TP = trial pitting, DS = dynamic sampling.

The investigation works were carried out under the supervision of a suitably experienced ground engineer who undertook the logging and reporting of the exploratory holes and *in situ* testing.

3.1.2 Phase 2

The scope of the ground investigation, including the location, scheduled depth and type of exploratory hole undertaken was determined by Arcadis Consulting (UK) Ltd and is summarised in Table 3-2.

Table 3-2 Initial ground investigation scope – Phase 2

Location ID	Hole Type	Scheduled Depth (m)	Requirements
BH101 - 103	CP	10.00	Determine depth to bedrock in former quarry area
DP101 – 108	DP	10.00	Determine depth to bedrock in former quarry area
PLT101 - 102	PLT	1.20	Assess settlement of strata in former quarry area
TP101, 103, 112, 115	TP + SA	3.00	Undertake soakaway infiltration tests
TP102, 104 – 111, 113-114, 116	TP	3.00	Determine ground conditions

WS101 - 106	WLS	3.00	Determine ground conditions and install ground gas and groundwater monitoring wells.
WS107 - 111	WLS	3.00	Determine depth of former landfill, determine ground conditions and install ground gas and groundwater monitoring wells.

Notes

CP = cable percussive, DP = dynamic probe, PLT = plate load test, SA = soakaway infiltration testing, TP = trial pit, WLS = dynamic (windowless) sampler

3.2 Exploratory Holes

3.2.1 Exploratory Hole Locations

The co-ordinates and elevations of the exploratory hole locations were obtained by the Arcadis supervising engineer using a Trimble VRS NOW GPRS system; allowing an accuracy of +/-50 mm.

Drawing UA008386-AFS-DWG-G001 presented in Appendix A displays the as-constructed exploratory hole locations while the co-ordinates and elevation of the ground surface at each exploratory hole location are given on the individual logs.

3.2.2 Investigation Methodology

The following methods and techniques were undertaken to construct the exploratory holes at the site. Details of the methods of investigation, associated standards adopted and a key to the notation and symbols used on the logs is presented in Appendix B; the exploratory hole records are presented in Appendix C.

3.2.2.1 Phase 1

The completed scope of Phase 1 investigation is summarised in Table 3-3 below.

Table 3-3. Summary of completed exploratory holes – Phase 1

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Termination Reason	Comment
WS01	DS	05 Sept 2016	05 Sept 2016	3.00	Target depth	Standpipe Piezometer installed
WS02-TP	HP	08 Sept 2016	08 Sept 2016	0.50	Engineer's instruction	
WS03	DS	05 Sept 2016	05 Sept 2016	3.00	Target depth achieved	Standpipe Piezometer installed
WS04	DS	05 Sept 2016	05 Sept 2016	1.30	Terminated due to refusal on bedrock	
WS05	DS	05 Sept 2016	05 Sept 2016	1.90	Terminated due to refusal on bedrock	
WS06	DS	05 Sept 2016	05 Sept 2016	1.10	Terminated due to refusal on bedrock	

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WS07	DS	05 Sept 2016	05 Sept 2016	1.10	Terminated due to refusal on bedrock	
TP01	-	-	-	-	Removed from scope of works	Unable to access
TP02	TP	08 Sept 2016	08 Sept 2016	3.50	Target depth achieved	Soakaway infiltration test completed
TP03	TP	08 Sept 2016	08 Sept 2016	2.70	Unstable Pit	Unstable below 2.00 m
TP04	TP	08 Sept 2016	08 Sept 2016	2.80	Unstable Pit	Unstable below 0.50 m
TP05	TP	08 Sept 2016	08 Sept 2016	2.60	Unstable Pit	Unstable below 0.60 m
TP06	TP	08 Sept 2016	08 Sept 2016	2.90	Unstable Pit	Unstable below 1.00 m
TP07	TP	06 Sept 2016	06 Sept 2016	1.30	Terminated on bedrock	
TP08	TP	06 Sept 2016	06 Sept 2016	1.30	Terminated on bedrock	
TP09	TP	06 Sept 2016	06 Sept 2016	1.30	Terminated on bedrock	
TP10	TP	06 Sept 2016	06 Sept 2016	1.10	Terminated on bedrock	
TP11	TP	06 Sept 2016	06 Sept 2016	0.90	Terminated on bedrock	
TP12	TP	06 Sept 2016	06 Sept 2016	0.70	Terminated on bedrock	
TP13	TP	07 Sept 2016	07 Sept 2016	1.20	Terminated on bedrock	
TP14	TP	07 Sept 2016	07 Sept 2016	1.50	Terminated on bedrock	
TP15	TP	07 Sept 2016	07 Sept 2016	1.50	Terminated on bedrock	
TP16	TP	07 Sept 2016	07 Sept 2016	1.40	Terminated on bedrock	
TP17	TP	07 Sept 2016	07 Sept 2016	2.20	Terminated on bedrock	
TP18	TP	06 Sept 2016	06 Sept 2016	0.90	Terminated on bedrock	

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TP19	TP	07 Sept 2016	07 Sept 2016	0.60	Terminated on bedrock	
TP20	TP	07 Sept 2016	07 Sept 2016	1.20	Terminated on bedrock	
TP21	TP	06 Sept 2016	06 Sept 2016	0.55	Terminated on bedrock	

Notes

TP = trial pitting, DS = dynamic sampling HP= hand pit

3.2.2.2 Phase 2

The completed scope of Phase 1 investigation is summarised in Table 3-3 above.

Table 3-4. Summary of completed exploratory holes – Phase 2

Location ID	Hole Type	Start Date	End Date	Final depth (m)	Termination Reason	Comment
BH101	CP	-	-	-	-	Poor ground conditions preventing rig access
BH102	CP	-	-	-	-	Poor ground conditions preventing rig access
BH103	CP	-	-	-	-	Poor ground conditions preventing rig access
DP101	DP	06 Dec 2017	06 Dec 2017	5.60	Refusal	
DP102	DP	06 Dec 2017	06 Dec 2017	7.80	Refusal	
DP103	DP	06 Dec 2017	06 Dec 2017	7.80	Refusal	
DP104	DP	06 Dec 2017	06 Dec 2017	8.40	Refusal	
DP105	DP	06 Dec 2017	06 Dec 2017	8.20	Refusal	
DP106	DP	06 Dec 2017	06 Dec 2017	9.40	Refusal	
DP107	DP	06 Dec 2017	06 Dec 2017	10.00	Target Depth	
DP108	DP	06 Dec 2017	06 Dec 2017	10.00	Target Depth	
DP109	DP	11 Dec 2017	11 Dec 2017	12.50	Refusal	
DP110	DP	11 Dec 2017	11 Dec 2017	12.40	Refusal	
DP111	DP	11 Dec 2017	11 Dec 2017	10.70	Refusal	

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DP112	DP	11 Dec 2017	11 Dec 2017	12.20	Refusal	
PLT101	PLT	11 Dec 2017	11 Dec 2017	1.20	Target depth	
PLT102	PLT	11 Dec 2017	11 Dec 2017	1.20	Target depth	
TP101	TP + SA	13 Dec 2017	13 Dec 2017	3.00	Target Depth	
TP102	TP	13 Dec 2017	13 Dec 2017	0.90	Refusal	
TP103	TP + SA	13 Dec 2017	13 Dec 2017	0.90	Refusal	
TP104	TP	13 Dec 2017	13 Dec 2017	3.00	Target Depth	
TP105	TP	13 Dec 2017	13 Dec 2017	3.00	Target Depth	
TP106	TP	13 Dec 2017	13 Dec 2017	0.50	Refusal	
TP107	TP	12 Dec 2017	12 Dec 2017	0.60	Refusal	
TP108	TP	15 Dec 2017	15 Dec 2017	0.80	Refusal	
TP109	TP	12 Dec 2017	12 Dec 2017	0.40	Refusal	
TP110	TP	12 Dec 2017	12 Dec 2017	3.00	Target Depth	
TP111	TP	12 Dec 2017	12 Dec 2017	3.00	Target Depth	
TP112	TP + SA	14 Dec 2017	14 Dec 2017	1.10	Refusal	
TP113	TP	14 Dec 2017	14 Dec 2017	0.50	Refusal	
TP114	TP	14 Dec 2017	14 Dec 2017	1.30	Refusal	
TP115	TP + SA	14 Dec 2017	14 Dec 2017	0.70	Refusal	
TP116	TP	08 Dec 2017	08 Dec 2017	1.00	Refusal	Undertaken as TP116-WS
WS101	WLS	11 Dec 2017	11 Dec 2017	2.45	Refusal	Standpipe Piezometer installed
WS102	WLS	08 Dec 2017	08 Dec 2017	0.40	Refusal	
WS103	WLS	08 Dec 2017	08 Dec 2017	0.50	Refusal	
WS104	WLS	08 Dec 2017	08 Dec 2017	1.45	Refusal	Standpipe Piezometer installed
WS105	WLS	08 Dec 2017	08 Dec 2017	0.70	Refusal	

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WS106	WLS	08 Dec 2017	08 Dec 2017	0.40	Refusal	
WS107	WLS	07 Dec 2017	07 Dec 2017	0.65	Refusal	
WS108	WLS	07 Dec 2017	07 Dec 2017	0.80	Refusal	
WS109	WLS	07 Dec 2017	07 Dec 2017	1.20	Refusal	Standpipe Piezometer installed
WS110	WLS	07 Dec 2017	07 Dec 2017	3.00	Target Depth	Standpipe Piezometer installed
WS111	WLS	07 Dec 2017	07 Dec 2017	1.30	Refusal	Standpipe Piezometer installed
WS116 – TP	WLS	08 Dec 2017	08 Dec 2017	1.00	Refusal	Replaced TP116

Notes

CP = cable percussive, DP = dynamic probe, PLT = plate load test, SA = soakaway infiltration testing, TP = trial pit, WLS = dynamic (windowless) sampler

3.2.3 Dynamic Sampling

Dynamic sampling was completed using a track-mounted sampling rig capable of driving windowless sampling tubes using a mechanical hammer dropped repeatedly from a self-governed height/hydraulic hammer drive head.

Due to the method of investigation, the materials recovered within the sampler apparatus were generally disturbed and were assessed as complying with Class 3 to Class 5 of BS EN 22475-2. Sub-samples of the material recovered in the liners were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at 0.5 m intervals thereafter in clay soils; and small bulk samples were taken at 1 m intervals where the sand and gravel content of the soil was significant.

Standard penetration tests (SPT) were undertaken using the track mounted rig 1.0 m centres until the termination depth of the hole.

3.2.4 Trial Pitting/Trial Trenches

Trial pits were undertaken using tracked excavators. All pits were entirely logged from the surface at depths more than 1.20 m below ground level. Bladed buckets were used instead of toothed buckets to mitigate the risk of damage to buried services.

Samples of the material recovered in the trial pits were taken to enable representative laboratory testing. Generally small disturbed samples were taken at each change in stratum and at 0.5 m intervals thereafter in clay soils; and bulk samples were taken at 1 m intervals where the sand and gravel content of the soil was assessed as significant.

Photographic records of the trial pit elevation and arisings were taken and are presented in Appendix C with the associated trial pit log.

3.3 *In situ* Testing

3.3.1 General

Where *in situ* tests are standalone and are not directly associated with other exploratory holes, the tests results are presented as individual records and they are summarised within Table 3-3 as such; their as-

constructed locations are given on the test records and their positions are shown on drawing UA008386-AFS-EHP-0001.

3.3.2 Penetration Testing

3.3.2.1 Standard Penetration Tests

Standard penetration tests (SPT) were carried out as required in the investigation scope and in accordance with the methods given in the standard procedures presented within Appendix B. Generally tests were undertaken at regular intervals throughout the borehole to provide a profile of the soil's resistance with depth and a disturbed soil samples was recovered from the SPT split-spoon tool or a disturbed sample was taken over the range of the test interval.

The N-values as determined in the field are presented on the borehole logs as uncorrected values that do not take into account the energy losses or efficiency of the automatic trip hammer used to drive the test tool into the ground. The calibration certification for the test devices used in the investigation is presented in Appendix D and a summary of the SPT equipment used at each location for Phase 1 is presented in Table 3-5, and in Table 3-6 SPT equipment – Phase 2 for Phase 2.

Table 3-5 SPT equipment – Phase 1

Location ID	SPT Hammer Reference No.	Energy Efficiency Ratio, E _r %
WS01 - 05	219	81.01

Table 3-6 SPT equipment – Phase 2

Location ID	SPT Hammer Reference No.	Energy Efficiency Ratio, E _r %
WS101 - 111	365	59.56

3.3.2.2 Soakaway Tests

The soil infiltration rate was determined by conducting a soakaway test broadly in accordance with the methodology described in BRE 365 [6]. The tests were conducted in trial pits dug to the anticipated soakaway depth. Summary information of the tests undertaken Phase 1 are presented Table 3-7, and Phase 2 in Table 3-8 Summary of trial pit soakage tests – Phase 2 while detailed test sheets are presented with the relevant trial pit log in Appendix C.

Table 3-7 Summary of trial pit soakage tests – Phase 1

Location ID	Depth of pit (m)	Soil Infiltration Rate f ms ⁻¹	Comment/limitations
TP02	3.50	$3.07 \cdot 10^{-3}$	
TP19	0.60	Unable to calculate	25% to 75% effect depth levels not achieved
TP21	0.55	Unable to calculate	25% to 75% effect depth levels not achieved

Table 3-8 Summary of trial pit soakage tests – Phase 2

Location ID	Depth of pit (m)	Soil Infiltration Rate f ms ⁻¹	Comment/limitations
TP101	3.00	Unable to calculate	Increase in water level during test
TP103	0.90	Unable to calculate	25% to 75% effect depth levels not achieved
TP112	1.10	Unable to calculate	Increase in water level during test
TP115	0.70	Unable to calculate	25% to 75% effect depth levels not achieved

3.4 Installations and Post-fieldwork Monitoring

3.4.1 Installations

Installations to enable long term monitoring of the site were constructed in exploratory holes selected by Arcadis Consulting (UK) Ltd. A summary of the Phase 1 and Phase 2 installation details is presented in Table 3.9 and 3.10 respectively; installation details are also provided on the relevant exploratory hole logs. Installations have flush covers and no marker posts due to land use, but can be located using co-ordinates (in Ordnance Datum) presented in the hole logs.

Table 3-9 Summary exploratory hole installations – Phase 1

Location ID	Installation Type	Response Zone Top m bgl	Response Zone Base m bgl	Comment/limitations
WS01	SP50	0.50	2.10	Flush cover set in concrete
WS03	SP50	0.50	2.15	Flush cover set in concrete

Notes: SP50 = 50 mm ID standpipe

Table 3-10 Summary exploratory hole installations – Phase 2

Location ID	Installation Type	Response Zone Top m bgl	Response Zone Base m bgl	Comment/limitations
WS101	SP50	0.45	2.00	Flush cover set in concrete
WS104	SP50	0.50	1.45	Flush cover set in concrete
WS109	SP50	0.50	1.20	Flush cover set in concrete
WS110	SP50	1.00	3.00	Flush cover set in concrete
WS111	SP50	0.75	1.30	Flush cover set in concrete

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Notes: SP50 = 50 mm ID standpipe

3.4.2 Post-fieldwork Monitoring

Phase 1 post-field work monitoring was undertaken on two separate visits on 16th and 23rd September 2016. Phase 2 post-field work monitoring was undertaken on three separate visits on 9th, 16th and 25th January 2018. Serviceable Phase 1 monitoring wells were also monitored during the Phase 2 monitoring visits.

The monitoring visits to the site were made to record land gas emissions and groundwater levels and the results of the groundwater monitoring are presented within Appendix E.

4 LABORATORY TESTING

4.1 General

Geotechnical and geo-environmental chemical testing was undertaken on selected samples obtained from the exploratory holes. The testing was scheduled by a geotechnical and/or geo-environmental engineer and the testing was undertaken by an Arcadis approved testing laboratory.

4.2 Geotechnical Laboratory Testing

4.2.1 Phase 1

The geotechnical tests detailed in Table 4-1 were carried out in accordance with either BS1377:1990: Parts 1 to 8 [11]; BS EN ISO 17892: Parts 1 to 12 [12]; BRE SD 1:2005 [14]; or other methods as listed in Table 4-1. The complete results of the geotechnical laboratory testing are presented in Appendix F.

Table 4-1 Summary of geotechnical test data – Phase 1

Test	Method	No of Determinations
Moisture content	BS1377 Pt2-3.2	7
4-point liquid and plastic limit	BS 1377 Pt2-4.3 & 5.3	7
Wet sieving	BS1377 Pt2-9.2	1
Sedimentation	BS1377 Pt2-9.4	2
pH, water soluble sulphate; total sulphate, nitrate, magnesium	BRE SD1	6
Density / MC relationship (2.5kg/4.5kg)	EN ISO 17892 Pt3	2

4.2.2 Phase 2

The geotechnical tests detailed in Table 4-2 Summary of geotechnical test data were carried out in accordance with either BS1377:1990: Parts 1 to 8 [11]; BS EN ISO 17892: Parts 1 to 12 [12]; BRE SD 1:2005 [14]; or other methods as listed in Table 4-2. The complete results of the geotechnical laboratory testing are presented in Appendix F.

Table 4-2 Summary of geotechnical test data – Phase 2

Test	Method	No of Determinations
Moisture content	BS1377 Pt2-3.2	9
4-point liquid and plastic limit	BS 1377 Pt2-4.3 & 5.3	6
Density / MC Relationship (2.5kg/4.5kg)	EN ISO 17892 Pt3	3
pH, water soluble sulphate; total sulphate, nitrate, magnesium	BRE SD1	2

4.3 Geo-Environmental Laboratory Testing

4.3.1 Phase 1

Geo-environmental tests were undertaken on soil, groundwater and prepared leachate specimens obtained from the samples collected from the site. Testing was carried out for the contaminants detailed in

Table 4-3, Table 4-4 and Table 4-5. The results of the chemical laboratory testing are presented in Appendix G. Details of the test methodology is presented with the test results.

Table 4-3 Summary of geo-environmental test data – soil matrix

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn),, pH, Cyanide Free & Total Asbestos Screen Moisture Content Speciated Polycyclic Aromatic Hydrocarbon compounds (PAH) pH Sulphate – Water Soluble (2:1) Phenol (total), Cresol, Chlorinated Phenols	Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES) Stereobinocular Microscope Gravimetric GC/MS Potentiometric ICP-OES Skalar CFA	34
Total Petroleum Hydrocarbon 6 Banded (TPH6)	Gas Chromatography – Mass Spectrometry (GC-MS)	20
Pesticides Suite – Organochlorine. Organophosphorus	Gas Chromatography – Mass Spectrometry (GC-MS)	5
FOC (Fraction Organic Carbon)	Titrimetry and Calculation	12

Table 4-4 Summary of geo-environmental test data – groundwater matrix

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn),, pH, Cyanide Free & Total Asbestos Screen Moisture Content Speciated Polycyclic Aromatic Hydrocarbon compounds (PAH) pH Sulphate – Water Soluble (2:1) Phenol (total), Cresol, Chlorinated Phenols	Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES) Stereobinocular Microscope Gravimetric GC/MS Potentiometric ICP-OES Skalar CFA	8
Pesticide Screen	GC/MS	4

Table 4-5 Summary of geo-environmental testing data - leachate

Test type	No of Determinations
Leachate Prep (CEN 2:1)	8

4.3.2 Phase 2

Geo-environmental tests were undertaken on soil, groundwater and prepared leachate specimens obtained from the samples collected from the site. Testing was carried out for the contaminants detailed in Table 4-6 Summary of geo-environmental test data – soil matrix Table 4-7 Summary of geo-environmental test data – groundwater Table 4-8 Summary of geo-environmental testing data - leachate The results of the chemical laboratory testing are presented in Appendix G. Details of the test methodology are presented with the test results.

Table 4-6 Summary of geo-environmental test data – soil matrix

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn), pH, Cyanide Free & Total	Induced Coupled Plasma Optical Emission Spectroscopy (ICP-OES)	28
Asbestos Screen	Stereobinocular Microscope	
Moisture Content	Gravimetric	
Speciated Polycyclic Aromatic Hydrocarbon compounds (PAH)	GC/MS	
pH	Potentiometric	
Sulphate – Water Soluble (2:1)	ICP-OES	
Phenol (total), Cresol, Chlorinated Phenols	Skalar CFA	
Total Petroleum Hydrocarbon 6 Banded (TPH6)	Gas Chromatography – Mass Spectrometry (GC-MS)	14
Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG)	Gas Chromatography – Flame Ionisation Detector (GC-FID)	5
Total Organic Carbon	Titrimetry and Calculation	4

Table 4-7 Summary of geo-environmental test data – groundwater matrix

Test type	Method	No of Determinations
Metals (As, B, Cr, Cd, Cu, Pb, Hg, Ni, Se, Zn), pH	ICP-OES, ICP-MS, Skalar CFA, Potentiometric, HPLC, Discrete Analyse	6
Speciated PAH	GC/MS	

Cosmeston

Cyanide Free & Total	Potentiometric	
PAHs	ICP-OES	
Sulphate as SO ₄	HPLC	
Phenols – Speciated		
Alkalinity (as CaCO ₃)	Titrimetric	
Ammoniacal Nitrogen	ISE	1
Chloride	Colometric	1
VOC	HS-GC/MS	2
SVOC	GC/MS	2
TPHCWG analysis	GC/MS	2

Table 4-8 Summary of geo-environmental testing data - leachate

Test type	No of Determinations
Leachate Prep (CEN 2:1)	4
Metals (Arsenic, Boron, Cadmium, Chromium (total), Chromium (VI), Copper, Lead, Mercury, Nickel, Selenium, Zinc)	4
Cyanide (free)	4
Cyanide (total)	4
Speciated Polycyclic Aromatic Hydrocarbon compounds (PAH)	4
pH	4
Total Phenols	4
Water soluble sulphate	4

5 REFERENCES

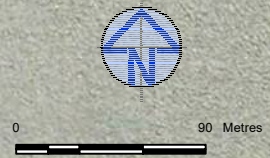
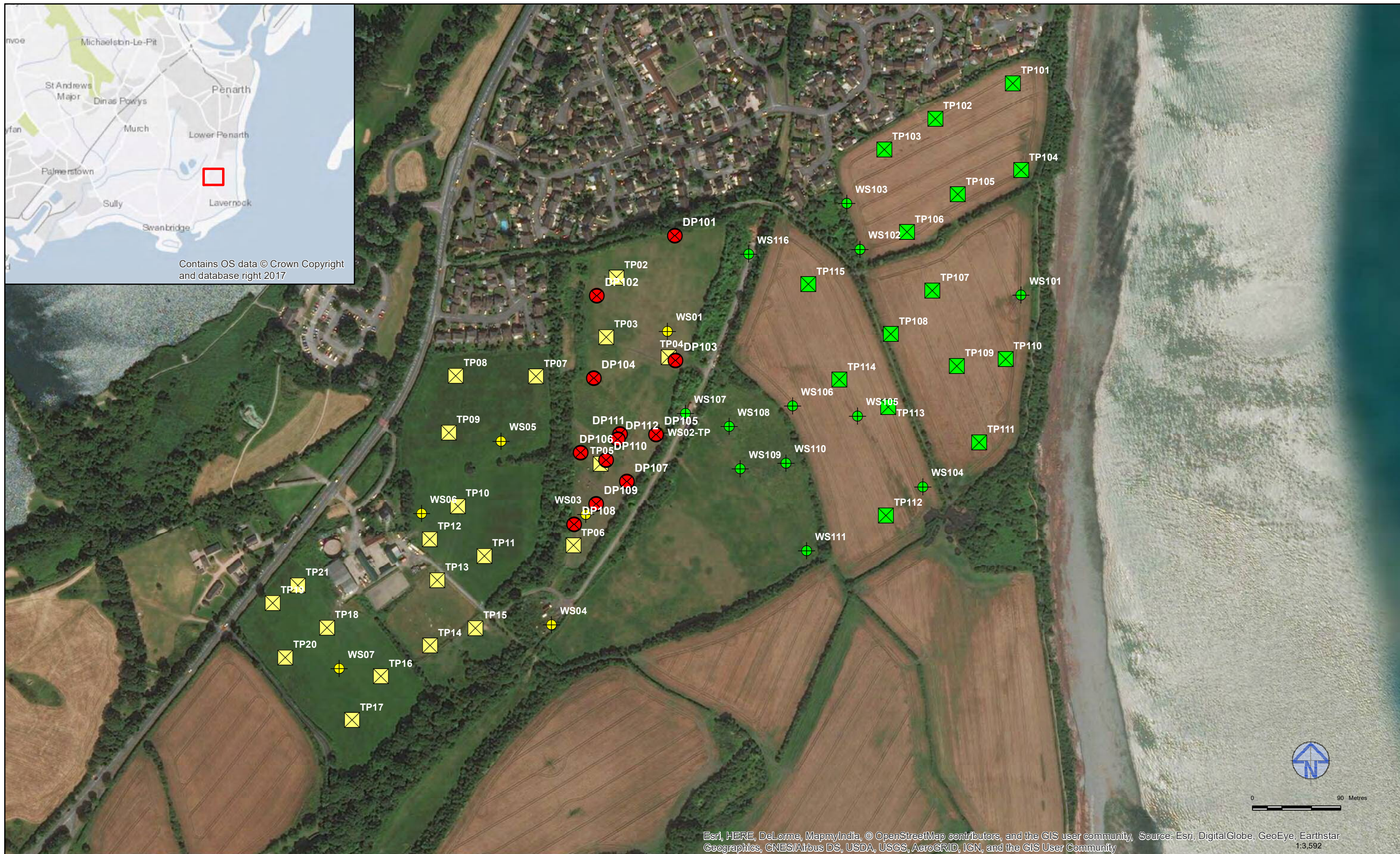
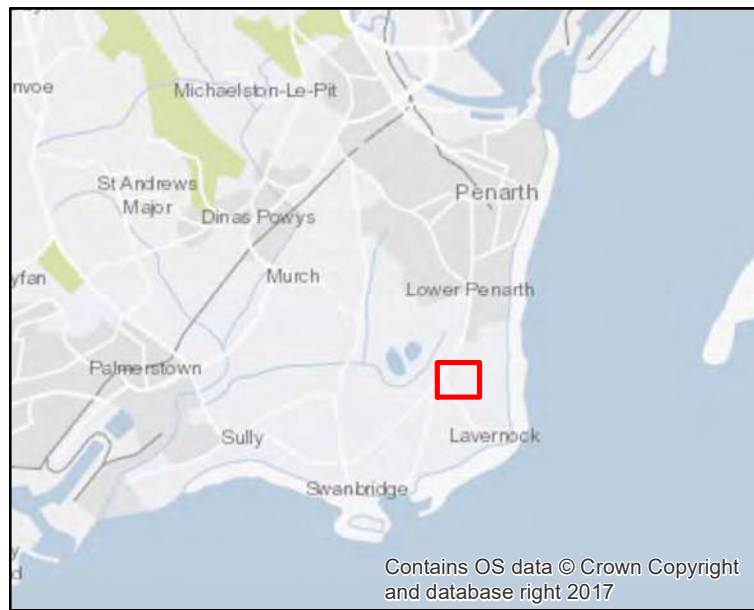
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2. Arcadis Consulting. 2017. Pre-construction information for Cosmeston – Phase 2. Arcadis Consulting Report. August 2017
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10. BS 10175. 2011. Investigation of potentially contaminated sites – Code of practice. British Standards Institution.
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14. Building Research Establishment. 2005. Concrete in aggressive ground. BRE Special Digest 1. 3rd Edition. BRE, Watford.
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APPENDIX A

DRAWINGS

Drawing UA008386-AFS-DWG-G001: Exploratory Hole Location
Plan



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REV	Date	Description	Drawn	Check	Approv
01	29/01/18	Exploratory Hole Location Plan	SF	AP	GW

Legend

- Dynamic Probing- Phase 2 Hole Location
- Window Sample- Phase 2 Hole Location
- Window Sample- Phase 1 Hole Location
- Trial Pit- Phase 2 Hole Location
- Trial Pit- Phase 1 Hole Location

Client



Welsh Government
Client

Welsh Government
Cathays Park,
Cardiff,
CF10 3NQ


Site
Lower Cosmeston Farm,
Cosmeston,
Penarth,
CF64 9FH

Issued for Information

Designed	SF	Date	Signed
Drawn	SF	29 JAN 2018	Signed
Checked	AP	29 JAN 2018	Signed
Approved	GW	29 JAN 2018	Signed
Scale:	As Shown	Datum:	AOD
Original Size:	A3	Grid:	OS
Suitability Code:	S2	Project Number:	UA008386

PROJECT:
Lower Cosmeston Farm

TITLE:
Exploratory Hole Location Plan



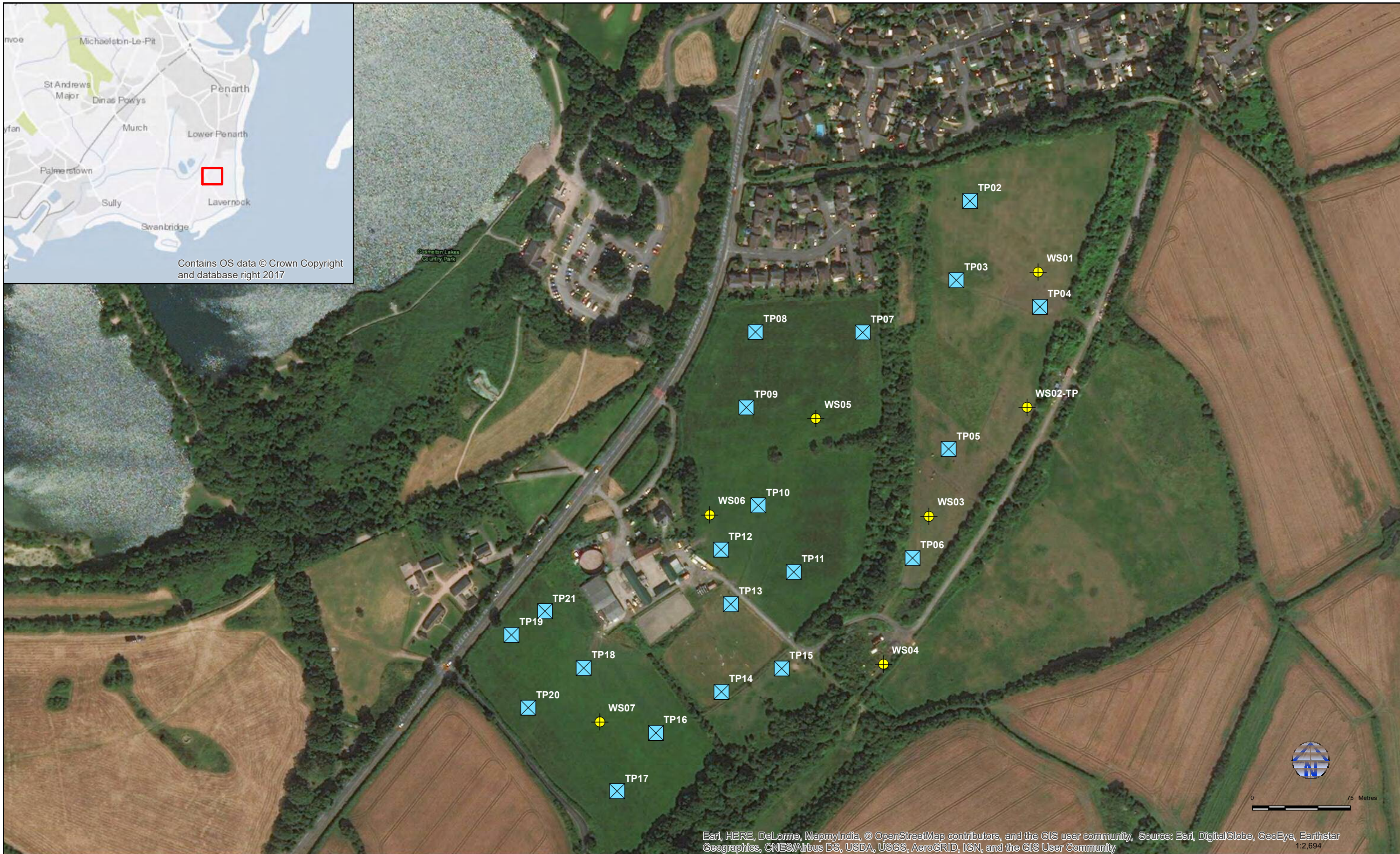
ARCADIS Design & Consultancy for natural and built assets

Registered office: Arcadis House, 34 York Way, London, N1 9AB
Coordinating office: 2 Glass Wharf, Temple Quay, Bristol, BS2 0FR
Tel: 44 (0)1173 721 200
www.arcadis.com

Drawing Number: UA008386-AFS-DWG-G001 Revision: 01



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REV	Date	Description	Drawn	Check	Approv
01	29/01/18	Exploratory Hole Location Plan	SF	AP	GW

NOTES:

Legend

- Window Sample- Phase 1 Hole Location
- Trial Pit- Phase 1 Hole Location

Client



Welsh Government
Client

Welsh Government
Cathays Park,
Cardiff,
CF10 3NQ


Site
Lower Cosmeston Farm,
Cosmeston,
Penarth,
CF64 9FH

Issued for Information

Designed	SF	Date	29 JAN 2018	Signed	
Drawn	SF	Date	29 JAN 2018	Signed	
Checked	AP	Date	29 JAN 2018	Signed	
Approved	GW	Date	29 JAN 2018	Signed	
Scale:	As Shown	Datum:	AOD		
Original Size:	A3	Grid:	OS		
Suitability Code:	S2	Project Number:	UA008386		

PROJECT:
Lower Cosmeston Farm

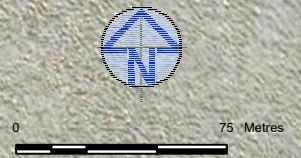
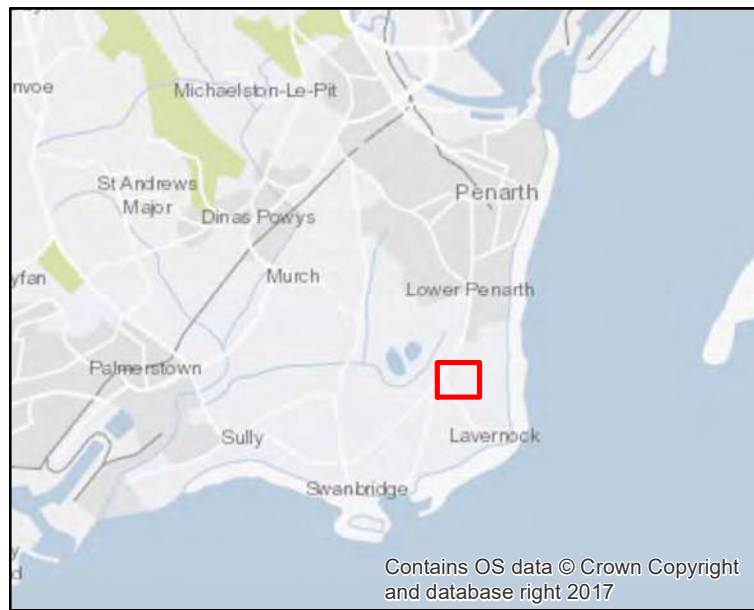
TITLE:
Exploratory Hole Location Plan



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Revision: 01



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01	29/01/18	Exploratory Hole Location Plan	SF	AP	GW
REV	Date	Description	Drawn	Check	Approv

NOTES:

Legend

- Dynamic Probing- Phase 2 Hole Location
- Window Sample- Phase 2 Hole Location
- Trial Pit- Phase 2 Hole Location

Client



Welsh Government
Client

Welsh Government
Cathays Park,
Cardiff,
CF10 3NQ


Site
Lower Cosmeston Farm,
Cosmeston,
Penarth,
CF64 9FH

Issued for Information

Designed	SF	Date	29 JAN 2018	Signed
Drawn	SF	Date	29 JAN 2018	Signed
Checked	AP	Date	29 JAN 2018	Signed
Approved	GW	Date	29 JAN 2018	Signed
Scale:	As Shown	Datum:	AOD	
Original Size:	A3	Grid:	OS	
Suitability Code:	S2	Project Number:	UA008386	

PROJECT:
Lower Cosmeston Farm

TITLE:
Exploratory Hole Location Plan



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Tel: 44 (0)1173 721 200
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Drawing Number: UA008386-AFS-DWG-G001
Revision: 01

APPENDIX B

STANDARD PROCEDURES

B0 General Principles

This ground investigation was undertaken in general accordance with the principles of BS EN 1997-1 [1] and BS EN 1997-2 [2] and the advice given in BS5930:2015 [7], which, provides complimentary guidance on the application of the primary standards. Where the requirements of the ground investigation specification differ from these primary standards, the investigation methodology was adapted as required and specific notes regarding methods and techniques employed were made in the appropriate report sections.

B1 Buried Services

Service clearance was undertaken in accordance with Arcadis' common operating practice COP SA1. This document details the methods and safe working practices used to undertake excavations safely. Prior to breaking ground, services plans were consulted and the area scanned using a Cable Avoidance Tool (CAT) with detected signals marked on the ground. For all investigation positions, other than for machine excavated trial pits, hand excavated inspection pits are completed to 1.20 m bgl prior to the use of drilling and boring plant.

B2 Sampling requirements

The selection of sample types and sampling techniques has been chosen to take account of the soil fabric, size and quality of sample required based on whether the soils mass properties or the intact material properties of the ground are to be determined in subsequent laboratory tests. BS EN ISO 22475-1 [4] describes three generic sample groups that are:

- a. Sampling by drilling. Generally a disturbed sample recovered from the drilling tool or digging equipment, typically meeting Class 3 to Class 5 requirements, with the recovered material being stored in bulk bags or sealed jar or tub containers.
- b. Sampling by sampler. Typically referred to as open tube or drive sampling in which a tube with a sharp cutting edge is driven into the ground either by static thrust or dynamically driven to give a relatively undisturbed sample of Class 1 or Class 2 but may result in a Class 3 sample.
- c. Block sampling. Cylindrical large diameter samples or cuboid hand-cut samples usually relatively undisturbed Class 1 and Class 2.

The open-tube sampling equipment used on the site was of a type and design that conformed to BS EN ISO 22475-1. For the purpose of this ground investigation block sampling was not required.

Generally samples were assessed on site and any unexpected deterioration in sample quality was reported to the ground engineer by the lead drilling technician.

Sufficient and representative samples were taken to allow the geo-mechanical properties of the ground to be adequately characterised and to enable the sequence of soil strata to be described by an engineering geologist or geotechnical engineer.

Where samples have been taken for chemical tests the drilling method attempted to adopt dry drilling over the sampling range that generally was achieved by the use of drill casing to separate and isolate the upper soil layers and exclude groundwater. Cross-contamination was further reduced by regular cleaning of sampling tools. Sample integrity was maintained by sealing samples immediately on collection and storing the samples in a temperature controlled cool box. Samples were despatched from the site at the end of the shift on which they were collected or as

required in the project specification. Details of best practice storage, preservation and decontamination measures undertaken are given below:

Task	Soil	Groundwater	Ground Gas
Storage	Glass jars and vials supplied by the laboratory were used for the collection of soil samples to be analysed for volatile compounds. Plastic one-litre tubs were used to collect soil samples for metals analysis.	Glass vials supplied by the laboratory were used for the collection of samples to be analysed for volatile compounds. Samples to be analysed for lower volatility compounds were stored in laboratory prepared glass bottles.	1.4L Canisters supplied by the laboratory.
Preservation	Filling of sample containers as far as practicable to minimise headspace and low storage temperature to minimise the potential for volatilisation and biodegradation of petroleum hydrocarbon compounds prior to analysis.		Not required.
Decontamination	Disposable gloves were worn and changed between sample collection to prevent cross-contamination.	Groundwater samples were collected using dedicated disposable tubing / bailers, that were changed between monitoring well locations in order to prevent cross-contamination.	Disposable gloves were worn and changed between sample collection to prevent cross-contamination.
Transport	Samples stored in dedicated sample boxes provided by the laboratory. Sample details and analytical requests were recorded on the laboratory chain of custody form included with samples, prior to dispatching to laboratory for analysis. Samples were dispatched to the laboratory on the day of sampling.		

B3 Sample description

Sample description was undertaken by the Arcadis site geologist in accordance with BS 5930: 2015. The descriptions of the individual samples were used to identify the sequence of strata at the exploratory hole location and from which representative exploratory hole logs were drawn.

B4 *In situ* testing

In situ geotechnical tests were undertaken taking account of the investigation scope and requirement to attain the appropriate parameters required in the geotechnical design. The tests were undertaken in accordance with the requirements of the relevant parts of BS EN ISO 22476 [5, 6] and other methods as follows:

Dynamic probing

Dynamic probes were undertaken in general accordance with BS EN ISO 22476-2, BS EN 1997-2 and the national annex to BS EN 1997. The tests were generally made using the super-heavy DPSH-B configuration of the apparatus, however, it should be noted that the basis for selection of the type of dynamic probe should be a consideration of the driving energy in relation to the type of ground conditions anticipated at the site.

Where adequate correlation with borehole data is available an interpretation of the estimated soil type may be made, however, it should be noted that probing can give unreliable results in mixed soils.

Standard penetration testing

Standard penetration tests were carried out in accordance with BS EN ISO 22476-3, BS EN 1997-2 and the national Annex to BS EN 1997-2. The test records are presented on the borehole logs as blow counts for each increment with the N-value as the total number of blows of the four main test increments.

Where the N-value exceeds a total of 50 blows, the test reports the penetration in millimetres for the last test increment recorded, and the N value is indicated as greater than 50,

e.g. 4,5/12,14,18, 6 for 10 mm

indicates that the seating blows (4 and 5) were completed and that the test terminated in the 4th increment after penetrating 10 mm.

Where the seating blows exceeded 25 blows for less than 150 mm; the test was stopped and the rods remarked after which, the main drive was continued. The test is then reported as the number of blows in each seating drive for the recorded penetration with the results of the main drive given as above,

e.g. 14/11 for 45 mm/12,14,16, 8 for 10 mm.

In certain circumstances where groundwater in-flow may affect the test, particularly in fine sand or silt, low SPT blow counts may be recorded. Where the SPT blow count was very low, N values of 5 or less, the test was, at the discretion of the site engineer, continued for a further 300 mm, recording blows for each 75 mm increment. **This is not** a standard penetration test value, it does however give an indication of potential disturbance to the ground.

B5 Data transfer format

The data collated during the ground investigation has been organised and managed using the "AGS data format" that allows data transfer between different disciplines and organisations in accordance with BS 8574 [8].

B6 References

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3. BS EN ISO 22282-1:2012. Geotechnical investigation and testing – Geohydraulic testing. Part 1: General Rules. British Standards Institution.
4. BS EN ISO 22475-1. Geotechnical investigation and testing – Sampling methods and groundwater measurements – Part 1 Technical principles for execution.
5. BS EN ISO 22476-2. Geotechnical investigation and testing – Field testing – Part 2: Dynamic Probing. British Standards Institution
6. BS EN ISO 22476-3 2005. Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test. British Standards Institution
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Cosmeston

B7 Exploratory Hole Key

Key to Exploratory Hole Symbols and Abbreviations

SAMPLE TYPES

B	Bulk disturbed sample	ES	Environmental soil sample	U	Undisturbed sample
C	Core sample	EW	Environmental water sample	UT	Undisturbed thin wall sample
CBR-D	Disturbed sample from CBR test area	G	Gas sample	W	Water sample
CBR-U	Undisturbed sample from CBR test area	L	Liner sample		
D	Small disturbed sample	SPT	SPT split spoon sample		

IN-SITU TESTING

SPTs	Standard Penetration Test (using a split spoon sampler)
SPTc	Standard Penetration Test (using a solid 60 degree cone)
N	Recorded SPT 'N' Value *
-/-	Blows/Penetration (mm) after seating blows totalling 150 mm
MX	Mexi Probe Test (records CBR as %)
HV	Hand Shear Vane Test (undrained shear strength quoted in kPa)
PP	Pocket Penetrometer Test (kg/m ³)
()	Denotes residual test value
PID	Photo Ionisation Detector (ppm) *
Kf/Kr	Permeability Test (f = falling head, r = rising head quoted in ms ⁻¹)
HPD	High Pressure Dilatometer Test (pressure meter)
PKR	Packer / Lugeon Permeability Test
CBR	California Bearing Ratio Test

ROTARY CORE DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation (% of intact core >100 mm)
FI	Fracture Spacing (average fracture spacing; in mm, over indicated length of core) **
NI	Non-Intact Core
AZCL	Assumed Zone of Core Loss

GROUNDWATER

	Groundwater strike
	Standing water level after 20 minutes; 1st, 2nd etc (number denotes level order)

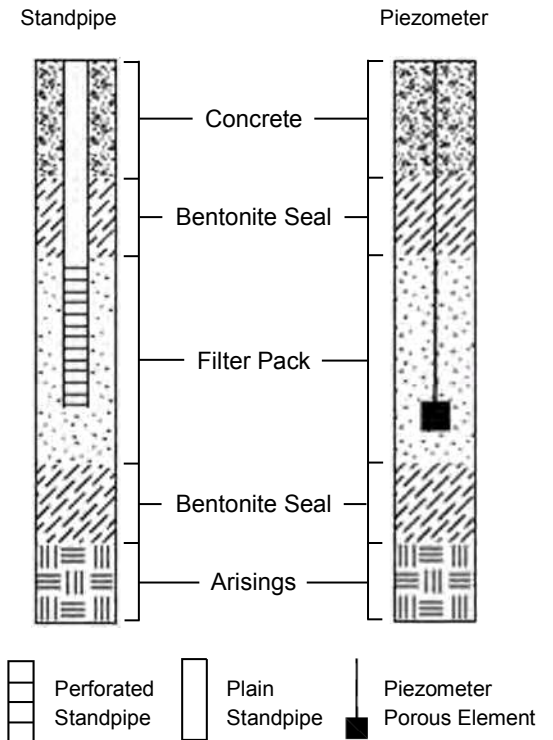
STRATA LEGENDS - Note: Composite strata types are shown by combining symbols

	Made Ground		Silt		Peat		Limestone
	Concrete		Sand		Void		Chalk
	Bituminous Bound Materials		Gravel		Mudstone		Coal
	Topsoil		Cobbles		Siltstone		Metamorphic Rock
	Clay		Boulders		Sandstone		Fine Grained Igneous Rock

* Where a single value is quoted this is the uncorrected 'N' value for a full 300 mm test drive following a seating drive of 150mm. Where the full test drive penetration is not achieved the number of blows is quoted for the penetration below the test total of 300mm, e.g.: 50/75.

** The minimum, average and maximum are shown e.g. 5/45/125.

INSTALLATION & BACKFILL DETAILS



STRATUM BOUNDARIES

	Unit boundary
--	---------------

APPENDIX C

EXPLORATORY HOLE LOGS

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318164.82

Ground Level (mAOD)
19.08
Northing (OS mN)
169230.89

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.40 0.00 - 0.40	ES B1 ES2	0.40	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of ceramic pot fragments, brick and mudstone.		(0.40)	18.68	
0.60 0.60 - 1.20 0.60 - 1.20	ES B3 ES4					MADE GROUND: Soft to firm yellowish grey slightly sandy slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of brick and mudstone. Cobbles and boulders are angular to subrounded of mudstone.				
2.30 - 3.50 2.30 - 3.50	B5 ES6	1.20	PID	<1ppm		Weak dark grey mudstone recovered as angular gravel and cobbles.		(1.80)	16.88	
						Weak dark grey mudstone recovered as angular gravel and cobbles.				
2.30 - 3.50 2.30 - 3.50	B5 ES6	3.50	PID	<1ppm		Soft yellow slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone. (Weathered St Mary's Well Bay Member)		(1.30)	15.58	

<p>PLAN DETAILS</p> <p>Long Axis Orientation: 35</p> <p>Shoring / Support: None</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on Engineer's instruction - Target depth achieved. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p style="text-align: right;">Termination Depth: 3.50m</p>
---	---

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318154.37

Ground Level (mAOD)
20.51
Northing (OS mN)
169170.19

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of brick and mudstone.		(0.30)		
0.30 - 1.00 0.30 - 1.00	B3 ES4	0.30	PID	<1ppm		MADE GROUND: Soft yellowish brown slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of brick and mudstone.		0.30	20.21	
								(0.90)		
1.20 - 2.70 1.20 - 2.70	B5 ES6	1.00	PID	<1ppm		Greyish yellow clayey slightly sandy GRAVEL with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular of mudstone.		1.20	19.31	
								(1.50)		
		2.70	PID	<1ppm				2.70	17.81	

PLAN DETAILS	Remarks
<p>3.5 0.8 Long Axis Orientation: 80 Shoring / Support: None Stability: Unstable Groundwater (description): Not encountered</p>	<p>Terminated due to collapsing sides from 2.0 m. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 2.70m</p>

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318218.11

Ground Level (mAOD)
23.89
Northing (OS mN)
169149.80

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown sandy gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of brick and mudstone.		(0.30)		
0.30 0.30 - 1.00 0.30 - 1.00	ES B3 ES4	0.30	PID	<1ppm		MADE GROUND: Grey sandy slightly clayey GRAVEL. Gravel is angular to subrounded fine to coarse of brick and mudstone.		0.30	23.59	
								(0.90)		
1.20 - 2.80 1.20 - 2.80	B5 ES6	1.00	PID	<1ppm		Soft yellowish brown-grey gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone.		1.20	22.69	
								(1.60)		
		2.80	PID	<1ppm				2.80	21.09	

PLAN DETAILS

Long Axis Orientation: 80

Shoring / Support: None

Stability: Unstable

Groundwater (description): Not encountered

Remarks

Terminated at 2.80 m due to collapsing sides from 0.50 m. Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
2.80m








Project
Cosmeston Phase 1
Client
Welsh Government

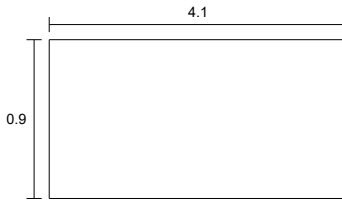
Project No.
UA008386-01
Easting (OS mE)
318148.51

Ground Level (mAOD)
24.68
Northing (OS mN)
169040.96

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2	0.30	PID	<1ppm		MADE GROUND: Grass over soft brown sandy gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of brick and mudstone .		(0.30)	24.38	
						MADE GROUND: Black angular to rounded fine to coarse GRAVEL of clinker and ash.		0.30 (0.10) 0.40		
0.60 0.60 - 2.10 0.60 - 2.10	ES B3 ES4	2.10	PID	<1ppm		Soft to firm yellowish brown grey sandy gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		(1.70)	22.58	
						Soft yellow gravelly CLAY with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		2.10 (0.50)		
								2.60	22.08	

PLAN DETAILS	Remarks
 <p>4.1 Long Axis Orientation: 90 Shoring / Support: None Stability: Unstable Groundwater (description): Not encountered</p>	<p>Terminated at 2.6 m due to collapsing sides. Pit began collapsing from 0.6m onwards. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 2.60m</p>

Project
Cosmeston Phase 1
Client
Welsh Government

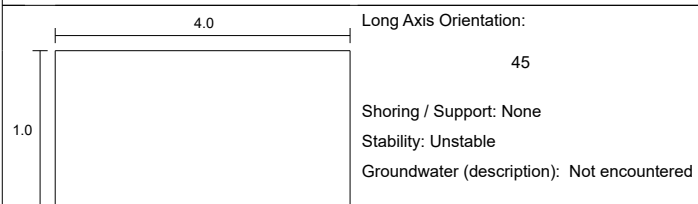
Project No.
UA008386-01
Easting (OS mE)
318120.81

Ground Level (mAOD)
26.75
Northing (OS mN)
168957.70

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.25 0.00 - 0.25	ES B1 ES2					MADE GROUND: Grass over soft brown locally yellow sandy gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of brick and mudstone.		(0.25)		
0.25 - 1.00 0.25 - 1.00	B3 ES4	0.25	PID	<1ppm		MADE GROUND: Light to dark brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of brick and mudstone. Cobbles are angular to subrounded of mudstone.		0.25	26.50	
								(0.75)		
1.00 1.00 - 1.90	ES B5	1.00	PID	<1ppm		MADE GROUND: Black loose angular to subrounded fine to coarse GRAVEL of clinker, ash and brick.		1.00	25.75	
								(0.90)		
1.90 - 2.90	ES6	1.90	PID	<1ppm		MADE GROUND: Soft yellow gravelly CLAY. Gravel is angular to subrounded fine to coarse of brick, clinker, ash and mudstone.		1.90	24.85	
								(1.00)		
		2.90	PID	<1ppm				2.90	23.85	

PLAN DETAILS 		Remarks Terminated at 2.90 m due to collapsing sides from 1.00 m. Backfilled with arisings and surface left raised to accommodate future settlement.
		Termination Depth: 2.90m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318082.72

Ground Level (mAOD)
17.78
Northing (OS mN)
169130.11

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.20)	17.58	
0.00 - 0.20	ES2					Firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular to subangular of mudstone (Weathered St Mary's Well Bay Member).		(0.30)		
		0.50	PID	<1ppm		Weak to medium strong grey MUDSTONE recovered as gravel with low cobble content. Gravel is angular to subrounded fine to coarse. Cobbles are angular to subangular (St Mary's Well Bay Member).		(0.20)	17.28	
0.70 - 1.30	B3					Firm light brownish grey CLAY (St Mary's Well Bay Member).		(0.60)	17.08	
0.70 - 1.30	ES4					1.30	PID	<1ppm		

<p>PLAN DETAILS</p> <p>Long Axis Orientation: 85</p> <p>Shoring / Support: None</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.30m</p>
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Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318000.87

Ground Level (mAOD)
13.98
Northing (OS mN)
169130.66

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)		
		0.30	PID	<1ppm		Firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular of mudstone (Weathered St Mary's Well Bay Member).		0.30 (0.30)	13.68	
0.70	ES					Weak to medium strong grey MUDSTONE recovered as angular to subrounded cobbles and boulders, with some gravel of angular to subrounded fine to coarse mudstone (St Mary's Well Bay Member). Firm light brownish grey CLAY (St Mary's Well Bay Member).		0.60 (0.10) 0.70	13.38 13.28	
		1.30	PID	<1ppm		Medium strong bedrock of MUDSTONE (St Mary's Well Bay Member).		(0.60)		
								1.30	12.68	

<p>PLAN DETAILS</p>	<p>Remarks</p> <p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.30m</p>
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




Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317993.69

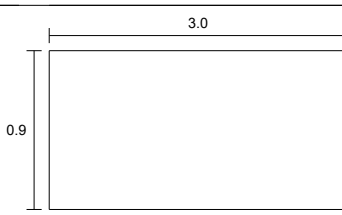
Ground Level (mAOD)
14.52
Northing (OS mN)
169073.00

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2	0.30	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded of mudstone.		(0.30)	14.22	
						Firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular to subrounded of mudstone.		(0.20)		
						Weak to medium strong grey MUDSTONE recovered as gravel, cobbles and boulders. Gravel is angular to subrounded fine to coarse. Cobbles and boulders are angular to subangular (Weathered St Mary's Well Bay Member).		(0.20)		
0.70 - 1.30 0.70 - 1.30	B3 ES4	1.30	PID	<1ppm		Stiff yellowish grey gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		(0.70)	13.82	
						Medium strong grey MUDSTONE (St Mary's Well Bay Member).		(0.60)		
								1.30	13.22	

PLAN DETAILS



3.0
Long Axis Orientation:
25
Shoring / Support: None
Stability: Stable
Groundwater (description): Not encountered

Remarks

Terminated on bedrock.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
1.30m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318002.87

Ground Level (mAOD)
15.24
Northing (OS mN)
168997.87

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2	0.30	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)	14.94	
						Firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular to subrounded of mudstone.		(0.20)		
						Weak to medium strong MUDSTONE recovered as cobbles and boulders with some gravel. Gravel is angular to subrounded fine to coarse. Cobbles and boulders are angular to subrounded (Weathered St Mary's Well Bay Member).		(0.25)		
0.75 - 1.10 0.75 - 1.10	B3 ES4	1.10	PID	<1ppm		Stiff grey CLAY (Weathered St Mary's Well Bay Member).		(0.35)	14.49	
						Medium strong grey MUDSTONE (St Mary's Well Bay Member).		1.10		

<p>PLAN DETAILS</p> <p>3.5 1.2 15 Long Axis Orientation: 15 Shoring / Support: None Stability: Stable Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.10m</p>
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
Project
Cosmeston Phase 1
Client
Welsh Government

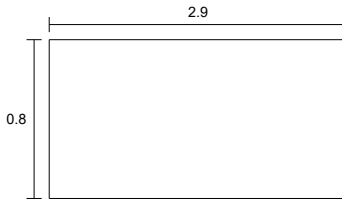
Project No.
UA008386-01
Easting (OS mE)
318030.07

Ground Level (mAOD)
19.10
Northing (OS mN)
168947.07

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.25 0.00 - 0.25	ES B1 ES2	0.25	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.25)	18.85	
0.35 - 0.90 0.35 - 0.90	B3 ES4					Grey GRAVEL with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone.		0.25 (0.10) 0.35		
		0.90	PID	<1ppm		Firm to stiff yellowish grey slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular of mudstone (Weathered St Mary's Well Bay Member).		(0.55)	18.20	
						Medium strong grey MUDSTONE (St Mary's Well Bay Member).		0.90		

PLAN DETAILS  <p>Long Axis Orientation: 160</p> <p>Shoring / Support: None</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>		Remarks Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
		Termination Depth: 0.90m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317974.28

Ground Level (mAOD)
15.43
Northing (OS mN)
168964.18

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone .		(0.30)		
		0.30	PID	<1ppm		Soft yellowish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone.		0.30 (0.20)	15.12	
0.60 - 0.70 0.60 - 0.70	B3 ES4					Grey GRAVEL with medium cobble and boulder content. Gravel is angular to rounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone.		0.50 (0.10)	14.92	
		0.70	PID	<1ppm		Firm yellowish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		0.60 (0.10)	14.82	
						Medium strong grey MUDSTONE (St Mary's Well Bay Member).		0.70	14.72	

PLAN DETAILS	Remarks
<p>3.6 Long Axis Orientation: 30 Shoring / Support: None Stability: Stable Groundwater (description): Not encountered</p>	<p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p>
	<p>Termination Depth: 0.70m</p>

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317981.97

Ground Level (mAOD)
17.51
Northing (OS mN)
168922.50

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2	0.30	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of brick and mudstone.		(0.30)	17.21	
						Firm yellowish brown slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone.		(0.20)		
0.60 - 1.20 0.60 - 1.20	B3 ES4	0.70	PID	<1ppm		Grey weak to medium strong MUDSTONE recovered as GRAVEL with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular of mudstone (Weathered St Mary's Well Bay Member).		0.50 (0.10)	16.91	
						Firm yellowish grey slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		(0.60)		
						Grey medium strong MUDSTONE (St Mary's Well Bay Member).		1.20	16.31	

PLAN DETAILS	Remarks
	Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
	Termination Depth: 1.20m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317974.72

Ground Level (mAOD)
18.55
Northing (OS mN)
168855.46

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)		
0.30 - 1.50 0.30 - 1.50	B3 ES4	0.30	PID	<1ppm		Firm yellowish grey slightly sandy slightly gravelly CLAY with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subangular of mudstone (Weathered St Mary's Well Bay Member).		0.30	18.25	
		1.50	PID	<1ppm		Medium strong grey MUDSTONE (St Mary's Well Bay Member).		1.50	17.05	

<p>PLAN DETAILS</p> <p>Long Axis Orientation: 45</p> <p>Shoring / Support: None</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.50m</p>
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Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318020.78

Ground Level (mAOD)
20.08
Northing (OS mN)
168873.46

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES	0.00	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of brick and mudstone.		(0.20)	19.88	
0.00 - 0.20	B1	0.20	PID	<1ppm		Firm yellowish grey-brown gravelly CLAY with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone.		0.20	19.88	
0.20 - 1.20	B3									
0.20 - 1.20	ES4									
		1.20	PID	<1ppm				(1.30)		
						Medium strong grey MUDSTONE (St Mary's Well Bay Member).		1.50	18.58	

PLAN DETAILS <p>4.0 0.9 Long Axis Orientation: 35</p> <p>Shoring / Support: None Stability: Stable Groundwater (description): Possible perched groundwater on bedrock</p>		Remarks Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
		Termination Depth: 1.50m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317924.55

Ground Level (mAOD)
17.35
Northing (OS mN)
168824.20

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone (TOPSOIL).		(0.30)		
0.30 - 0.90 0.30 - 0.90	B3 ES4	0.30	PID	<1ppm		Firm brown mottled yellowish orange slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		0.30 (0.60)	17.05	
0.90 - 1.40 0.90 - 1.40	B5 ES6	0.90	PID	<1ppm		Firm grey slightly sandy slightly gravelly CLAY with medium cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded fine to coarse of mudstone (Weathered St Mary's Well Bay Member).		0.90 (0.50)	16.45	
		1.40	PID	<1ppm		Medium strong grey MUDSTONE (St Mary's Well Bay Member).		1.40	15.95	

PLAN DETAILS	Remarks
<p>4.0 1.1</p> <p>Long Axis Orientation: 135</p> <p>Shoring / Support: None Stability: Stable Groundwater (description): Not encountered</p>	<p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.40m</p>

Project
Cosmeston Phase 1
Client
Welsh Government

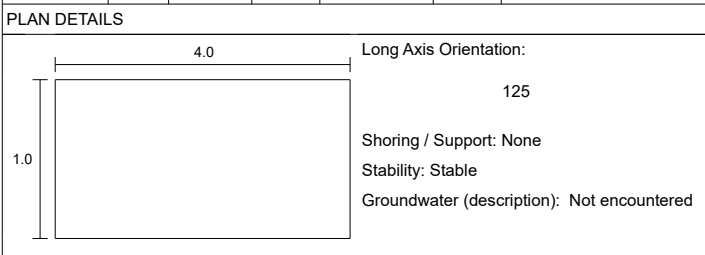
Project No.
UA008386-01
Easting (OS mE)
317895.01

Ground Level (mAOD)
18.80
Northing (OS mN)
168779.37

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)	18.50	
0.30 - 1.60 0.30 - 1.60	B3 ES4	0.30	PID	<1ppm		Firm yellowish brown slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone (Weathered St Mary's Well Bay Member).		0.30	18.50	
		1.00	PID	<1ppm				(1.30)		
1.60 - 2.20 1.60 - 2.20	B5 ES6					Firm grey mottled orange gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded of mudstone and limestone (Weathered St Mary's Well Bay Member).		1.60	17.20	
		2.20	PID	<1ppm		Medium strong grey MUDSTONE (St Mary's Well Bay Member).		(0.60)		
								2.20	16.60	



Remarks

Terminated on bedrock.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
2.20m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317869.45

Ground Level (mAOD)
15.47
Northing (OS mN)
168873.67

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subangular fine to coarse of mudstone.		(0.30)	15.17	
0.00 - 0.30	B1 ES2									
0.30 - 0.90	B3	0.30	PID	<1ppm		Firm to stiff yellowish brown slightly sandy slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to rounded of mudstone (Weathered St Mary's Well Bay Member).		0.30	15.17	
0.30 - 0.90	ES4									
		0.90	PID	<1ppm	▼	Medium strong grey MUDSTONE (St Mary's Well Bay Member).		0.90	14.57	

PLAN DETAILS <p>4.4 1.0 110 Long Axis Orientation: Shoring / Support: None Stability: Stable Groundwater (description): Possible perched groundwater on bedrock</p>		Remarks Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
		Termination Depth: 0.90m







Project
Cosmeston Phase 1
Client
Welsh Government

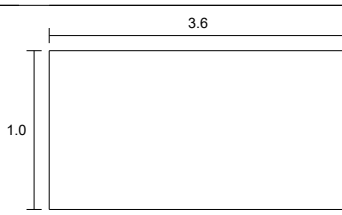
Project No.
UA008386-01
Easting (OS mE)
317814.16

Ground Level (mAOD)
14.54
Northing (OS mN)
168898.90

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES									
0.00 - 0.30	B1									
0.00 - 0.30	ES2							(0.30)		
0.30 - 0.60	B3	0.30	PID	<1ppm				0.30	14.24	
0.30 - 0.60	ES4							(0.30)		
		0.60	PID	<1ppm				0.60	13.94	
						MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.				
						Soft yellowish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).				
						Medium strong grey MUDSTONE.				

PLAN DETAILS  <p>Long Axis Orientation: 40</p> <p>Shoring / Support: None</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>		Remarks Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
		Termination Depth: 0.60m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317826.92

Ground Level (mAOD)
16.35
Northing (OS mN)
168843.35

Start Date
07/09/2016
End Date
07/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 0.00 - 0.30 0.00 - 0.30	ES B1 ES2					MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)		
0.30 - 1.20 0.30 - 1.20	B3 ES4	0.30	PID	<1ppm		Slight brownish grey slightly sandy gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to subrounded fine to coarse of mudstone.		0.30	16.05	
		1.20	PID	<1ppm		Medium strong grey MUDSTONE (St Mary's Well Bay Member).		1.20	15.15	

<p>PLAN DETAILS</p> <p>4.2 0.9 Long Axis Orientation: 50 Shoring / Support: None Stability: Stable Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.</p> <p>Termination Depth: 1.20m</p>
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Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317839.66

Ground Level (mAOD)
13.88
Northing (OS mN)
168916.94

Start Date
06/09/2016
End Date
06/09/2016

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)		
0.00 - 0.30	B1 ES2									
0.30 - 0.55	B3	0.30	PID	<1ppm		Firm to stiff yellowish brown slightly sandy slightly gravelly CLAY with low cobble and boulder content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles and boulders are angular to rounded of mudstone (Weathered St Mary's Well Bay Member).		0.30	13.58	
0.30 - 0.55	ES4							(0.25)		
		0.55	PID	<1ppm		Medium strong grey MUDSTONE (St Mary's Well Bay Member).		0.55	13.33	

PLAN DETAILS	Remarks
	Terminated on bedrock. Backfilled with arisings and surface left raised to accommodate future settlement.
	Termination Depth: 0.55m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318216.88

Ground Level (mAOD)
22.89
Northing (OS mN)
169176.47

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.20	ES B1					MADE GROUND: Grass over soft brown sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is subangular to subrounded fine to coarse of mudstone.		(0.20)	22.69	
0.20 - 0.50	ES2					Soft grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone.		(0.30)		
0.20 - 0.50						Grey weak MUDSTONE recovered as angular to rounded fine to coarse gravel. (Weathered St Mary's Well Bay Member).		0.50	22.39	
0.50	D7	0.50	SPT(S) PID	N=31 (7,8/11,12,3,5) <1ppm	0					
0.95	D8	0.95	SPT(S)	N=6 (2,2/2,1,1,2)	0					
1.30 - 1.50	B3							(1.50)		
1.30 - 1.50	ES4	1.50	PID	<1ppm						
2.00	D9	2.00	SPT(S)	N=6 (1,1/1,1,2,2)	0	Soft yellowish brown gravelly CLAY with medium cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are subangular of mudstone. (Weathered St Mary's Well Bay Member).		2.00	20.89	
2.20 - 2.50	B5	2.30	HV(1)	3(3)kPa				(0.50)		
2.20 - 2.50	ES6	2.50	PID	<1ppm		Firm brownish grey slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are subangular of mudstone (Weathered St Mary's Well Bay Member).		2.50	20.39	
								(0.50)		
3.00	D10	3.00	SPT(S)	N=8 (2,2/2,2,1,3)	0			3.00	19.89	

DRILLING TECHNIQUE			WATER OBSERVATIONS					HOLE/CASING DIAMETER				BACKFILL			
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.50	Inspection Pit											0.00	0.10	Sand
1.40	2.70	Dynamic Sample											0.10	0.50	Bentonite
													0.50	2.10	Gravel
													2.10	3.00	Bentonite

Remarks
Terminated on Engineer's instruction - Target depth achieved

Termination Depth:
3.00m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318208.33

Ground Level (mAOD)
25.98
Northing (OS mN)
169073.08

Start Date
08/09/2016
End Date
08/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 - 0.10	ES1	0.10	PID	<1ppm		MADE GROUND: Grass over soft to firm dark brown to grey slightly sandy CLAY with occasional gravels, and frequent roots and rootlets. Gravel is subangular to subrounded fine to coarse of mudstone. Firm to stiff yellowish brown gravelly CLAY with medium cobble content. Gravel is subangular to subrounded fine to coarse of mudstone. Cobbles are subangular of mudstone (Weathered St Mary's Well Bay Member).		(0.20)	25.78	
0.20 - 0.40	ES2	0.40	PID	<1ppm				(0.30)		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.50	Inspection Pit											0.00	0.50	Arisings

Remarks
Terminated on Engineer's instruction following ES sample collection

Termination Depth:
0.50m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318133.31

Ground Level (mAOD)
26.15
Northing (OS mN)
168990.04

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00	ES	0.20	PID	<1ppm		MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.20)	25.95	
0.20 - 1.20	B2					MADE GROUND: Soft yellowish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are subangular of mudstone (REWORKED NATURAL).		(1.00)		
0.20 - 1.20	ES1									
1.20	D3	1.20	SPT(S)	N=6 (1,2/2,1,2,1)		MADE GROUND: Soft to firm yellowish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of mudstone. Cobbles are subangular of mudstone (REWORKED NATURAL).		1.20	24.95	
		1.20	PID	<1ppm		MADE GROUND: Grey weak MUDSTONE with low cobble content. Recovered as angular to subrounded gravel. Cobbles are angular to subangular (REWORKED NATURAL)		(0.30)	24.65	
1.65 - 1.80	ES4	1.80	PID	<1ppm		MADE GROUND: Soft to firm yellowish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular of mudstone (REWORKED NATURAL).		(0.40)	24.25	
2.00	D5	2.00	SPT(S)	N=7 (1,2/2,2,1,2)		MADE GROUND: Soft to firm yellowish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are angular of mudstone (REWORKED NATURAL).		2.00	24.00	
2.30	ES	2.40	PID	<1ppm		MADE GROUND: Black angular to subrounded fine to coarse GRAVEL of clinker and ash.		(0.15)	23.85	
2.30 - 2.40	ES6					Firm to stiff greyish brown CLAY with low cobble content. Cobbles are angular to subrounded of mudstone (Weathered St Mary's Well Bay Member).		(0.70)		
3.00	D7	3.00	SPT(S)	N=14 (5,7/7,3,2,2)				3.00	23.15	

DRILLING TECHNIQUE			WATER OBSERVATIONS					HOLE/CASING DIAMETER				BACKFILL			
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	3.00	Dynamic Sample											0.00	0.10	Concrete
													0.10	0.50	Bentonite
													0.50	2.15	Gravel
													2.15	3.00	Bentonite

Remarks
Terminated on Engineer's instruction - Target depth achieved.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
3.00m



Unless otherwise stated:
Depth (m), Diameter(mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used

Archway Dart

Contractor

Arcadis Consulting (UK) Ltd

Logged By

SC

Checked By

IP

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318098.59

Ground Level (mAOD)
27.99
Northing (OS mN)
168877.00

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00	ES					MADE GROUND: Grass over slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of brick, ash and clinker.		(0.20)		
0.00 - 0.50	B1							0.20	27.79	
0.00 - 0.50	ES2					MADE GROUND: Black angular to subrounded fine to coarse GRAVEL with low cobble and boulder content. Gravel is of ash and clinker. Cobbles and boulders are angular to subrounded of brick and concrete.		(0.30)		
0.50 - 0.90	D3	0.50	SPT(S) PID	N=14 (5,7,7,3,2,2) <1ppm		Grey weak to medium strong MUDSTONE (St Mary's Well Bay Member).		0.50	27.49	
0.90 - 1.30	D4	0.95	SPT(S)	N>50 (3,6/12,13,20,5 for 150mm)				(0.80)		
								1.30	26.69	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.50	Inspection Pit											0.00	1.30	Bentonite

Remarks
Terminated on Engineer's instruction on bedrock.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
1.30m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
318046.90

Ground Level (mAOD)
16.34
Northing (OS mN)
169064.57

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.10	ES				0	MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone. Soft to firm yellowish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone. Weak to medium strong grey MUDSTONE and LIMESTONE recovered as angular to subangular cobbles and boulders (Weathered St Mary's Well Bay Member). Soft yellowish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of mudstone (Weathered St Mary's Well Bay Member). Medium strong light grey MUDSTONE (St Mary's Well Bay Member).		(0.20)	16.14	
0.10 - 0.40	B2							(0.20)		
0.10 - 0.40	ES1	0.40	PID	<1ppm				(0.20)		
0.50 - 0.60	B4	0.60	PID	<1ppm				0.40		
0.50 - 0.60	ES3							0.50		
0.60 - 0.90	D5							0.60		
		0.95	SPT(S)	N=50 (3,6/12,13,20,5)				(0.30)		
								0.90		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.60	Inspection Pit											0.00	0.90	Arisings

Remarks
 Terminated on Engineer's instruction on bedrock.
 Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
0.90m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317965.76

Ground Level (mAOD)
14.04
Northing (OS mN)
168990.84

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill	
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend				
0.00	ES	0.20	PID	<1ppm	0	MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.20)	13.84		
0.00 - 0.20	B2							(0.40)			
0.00 - 0.20	ES1	0.60	SPT(S)	N>50 (5,4/5,9,10,26 for 40mm)			Soft to firm yellowish brown slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is angular to subrounded fine to coarse of mudstone.		(0.60)	13.44	
0.40	ES								(0.50)		
0.40 - 0.60	B4	0.60	PID	<1ppm	Weak to medium strong light grey to grey weak MUDSTONE (St Mary's Well Bay Member).		(1.10)	12.94			
0.40 - 0.60	ES3						Medium strong grey MUDSTONE.				
0.60 - 0.90	D5										
0.90 - 1.10	D6										

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.60	Inspection Pit											0.00	1.10	Arisings
0.60	1.10	Dynamic Sample													

Remarks
Terminated on Engineer's instruction on bedrock.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
1.10m

Project
Cosmeston Phase 1
Client
Welsh Government

Project No.
UA008386-01
Easting (OS mE)
317881.80

Ground Level (mAOD)
16.77
Northing (OS mN)
168832.61

Start Date
05/09/2016
End Date
05/09/2016

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00	ES B1					MADE GROUND: Grass over soft brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse of mudstone. Soft light brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone. Cobbles are subangular to subrounded of mudstone. Weak to medium strong grey MUDSTONE (St Mary's Well Bay Member).	(0.20)	16.57		
0.00 - 0.20	ES2				(0.30)					
0.20	ES B3				0.50					
0.20 - 0.50	ES4	0.50	SPT(S) PID	N=16 (5,11/6,3,3,4) <1ppm						
0.50 - 0.80	D5	0.50			(0.60)					
1.00 - 1.10	D6	0.95	SPT(S)	N>50 (4,5/20,30,0 for 0mm)			1.10	15.67		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.50	Inspection Pit											0.00	1.10	Arisings

Remarks
Terminated on engineer's instruction on bedrock.
Backfilled with arisings and surface left raised to accommodate future settlement.

Termination Depth:
1.10m

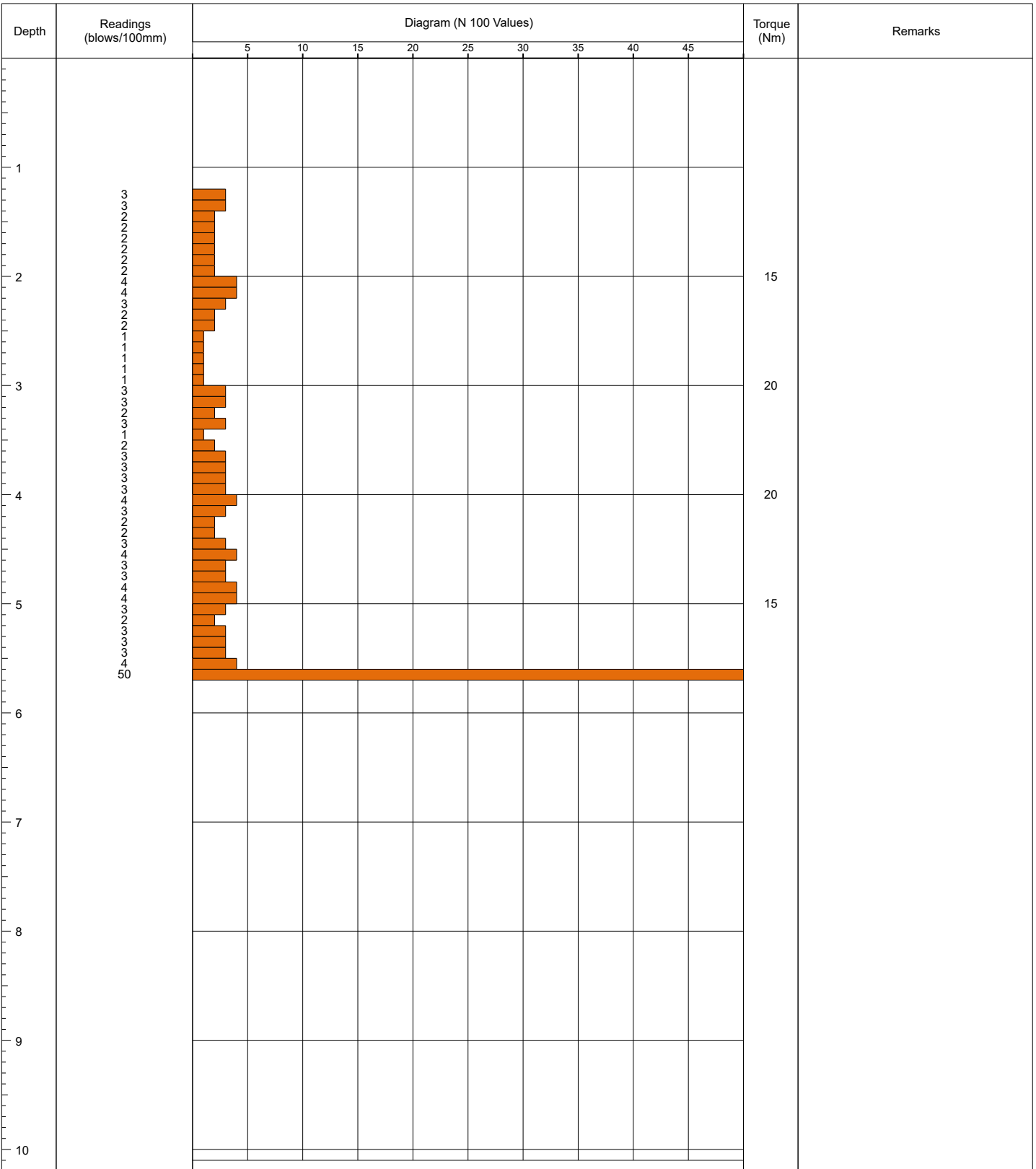
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318224.34

Ground Level (m OD)
21.00
Northing (OS mN)
169273.75

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS		Remarks Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 5.70 m bgl.
Test Type: DPSH-B Hammer Mass (kg): 63.5 Hammer Drop (mm): 750 Cone Diameter (mm): 50.0 Rod Diameter (mm): 35.0 Anvil Damper Type: None		
		Termination Depth: 5.80m

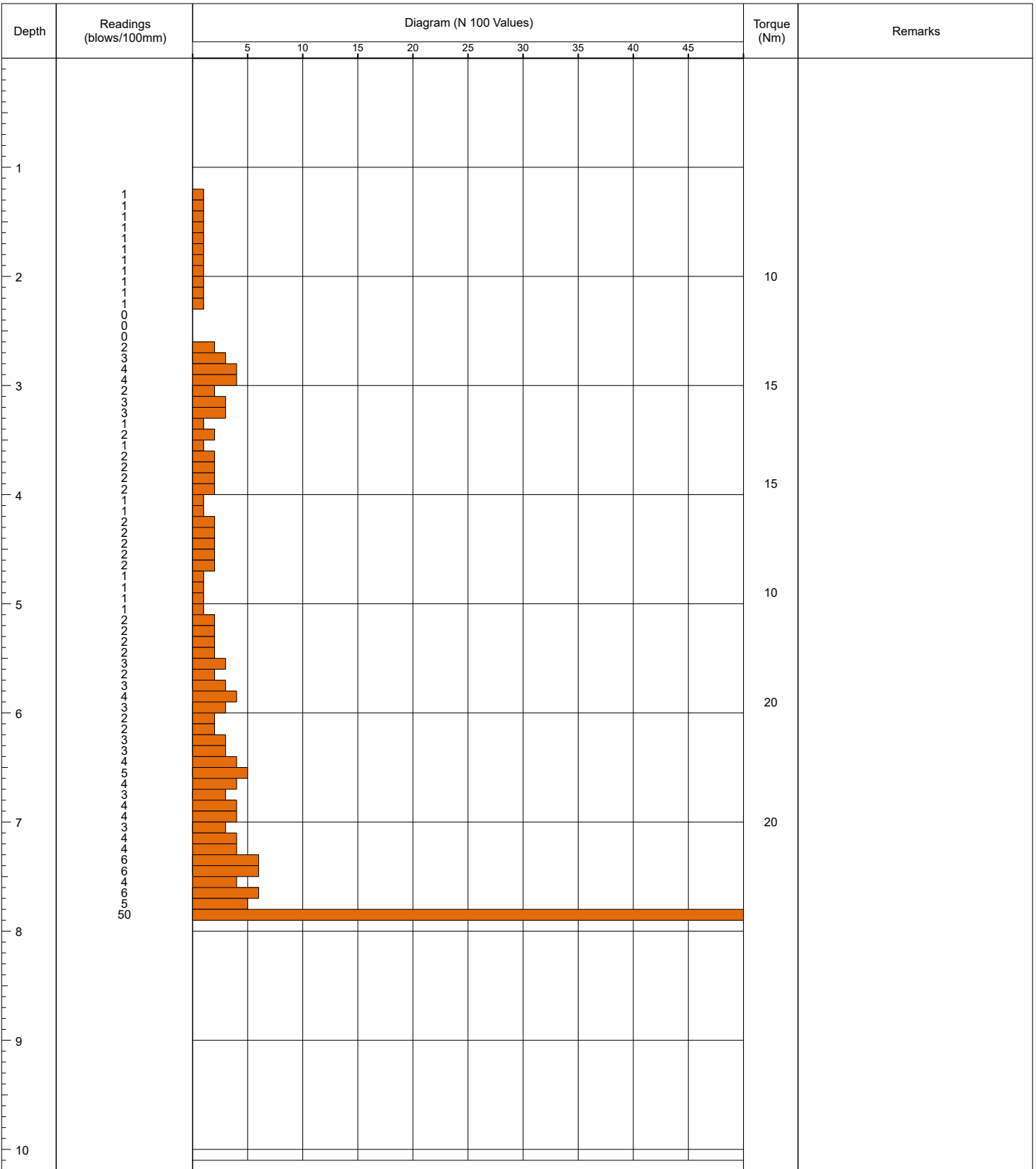
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318144.80

Ground Level (m OD)
19.23
Northing (OS mN)
169212.48

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



<p>DYNAMIC PROBE DETAILS</p> <p>Test Type: DPSH-B Hammer Mass (kg): 63.5 Hammer Drop (mm): 750 Cone Diameter (mm): 50.0 Rod Diameter (mm): 35.0 Anvil Damper Type: None</p>	<p>Remarks</p> <p>Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 7.80 m bgl. Location is planned, unable to survey as not marked.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto;"> Termination Depth: 7.90m </div>
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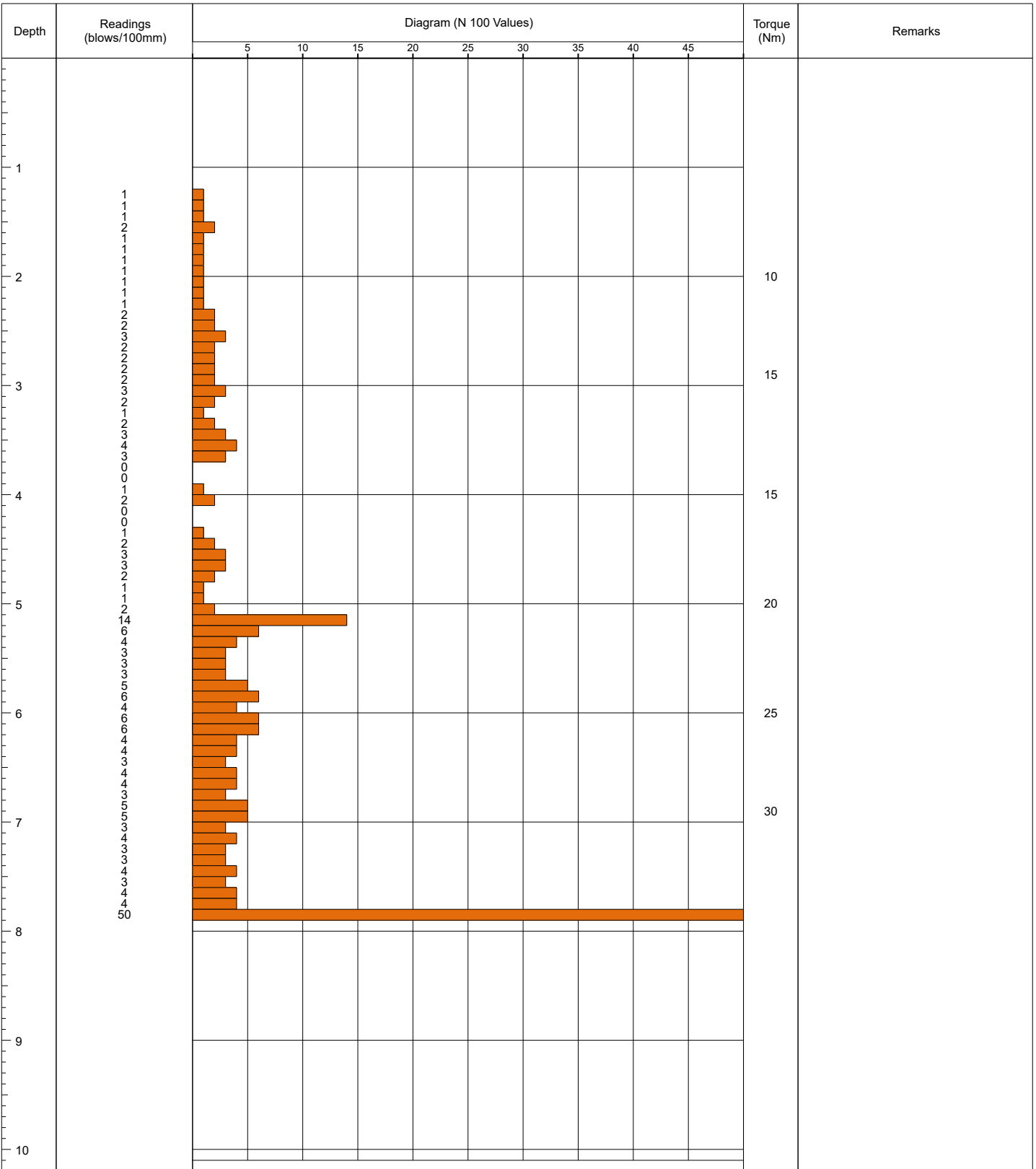
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318225.07

Ground Level (m OD)
24.18
Northing (OS mN)
169146.39

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 7.80 m bgl. Location is planned, unable to survey as not marked.

Termination Depth:
7.90m

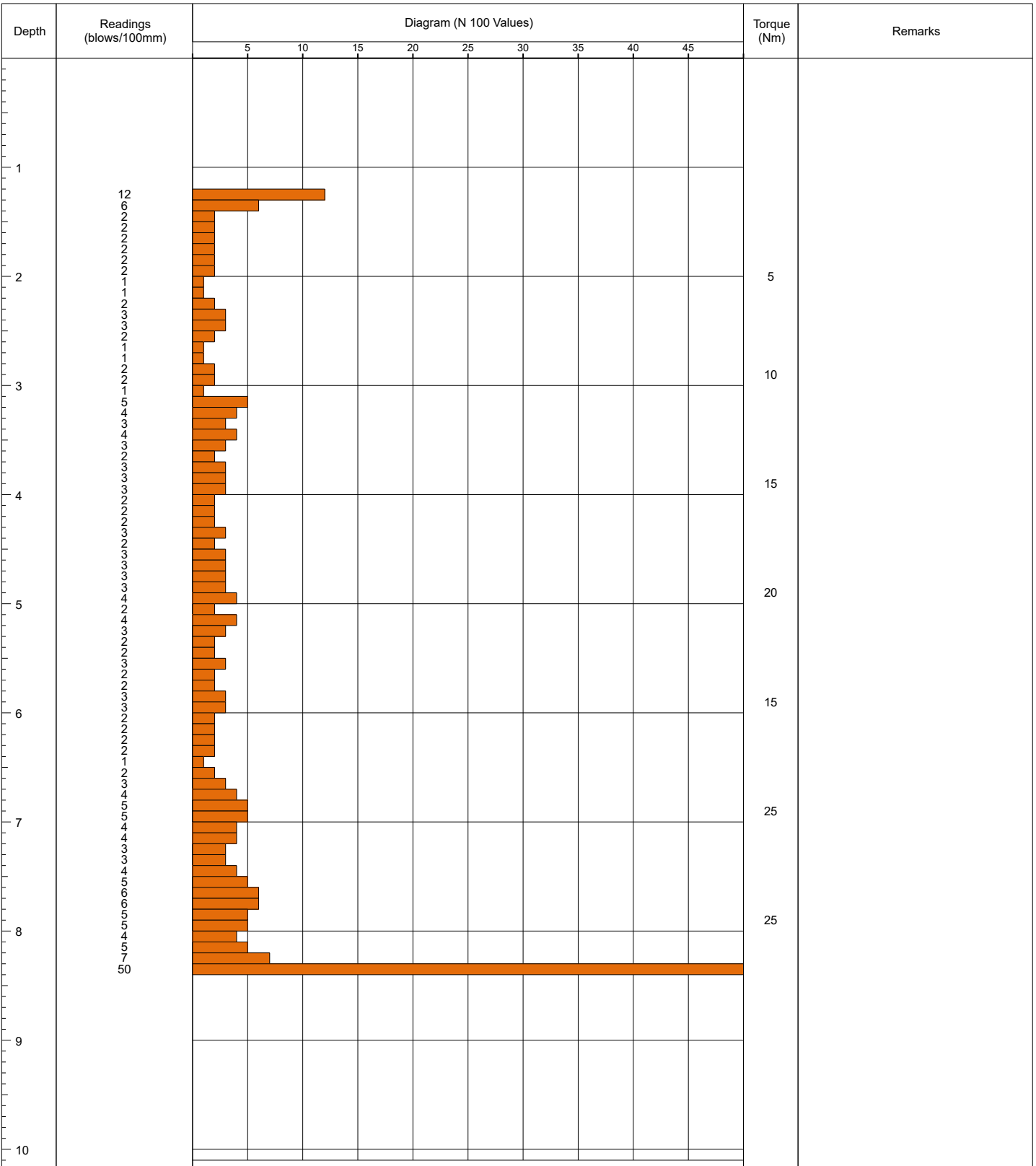
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318141.53

Ground Level (m OD)
21.19
Northing (OS mN)
169128.34

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 8.40 m bgl. Location is planned, unable to survey as not marked.

Termination Depth:
8.40m

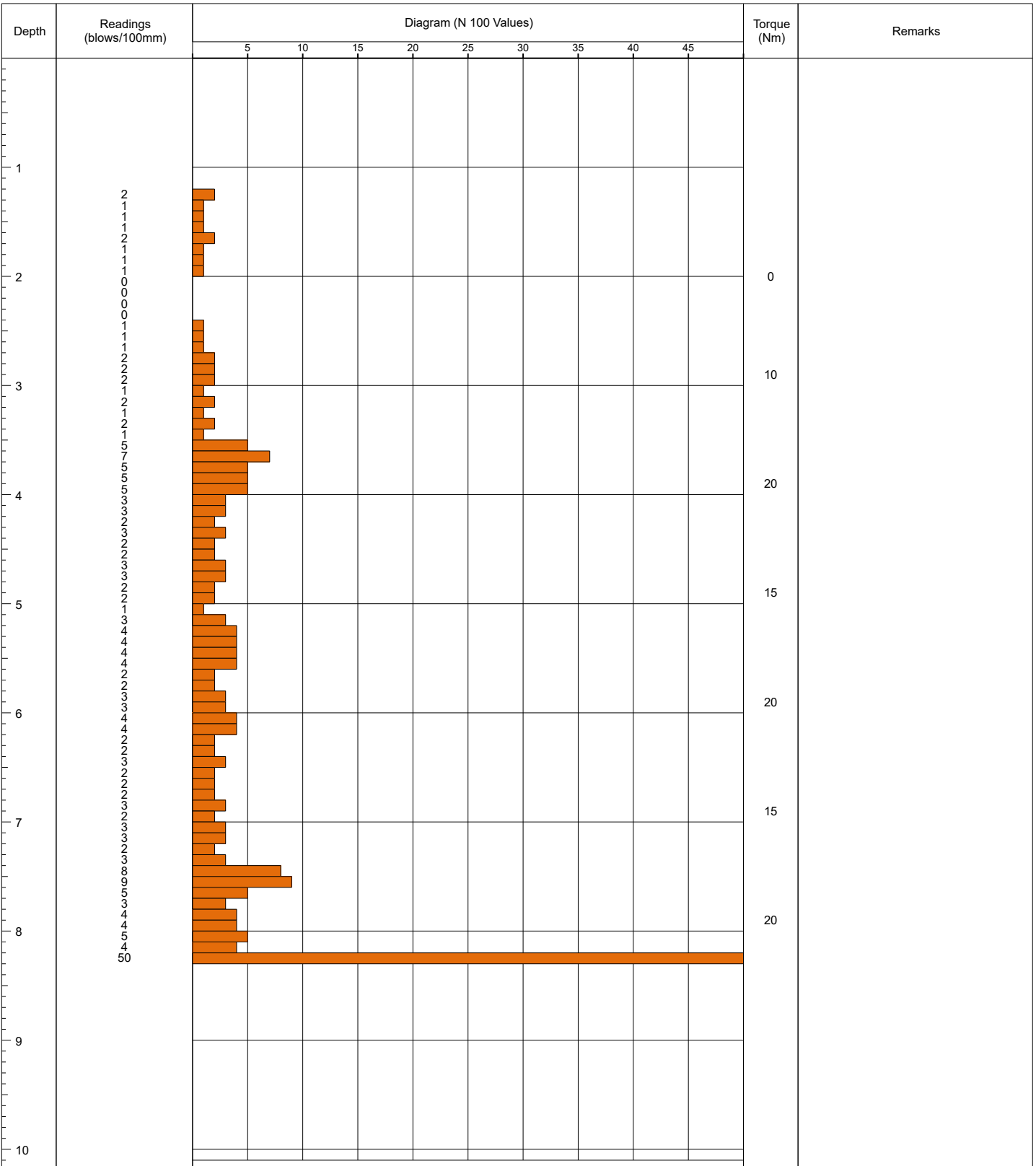
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318205.32

Ground Level (m OD)
26.07
Northing (OS mN)
169070.91

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 8.20 m bgl. Location is planned, unable to survey as not marked.

Termination Depth:
8.30m



Unless otherwise stated:
 Depth (m), Diameter (mm), Time (hhmm),
 Thickness (m), Level (mOD).

Equipment Used
Competitor Dart

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
GSTL

Checked By
CPr

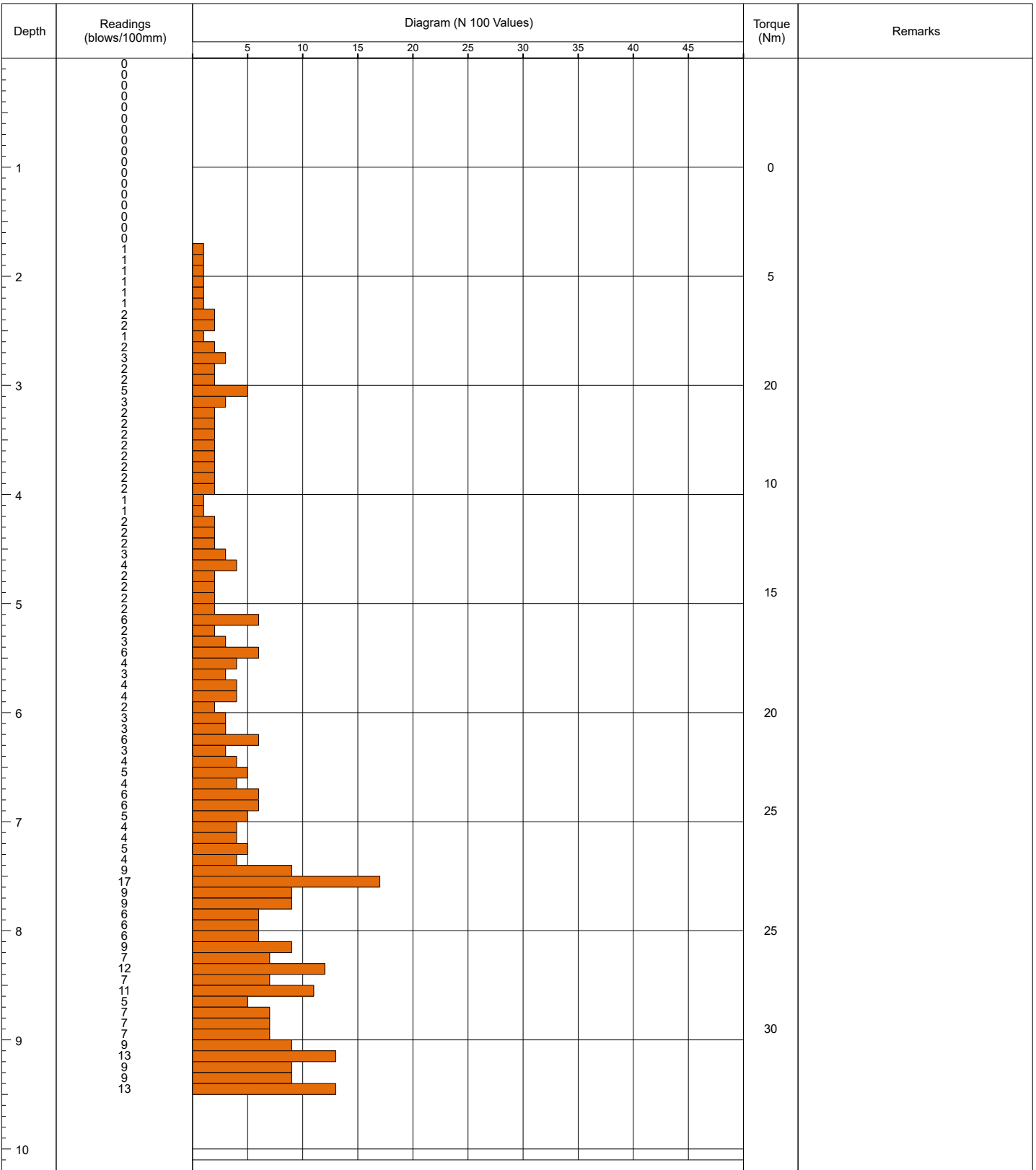
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318128.28

Ground Level (m OD)
22.45
Northing (OS mN)
169052.46

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Refusal at 9.40 m bgl. Location is planned, unable to survey as not marked.

Termination Depth:
9.50m

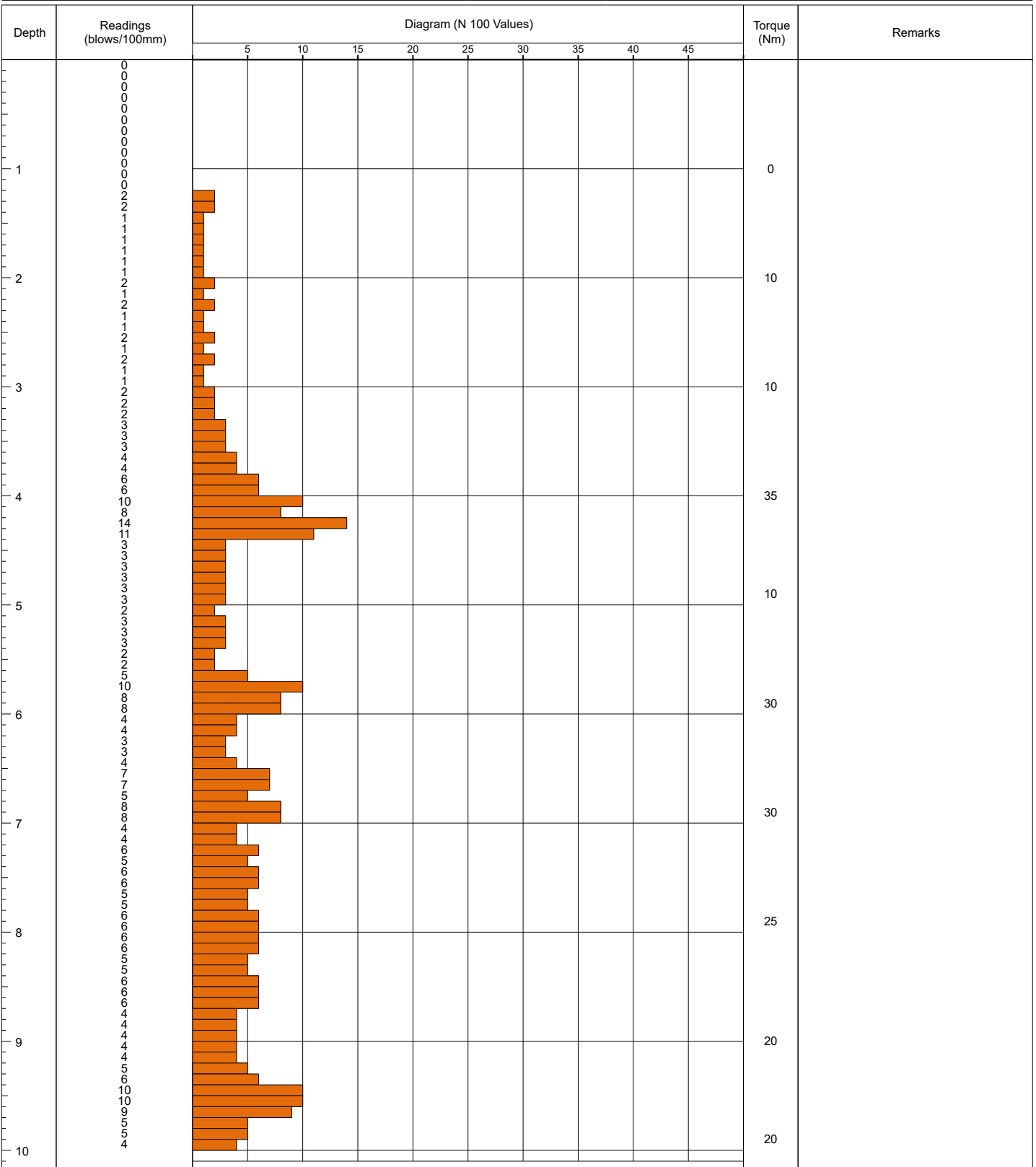
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318175.32

Ground Level (m OD)
26.64
Northing (OS mN)
169023.03

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Target depth reached (10.00 m bgl). Location is planned, unable to survey as not marked.

Termination Depth:
10.00m

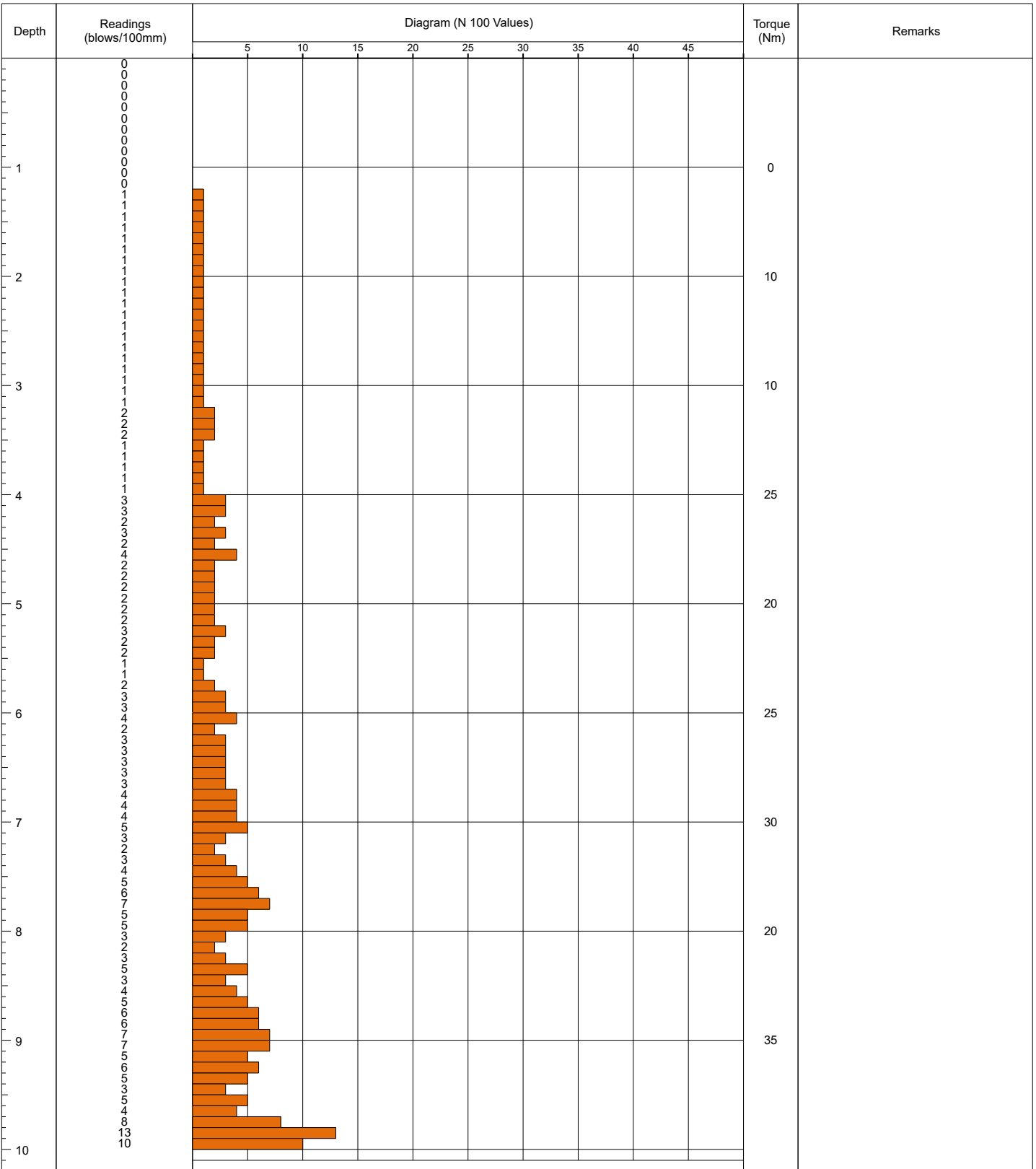
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318121.51

Ground Level (m OD)
26.13
Northing (OS mN)
168979.20

Start Date
06/12/2017
End Date
06/12/2017

Scale
1:50
Sheet 1 of 1



DYNAMIC PROBE DETAILS		Remarks Hand excavated inspection pit from 0.00 m to 1.20 m bgl. Target depth reached (10.00 m bgl). Location is planned, unable to survey as not marked.
Test Type: DPSH-B Hammer Mass (kg): 63.5 Hammer Drop (mm): 750 Cone Diameter (mm): 50.0 Rod Diameter (mm): 35.0 Anvil Damper Type: None		
		Termination Depth: 10.00m

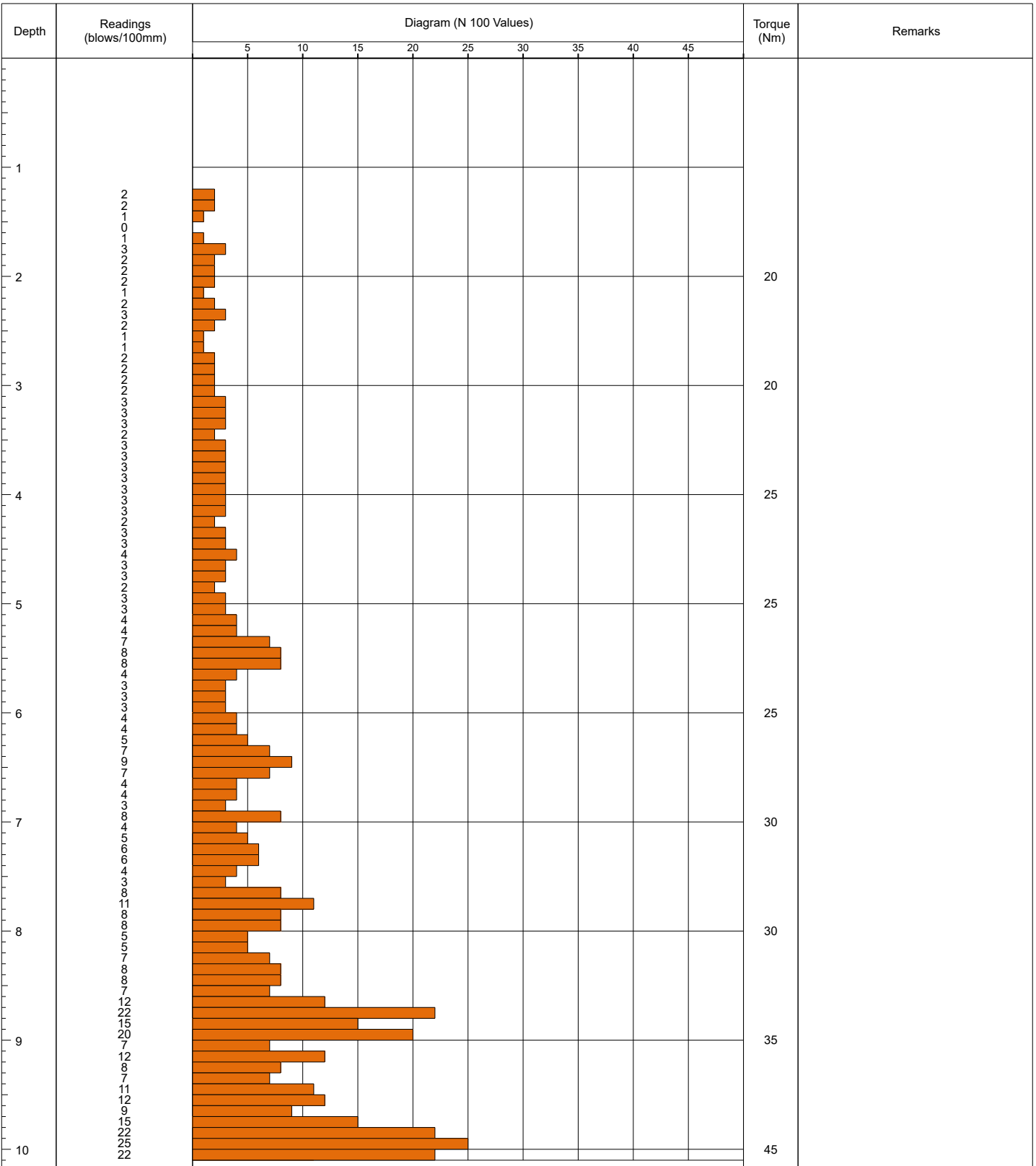
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318143.99

Ground Level (m OD)
26.35
Northing (OS mN)
169000.05

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 1 of 2



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Location is planned, unable to survey as not marked.

Termination Depth:
12.50m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318143.99

Ground Level (m OD)
26.35
Northing (OS mN)
169000.05

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 2 of 2

Depth	Readings (blows/100mm)	Diagram (N 100 Values)										Torque (Nm)	Remarks
		5	10	15	20	25	30	35	40	45			
11	11	[Bar chart showing values between 10 and 15]										45	
	16	[Bar chart showing values between 10 and 15]											
	10	[Bar chart showing values between 10 and 15]											
	10	[Bar chart showing values between 10 and 15]											
	11	[Bar chart showing values between 10 and 15]											
	10	[Bar chart showing values between 10 and 15]											
	11	[Bar chart showing values between 10 and 15]											
	12	[Bar chart showing values between 10 and 15]											
	21	[Bar chart showing values between 20 and 25]											
	23	[Bar chart showing values between 20 and 25]											
12	22	[Bar chart showing values between 20 and 25]										45	
	24	[Bar chart showing values between 20 and 25]											
	26	[Bar chart showing values between 20 and 25]											
	18	[Bar chart showing values between 20 and 25]											
12													
13													
14													
15													
16													
17													
18													
19													
20													

DYNAMIC PROBE DETAILS
Test Type: DPSH-B
Hammer Mass (kg): 63.5
Hammer Drop (mm): 750
Cone Diameter (mm): 50.0
Rod Diameter (mm): 35.0
Anvil Damper Type: None

Remarks
Location is planned, unable to survey as not marked.
Termination Depth: 12.50m

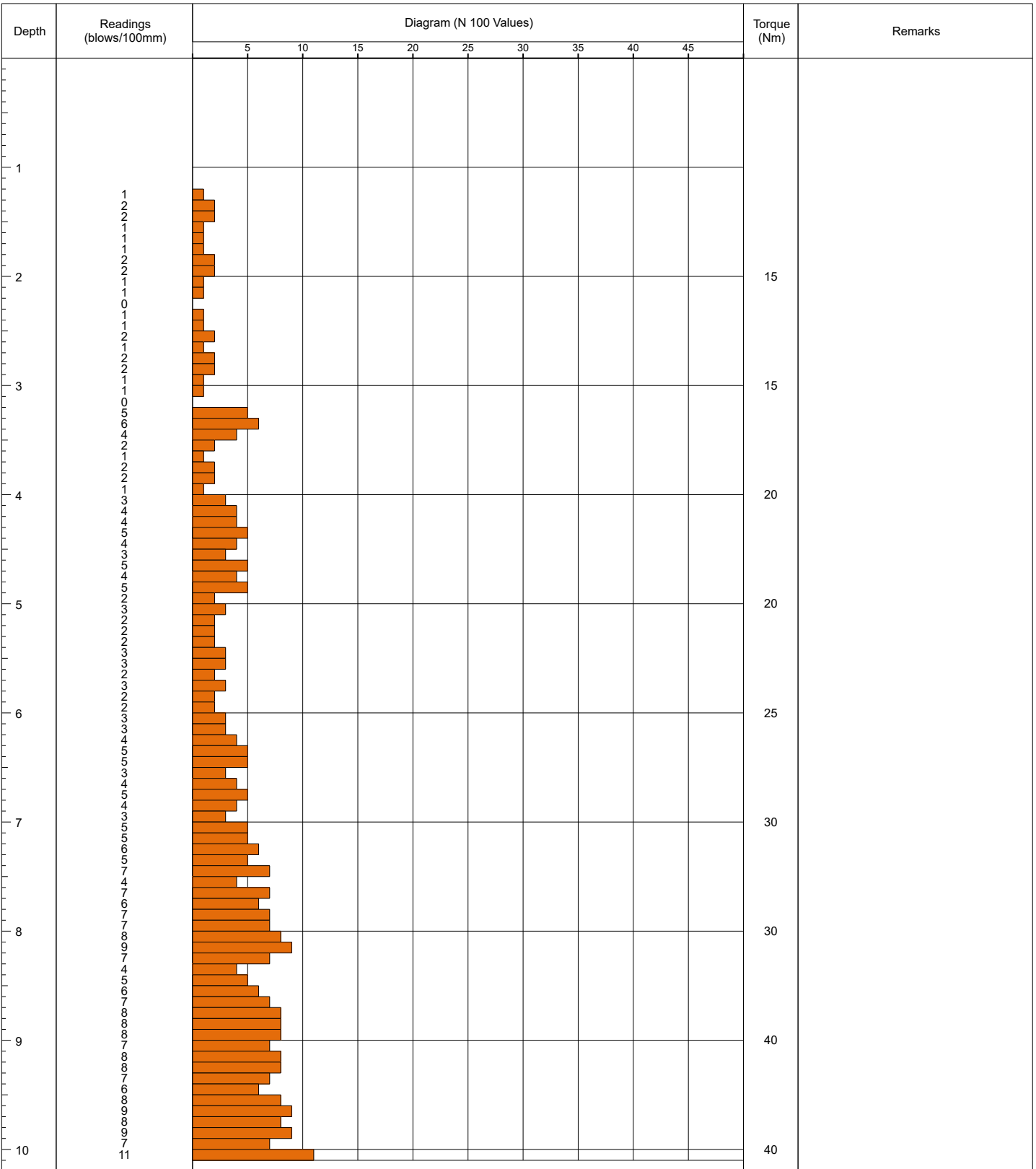
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318154.01

Ground Level (m OD)
26.35
Northing (OS mN)
169044.91

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 1 of 2



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Location is planned, unable to survey as not marked.

Termination Depth:
12.40m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318154.01

Ground Level (m OD)
26.35
Northing (OS mN)
169044.91

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 2 of 2

Depth	Readings (blows/100mm)	Diagram (N 100 Values)										Torque (Nm)	Remarks
		5	10	15	20	25	30	35	40	45			
11	11	[Bar chart showing values between 5 and 15]										45	
	13	[Bar chart showing values between 5 and 15]											
	10	[Bar chart showing values between 5 and 15]											
	11	[Bar chart showing values between 5 and 15]											
	12	[Bar chart showing values between 5 and 15]											
	13	[Bar chart showing values between 5 and 15]											
	15	[Bar chart showing values between 5 and 15]											
	14	[Bar chart showing values between 5 and 15]											
	15	[Bar chart showing values between 5 and 15]											
	16	[Bar chart showing values between 5 and 15]											
12	17	[Bar chart showing values between 5 and 15]											
	14	[Bar chart showing values between 5 and 15]											
	20	[Bar chart showing values between 5 and 15]											
	16	[Bar chart showing values between 5 and 15]											
13													
14													
15													
16													
17													
18													
19													
20													

DYNAMIC PROBE DETAILS		Remarks Location is planned, unable to survey as not marked.
Test Type: DPSH-B Hammer Mass (kg): 63.5 Hammer Drop (mm): 750 Cone Diameter (mm): 50.0 Rod Diameter (mm): 35.0 Anvil Damper Type: None		
		Termination Depth: 12.40m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318168.31

Ground Level (m OD)
24.82
Northing (OS mN)
169071.54

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 2 of 2

Depth	Readings (blows/100mm)	Diagram (N 100 Values)										Torque (Nm)	Remarks
		5	10	15	20	25	30	35	40	45			
11	18 17 16 23 25 28 111												
12													
13													
14													
15													
16													
17													
18													
19													
20													

DYNAMIC PROBE DETAILS
Test Type: DPSH-B
Hammer Mass (kg): 63.5
Hammer Drop (mm): 750
Cone Diameter (mm): 50.0
Rod Diameter (mm): 35.0
Anvil Damper Type: None

Remarks
Location is planned, unable to survey as not marked.
Termination Depth: 10.70m

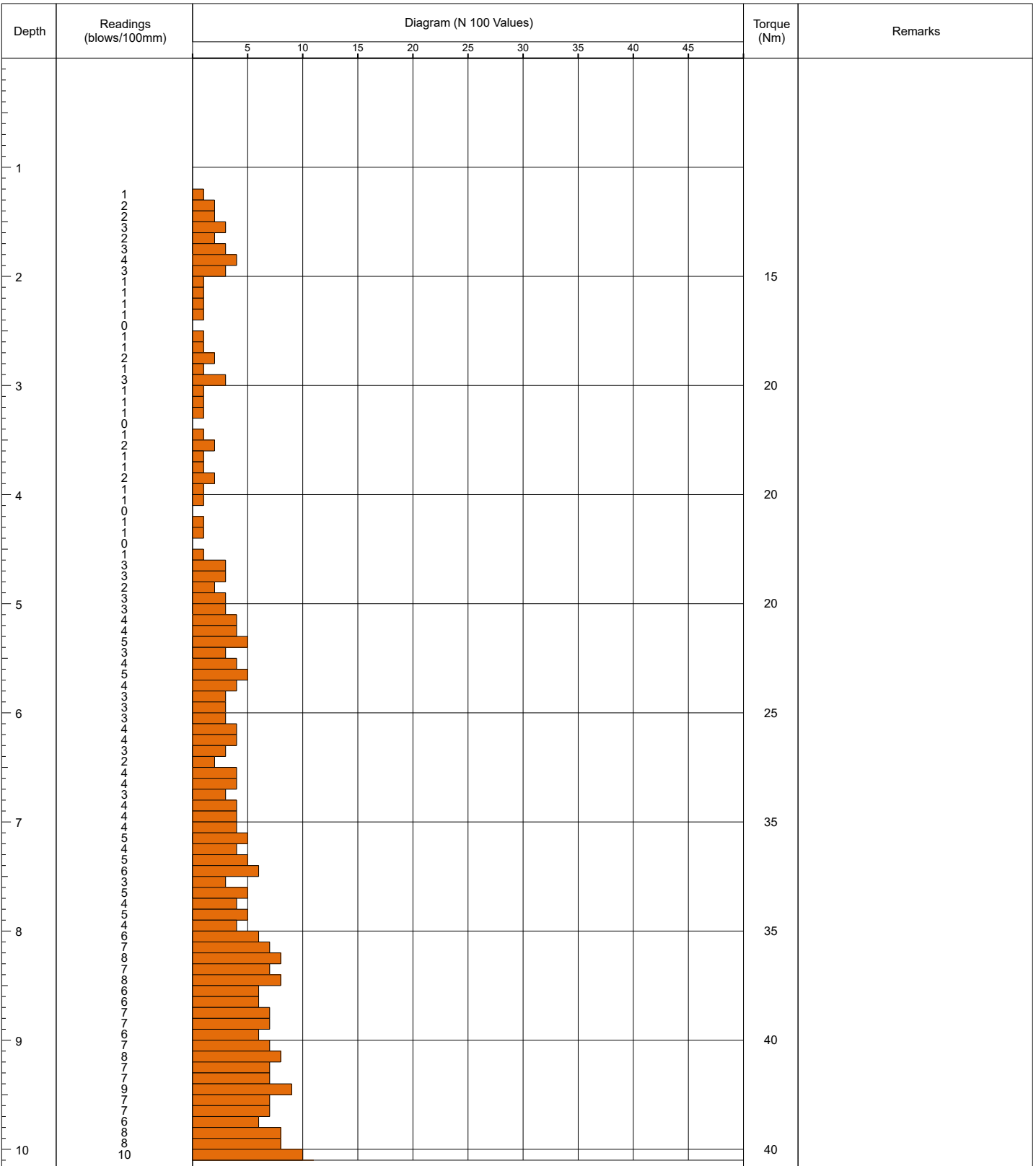
Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318165.84

Ground Level (m OD)
24.70
Northing (OS mN)
169066.08

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 1 of 2



DYNAMIC PROBE DETAILS

Test Type: DPSH-B
 Hammer Mass (kg): 63.5
 Hammer Drop (mm): 750
 Cone Diameter (mm): 50.0
 Rod Diameter (mm): 35.0
 Anvil Damper Type: None

Remarks

Location is planned, unable to survey as not marked.

Termination Depth:
12.20m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318165.84

Ground Level (m OD)
24.70
Northing (OS mN)
169066.08

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 2 of 2

Depth	Readings (blows/100mm)	Diagram (N 100 Values)										Torque (Nm)	Remarks
		5	10	15	20	25	30	35	40	45			
11	11	[Bar chart showing blow counts for depth 11]										45	
	12	[Bar chart showing blow counts for depth 12]											
	13	[Bar chart showing blow counts for depth 13]											
	9	[Bar chart showing blow counts for depth 9]											
	10	[Bar chart showing blow counts for depth 10]											
	9	[Bar chart showing blow counts for depth 9]											
	14	[Bar chart showing blow counts for depth 14]											
	15	[Bar chart showing blow counts for depth 15]											
	19	[Bar chart showing blow counts for depth 19]											
	15	[Bar chart showing blow counts for depth 15]											
12	16	[Bar chart showing blow counts for depth 16]											
	12	[Bar chart showing blow counts for depth 12]											
	17	[Bar chart showing blow counts for depth 17]											
	10	[Bar chart showing blow counts for depth 10]											
	9	[Bar chart showing blow counts for depth 9]											
	13	[Bar chart showing blow counts for depth 13]											
	14	[Bar chart showing blow counts for depth 14]											
	15	[Bar chart showing blow counts for depth 15]											
	16	[Bar chart showing blow counts for depth 16]											
	17	[Bar chart showing blow counts for depth 17]											
13	18	[Bar chart showing blow counts for depth 18]											
	19	[Bar chart showing blow counts for depth 19]											
	20	[Bar chart showing blow counts for depth 20]											
	19	[Bar chart showing blow counts for depth 19]											
	18	[Bar chart showing blow counts for depth 18]											
	17	[Bar chart showing blow counts for depth 17]											
	16	[Bar chart showing blow counts for depth 16]											
	15	[Bar chart showing blow counts for depth 15]											
	14	[Bar chart showing blow counts for depth 14]											
	13	[Bar chart showing blow counts for depth 13]											

DYNAMIC PROBE DETAILS		Remarks Location is planned, unable to survey as not marked.
Test Type: DPSH-B Hammer Mass (kg): 63.5 Hammer Drop (mm): 750 Cone Diameter (mm): 50.0 Rod Diameter (mm): 35.0 Anvil Damper Type: None		
		Termination Depth: 12.20m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318569.28

Ground Level (mAOD)
26.29
Northing (OS mN)
169429.19

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20 0.05 - 0.15	B1 ES2					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)	26.09	
						Firm light orangish brown slightly sandy CLAY with one boulder of subangular limestone.		0.20		
0.90 - 1.00 0.90 - 1.00	B3 ES4							(2.30)		
1.70 - 2.00	B5									
1.90 - 2.00	ES6									
						Weak dark blueish grey MUDSTONE recovered as angular fine to coarse gravel.		2.50	23.79	
								(0.50)		
								3.00	23.29	

PLAN DETAILS

2.9
0.6

Long Axis Orientation:
NA

Shoring / Support: N/A
Stability: Stable
Groundwater (description): Not encountered

Remarks

Infiltration test conducted (SA101). Terminated on bedrock.

Termination Depth:
3.00m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318490.15

Ground Level (mAOD)
28.56
Northing (OS mN)
169393.23

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.05 - 0.15	ES2							0.20	28.36	
0.30 - 0.60	B3					Firm light orangish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of mudstone and limestone. Cobbles are angular of limestone.		(0.50)		
0.40 - 0.50	ES4							0.70	27.86	
						Weak dark blueish grey MUDSTONE recovered as angular coarse gravel.		(0.20)		
								0.90	27.66	

<p>PLAN DETAILS</p>	<p>Remarks</p> <p>Terminated on Engineer's instruction upon reaching bedrock.</p> <p>Termination Depth: 0.90m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318438.04

Ground Level (mAOD)
29.38
Northing (OS mN)
169361.56

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.05 - 0.15	ES2							0.20	29.18	
0.30 - 0.40	ES4					Firm light orangish brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are angular to subrounded of limestone.		(0.70)		
0.30 - 0.70	B3									
						Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]		0.90	28.48	

<p>PLAN DETAILS</p> <p>2.4 0.6</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A Stability: Stable Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Infiltration test conducted (SA103). Terminated on bedrock.</p> <p>Termination Depth: 0.90m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318577.70

Ground Level (mAOD)
28.09
Northing (OS mN)
169340.61

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.02 - 0.05 - 0.15	B1 ES2					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
						Firm dark blueish grey CLAY with low cobble content. Cobbles are angular to subrounded of limestone.		0.20	27.89	
0.70 - 1.00	B3									
0.90 - 1.00	ES4									
1.70 - 2.00	B5							(2.80)		
1.90 - 2.00	ES6									
2.70 - 3.00	B7									
2.90 - 3.00	ES8									
								3.00	25.09	

<p>PLAN DETAILS</p> <p>3.0 0.6</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A Stability: Stable Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on Engineer's instruction.</p> <p>Termination Depth: 3.00m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318513.14

Ground Level (mAOD)
30.67
Northing (OS mN)
169315.88

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20 0.05 - 0.15	B1 ES2					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
						Firm light orangish brown slightly sandy CLAY with low cobble content. Cobbles are angular to subrounded of limestone.		0.20	30.47	
0.90 - 1.00 0.90 - 1.30	ES4 B3									
1.70 - 2.00	B5							(2.80)		
1.90 - 2.00	ES6									
2.80 - 3.00 2.90 - 3.00	B7 ES8									
								3.00	27.67	

PLAN DETAILS	Remarks
<p>3.0 0.6</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Seepage at 0.90 mbgf</p>	<p>Terminated on Engineer's instruction.</p> <p>Termination Depth: 3.00m</p>






Project
Cosmeston Phase 2
Client
Welsh Government

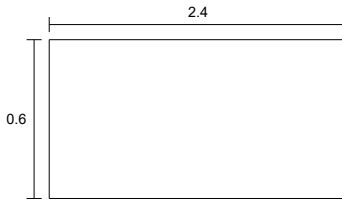
Project No.
UA008386-02
Easting (OS mE)
318461.16

Ground Level (mAOD)
32.70
Northing (OS mN)
169277.30

Start Date
13/12/2017
End Date
13/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20 0.05 - 0.15	B1 ES2					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.30 - 0.40 0.30 - 0.50	ES4 B3					Firm light orangish brown slightly sandy CLAY with medium cobble content. Cobbles are subangular of limestone.		0.20 (0.30)	32.50	
						Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]		0.50	32.20	

<p>PLAN DETAILS</p>  <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock.</p> <p>Termination Depth: 0.50m</p>
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



Project
Cosmeston Phase 2
Client
Welsh Government

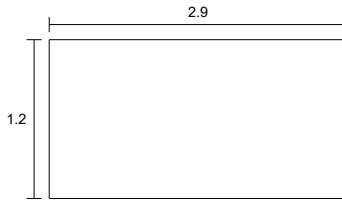
Project No.
UA008386-02
Easting (OS mE)
318487.14

Ground Level (mAOD)
33.25
Northing (OS mN)
169217.88

Start Date
12/12/2017
End Date
12/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.30	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.30)		
0.00 - 0.30	ES2									
0.30 - 0.60	B3					Firm light greyish orange slightly sandy CLAY with occasional boulders. Boulders are subangular strong grey limestone.		0.30	32.95	
0.30 - 0.60	ES4					Weak black thinly laminated MUDSTONE		(0.30)		
						Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]		0.60	32.65	

PLAN DETAILS	Remarks
 <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Terminated on bedrock.</p> <p>Termination Depth: 0.60m</p>

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318444.84

Ground Level (mAOD)
33.73
Northing (OS mN)
169173.23

Start Date
15/12/2017
End Date
15/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.05 - 0.15	ES2							0.20	33.53	
0.30 - 0.70	B3					Firm light orangeish brown slightly sandy CLAY with low cobble content. Cobbles are angular to subangular of limestone.		(0.52)		
0.50 - 0.60	ES4							0.72 (0.08) 0.80	33.01 32.93 32.93	
						Weak dark blueish grey finely laminated MUDSTONE.				
						Strong light grey LIMESTONE [ST MARY'S WELL BAY MEMBER]				

<p>PLAN DETAILS</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock.</p> <p>Termination Depth: 0.80m</p>
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




Project
Cosmeston Phase 2
Client
Welsh Government

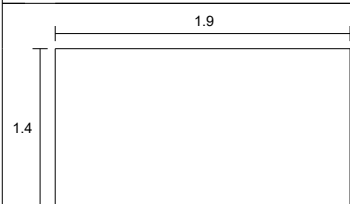
Project No.
UA008386-02
Easting (OS mE)
318512.21

Ground Level (mAOD)
34.60
Northing (OS mN)
169140.85

Start Date
12/12/2017
End Date
12/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.25)		
0.05 - 0.15	ES2									
0.30	B3					Firm light greyish orange slightly sandy CLAY with low cobble content. Cobbles are angular to subangular fine to coarse of limestone.		0.25	34.35	
0.30	ES4					Strong light grey LIMESTONE.		(0.15)		
								0.40	34.20	

<p>PLAN DETAILS</p>  <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock.</p> <p>Termination Depth: 0.40m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318561.84

Ground Level (mAOD)
34.16
Northing (OS mN)
169148.13

Start Date
12/12/2017
End Date
12/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.05 - 0.10	ES2					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.10 - 0.20	B1					Firm light brownish gray slightly sandy CLAY.		0.20	33.96	
0.30 - 0.70	B3							(0.60)		
0.60 - 0.70	ES4					Light orange slightly clayey SAND.		0.80	33.36	
						Strong light grey LIMESTONE.		(0.15)		
						Firm light brownish grey slightly sandy CLAY.		0.95	33.21	
								1.00	33.16	
1.60 - 2.00	B5							(1.60)		
1.90 - 2.00	ES6									
2.70 - 3.00	B7					Weak black thinly laminated slightly sandy MUDSTONE.		2.60	31.56	
2.90 - 3.00	ES8							(0.40)		
								3.00	31.16	

<p>PLAN DETAILS</p> <p>3.3 1.2</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A Stability: Stable Groundwater (description): Not encountered</p>	<p>Remarks</p> <p>Terminated on bedrock.</p> <p>Termination Depth: 3.00m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318535.05

Ground Level (mAOD)
36.36
Northing (OS mN)
169062.94

Start Date
12/12/2017
End Date
12/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.20)		
0.05 - 0.15	ES2					Firm light orangish grey slightly sandy CLAY.		0.20	36.16	
0.70 - 1.20	B3							(1.10)		
0.90 - 1.00	ES4									
2.00 - 2.40	B5					Brownish orange clayey SAND.		1.30	35.06	
2.10 - 2.20	ES6					Strong light grey LIMESTONE.		(0.15)	34.91	
						Firm light orangish grey sandy CLAY.		(0.25)	34.66	
								1.70		
2.80 - 3.00	B7					Weak black thinly laminated sandy MUDSTONE.		(0.90)		
2.90 - 3.00	ES8							2.60	33.76	
								(0.40)		
								3.00	33.36	

<p>PLAN DETAILS</p>	<p>Remarks</p> <p>Terminated on bedrock.</p> <p>Termination Depth: 3.00m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318439.74

Ground Level (mAOD)
33.74
Northing (OS mN)
168988.51

Start Date
14/12/2017
End Date
14/11/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.10	ES2							(0.15)		
0.00 - 0.15	B1							0.15	33.59	
0.20 - 0.70	B3									
0.30 - 0.40	ES4									
					▼			(0.95)		
						Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]		1.10	32.64 32.64	

PLAN DETAILS 		Long Axis Orientation: NA Shoring / Support: N/A Stability: Stable Groundwater (description): Seepage at 0.50 m bgl	Remarks Groundwater at 0.50m bgl and 1.10 m bgl. Water risen 430mm in 15 minutes. Soakaway with 0.8m of water (see Soakaway sheets for details). Terminated on bedrock.
			Termination Depth: 1.10m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318442.26

Ground Level (mAOD)
34.26
Northing (OS mN)
169099.06

Start Date
14/12/2017
End Date
14/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.25	B1					Soft dark brown sandy CLAY.		(0.30)		
0.10 - 0.20	ES2									
0.30 - 0.50	B3					Firm light orangeish brown slightly sandy CLAY with low cobble content. Cobbles are angular to subangular fine to coarse of limestone.		0.30	33.96	
0.35 - 0.45	ES4				▼	Weak dark blueish grey MUDSTONE. [ST MARY'S WELL BAY MEMBER]		(0.20)		
								0.50	33.76	
									33.76	

<p>PLAN DETAILS</p> <p>Long Axis Orientation: NA</p> <p>Shoring / Support: N/A</p> <p>Stability: Stable</p> <p>Groundwater (description): Seepage at 0.50 mbgl</p>	<p>Remarks</p> <p>Terminated on bedrock. Groundwater encountered at 0.50 m bgl</p> <p>Termination Depth: 0.50m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318392.22

Ground Level (mAOD)
31.97
Northing (OS mN)
169126.98

Start Date
14/12/2017
End Date
14/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark brown sandy CLAY.		(0.28)		
0.10 - 0.20	ES2					Firm light orangeish greyish brown CLAY with low cobble content. Cobbles are angular to subangular fine to coarse of limestone.		0.28	31.69	
						Band of strong light grey limestone cobbles				
0.70 - 1.10	B3							(1.02)		
0.90 - 1.10	ES4									
					▼	Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]		1.30	30.67 30.67	

<p>PLAN DETAILS</p>	<p>Remarks</p> <p>Terminated on bedrock. Groundwater encountered at 1.30 m bgl</p> <p>Termination Depth: 1.30m</p>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318360.77

Ground Level (mAOD)
30.66
Northing (OS mN)
169224.25

Start Date
14/12/2017
End Date
14/12/2017

Scale
1:25
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill	
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend				
0.00 - 0.10	ES2				▼	Soft dark brown sandy CLAY.		(0.15)	30.51		
0.00 - 0.15	B1					Firm light orangeish brown sandy CLAY with low cobble content. Cobbles are angular to subangular fine to coarse of limestone.					0.15
0.20 - 0.60	B3										(0.55)
0.30 - 0.40	ES4					Strong light grey LIMESTONE. [ST MARY'S WELL BAY MEMBER]					

<p>PLAN DETAILS</p> <p>2.5 Long Axis Orientation: NA Shoring / Support: N/A Stability: Stable Groundwater (description): Seepage at 0.60 m bgl</p>	<p>Remarks</p> <p>Terminated on bedrock. Groundwater encountered at 0.60 m bgl</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-left: auto;"> <p>Termination Depth: 0.70m</p> </div>
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Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318577.58

Ground Level (mAOD)
31.20
Northing (OS mN)
169213.43

Start Date
11/12/2017
End Date
11/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 - 0.25 0.10 - 0.20	B4 ES5					MADE GROUND: Soft to firm dark grey sandy CLAY.		(0.20)	31.00	
0.40 - 0.90 0.50	B6 B1					Firm yellow brown sandy CLAY		0.20 (0.20)	30.80	
0.70 - 0.80	ES7					Firm to stiff grey mottled light brown sandy CLAY		0.40		
1.00	B2	1.00	SPT(S)	N=13 (1,2/3,3,3,4)				(1.75)		
1.80	B3	2.00	SPT(S)	N=50 (3,5/10,13,17,10)						
						Very stiff dark grey CLAY		2.15 (0.30)	29.05	
								2.45	28.75	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit							128	1.00	128	1.00	0.00	0.20	Concrete
1.20	2.45	Dynamic Sample							87	2.45			0.20	0.45	Bentonite
													0.45	2.45	Gravel

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
2.45m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318413.26

Ground Level (mAOD)
29.78
Northing (OS mN)
169260.15

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark reddish brown slightly sandy CLAY.		(0.20)	29.58	
0.05 - 0.15	ES2					Reddish brown slightly sandy CLAY.		0.20		
0.20 - 0.40	B3							(0.20)	29.38	
0.25 - 0.35	ES4							0.40		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.40	Dynamic Sample Inspection Pit											0.00	0.40	Bentonite

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
0.40m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318399.78

Ground Level (mAOD)
28.72
Northing (OS mN)
169306.84

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Dark reddish brown sandy CLAY.		(0.27)		
0.10 - 0.20	ES2							0.27	28.45	
0.30 - 0.50	B3					Firm reddish brown sandy CLAY		(0.23)		
0.35 - 0.45	ES4							0.50	28.22	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.50	Inspection Pit Dynamic Sample											0.00	0.50	Bentonite

Remarks
Terminated on refusal. No groundwater encountered

Termination Depth:
0.50m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318477.47

Ground Level (mAOD)
34.21
Northing (OS mN)
169017.95

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill	
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend				
0.00 - 0.20	B1					MADE GROUND: Soft dark reddish brown sandy CLAY (POSSIBLE REWORKED NATURAL)		(0.30)	33.91		
0.00 - 0.20	ES2					Stiff light greyish green slightly sandy CLAY.		0.30			
0.30 - 0.90	B3										
0.50 - 0.70	ES4										
		1.00	SPT(S)	N=20 (2,6/6,5,5,4)				(1.10)			
1.20	D5					Weak light grey LIMESTOME (ST MARY'S WELL BAY MEMBER)		1.40	32.81 32.76		
1.20 - 1.40	B7										
1.40 - 1.45	D8										
1.45	D6							1.45			SPT(S)

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit Dynamic Sample							128	1.45	128	1.45	0.00	0.20	Concrete
													0.20	0.50	Bentonite
													0.50	1.45	Gravel

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
1.45m



Unless otherwise stated:
Depth (m), Diameter(mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Competitor Dart

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
WB

Checked By
SH


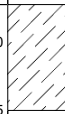



Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318410.66

Ground Level (mAOD)
32.45
Northing (OS mN)
169090.18

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark reddish brown sandy CLAY (POSSIBLE REWORKED NATURAL)		(0.25)	32.20	
0.00 - 0.20	ES2					Firm light greyish green slightly sandy CLAY with low cobble content. Cobbles are subangular of limestone.		0.25		
0.30 - 0.70	B3							(0.45)		
0.40 - 0.60	ES4					Weak light grey LIMESTONE		0.70		
									31.75	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.70	Dynamic Sample Inspection Pit											0.00	0.70	Bentonite

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
0.70m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318344.44

Ground Level (mAOD)
30.61
Northing (OS mN)
169100.49

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 - 0.20	B1					MADE GROUND: Soft dark reddish brown sandy CLAY.		(0.20)	30.41	
0.00 - 0.20	ES2					Firm light greyish and green slightly sandy CLAY.		0.20		
0.30 - 0.40	B3					Weak light grey LIMESTONE.		(0.20)		
0.30 - 0.40	ES4					[ST MARY'S WELL BAY MEMBER]		0.40		

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.40	Inspection Pit Dynamic Sample											0.00	0.40	Bentonite

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
0.40m

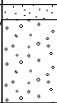

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318235.17

Ground Level (mAOD)
26.05
Northing (OS mN)
169092.69

Start Date
07/12/2017
End Date
07/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.00 - 0.10 0.00 - 0.10	B1 ES2					MADE GROUND: Dark brownish grey gravelly SAND. Gravel is subangular fine to coarse of mixed lithologies. Brown subangular to subrounded fine to coarse GRAVEL of mixed lithologies.		0.10 (0.55) 0.65	25.95 25.40	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.10	Inspection Pit Dynamic Sample											0.00	0.65	Bentonite

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
0.65m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318279.59

Ground Level (mAOD)
29.28
Northing (OS mN)
169079.52

Start Date
07/12/2017
End Date
07/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.10 - 0.30	B1							(0.30)		
0.10 - 0.30	ES2							0.30	28.98	
0.30 - 0.50	B3							(0.20)		
								0.50	28.78	
0.50	B4	0.50	PID	<1ppm				(0.30)		
								0.80	28.48	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	0.80	Inspection Pit Dynamic Sample											0.00	0.80	Arisings

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
0.80m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318291.09

Ground Level (mAOD)
30.94
Northing (OS mN)
169036.48

Start Date
07/12/2017
End Date
07/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.10 - 0.20	B1	0.60	PID	<1ppm		MADE GROUND: Dark reddish brown slightly clayey SAND.		(0.25)	30.69	
0.10 - 0.20	ES2					Dark brownish red slightly sandy CLAY.		(0.25)		
0.30 - 0.50	B3					MADE GROUND: LANDFILL WASTE constituting of plastic bags, plastic fragments and glass fragments.		(0.25)		
0.30 - 0.50	ES4							0.50		
0.80 - 1.00	D5							(0.70)	30.44	
								1.20	29.74	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit											0.00	0.20	Concrete
													0.20	0.50	Bentonite
													0.50	1.20	Gravel

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
1.20m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318337.70

Ground Level (mAOD)
31.60
Northing (OS mN)
169041.98

Start Date
07/12/2017
End Date
07/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/ Backfill
Depth	Type/ No.	Depth	Type/ No.	Results		Description	Legend			
0.10 0.10	B1 ES2					MADE GROUND: Dark grey brown gravelly SAND. Gravel is subangular fine to coarse of mixed lithologies.		(0.50)		
0.50 - 0.70 0.50 - 0.70	B3 ES4	0.70	PID	<1ppm		Light grey sandy subangular fine to coarse GRAVEL of mixed lithologies.		0.50 (0.20) 0.70	31.10 30.90	
						MADE GROUND: LANDFILL WASTE constituting of plastic bags, plastic fragments and glass fragments.		(2.30)		
								3.00	28.60	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit							87	3.00	128	1.00	0.00	0.20	Concrete
1.20	3.00	Dynamic Sample											0.20	0.50	Arisings
													0.50	1.00	Bentonite
													1.00	3.00	Gravel

Remarks
Terminated on Engineer's instruction. No groundwater encountered.

Termination Depth:
3.00m

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318358.83

Ground Level (mAOD)
33.71
Northing (OS mN)
168952.44

Start Date
07/12/2017
End Date
07/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.10 - 0.20	B1					MADE GROUND: Dark reddish brown slightly clayey SAND.		(0.20)	33.51	
0.10 - 0.20	ES2					Stiff light greenish grey slightly sandy CLAY.		0.20		
0.30 - 0.40	ES4							(0.45)		
0.30 - 0.60	B3					MADE GROUND: LANDFILL WASTE constituting of plastic bags, plastic fragments and glass fragments.		0.65	33.06	
1.10	EW	1.30	PID	<1ppm	▼			(0.65)		
								1.30	32.41	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.20	Inspection Pit		1.30					128	1.30	128	1.30	0.00	0.20	Concrete
1.20	1.30	Dynamic Sample											0.20	0.50	Arisings
													0.50	0.75	Bentonite
													0.75	1.30	Gravel

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
1.30m



Unless otherwise stated:
Depth (m), Diameter(mm), Time (hhmm),
Thickness (m), Level (mOD).

Equipment Used
Hand tools

Contractor
Arcadis Consulting (UK) Ltd.

Logged By
WB

Checked By
SH

Project
Cosmeston Phase 2
Client
Welsh Government

Project No.
UA008386-02
Easting (OS mE)
318299.72

Ground Level (mAOD)
21.93
Northing (OS mN)
169255.40

Start Date
08/12/2017
End Date
08/12/2017

Scale
1:50
Sheet 1 of 1

SAMPLES		TESTS			Water Strikes	STRATA		Depth (Thickness)	Level	Install/Backfill
Depth	Type/No.	Depth	Type/No.	Results		Description	Legend			
0.00 - 0.20	B1					Dark brownish black pseudo-fibrous PEAT.		(0.25)		
0.00 - 0.20	ES2					Light greyish green slightly clayey gravelly SAND with medium cobble content. Gravel is subangular fine to coarse of limestone. Cobbles are subangular of limestone.		0.25	21.68	
0.30 - 0.50	B3							(0.70)		
0.30 - 0.50	ES4							0.95	20.98	
						Dark brown and black MUDSTONE. [ST MARY'S WELL BAY MEMBER]		1.00	20.93	

DRILLING TECHNIQUE			WATER OBSERVATIONS						HOLE/CASING DIAMETER				BACKFILL		
From	To	Technique	Date/Time	Strike At	Time Elapsed	Rise To	Casing	Sealed	Hole Dia.	Depth	Casing Dia.	Depth	Top	Base	Backfill
0.00	1.00	Inspection Pit											0.00	1.00	Arisings

Remarks
Terminated on refusal. No groundwater encountered.

Termination Depth:
1.00m

ARCADIS Dynamic Sampling Photography

Project Cosmeston Farm					Exploratory Hole ID WS01
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 22.893	Easting (OS) 318216.878	Northing (OS) 169176.468	



(WS01 1.00-3.00 m)



(Gas and groundwater monitoring flush cover)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID WS03
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 26.149	Easting (OS) 318133.314	Northing (OS) 168990.041	



(WS03 1.20 - 3.00 m)



(Gas and groundwater monitoring flush cover)

Client Welsh Government	Checker IP	Approver JV
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ARCADIS Dynamic Sampling Photography

Project Cosmeston Farm					Exploratory Hole ID WS04
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 18.549	Easting (OS) 317974.718	Northing (OS) 168855.458	



(WS04 GL- 0.40 m Pit)



(WS04 0.4 m with SPT into bedrock)

Client Welsh Government	Checker IP	Approver JV
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ARCADIS Dynamic Sampling Photography

Project Cosmeston Farm					Exploratory Hole ID WS05
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 318046.903	Easting (OS) 169064.566	Northing (OS) 16.338	



(WS05 GL – 0.60 m Pit)



(WS05 0.6 m with SPT into bedrock)

Client Welsh Government	Checker IP	Approver JV
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ARCADIS Dynamic Sampling Photography

Project Cosmeston Farm					Exploratory Hole ID WS06
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 14.036	Easting (OS) 317965.759	Northing (OS) 168990.835	



(WS06 Pit GL-0.6 m Pit)



(WS06 0.6 m with SPT into bedrock)

Client Welsh Government	Checker IP	Approver JV
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ARCADIS Dynamic Sampling Photography

Project Cosmeston Farm					Exploratory Hole ID WS07
Job No UA008386	Date 05/09/16	Ground Level (mAOD) 16.767	Easting (OS) 317881.799	Northing (OS) 168832.609	



(WS07 GL-0.5 m Pit)



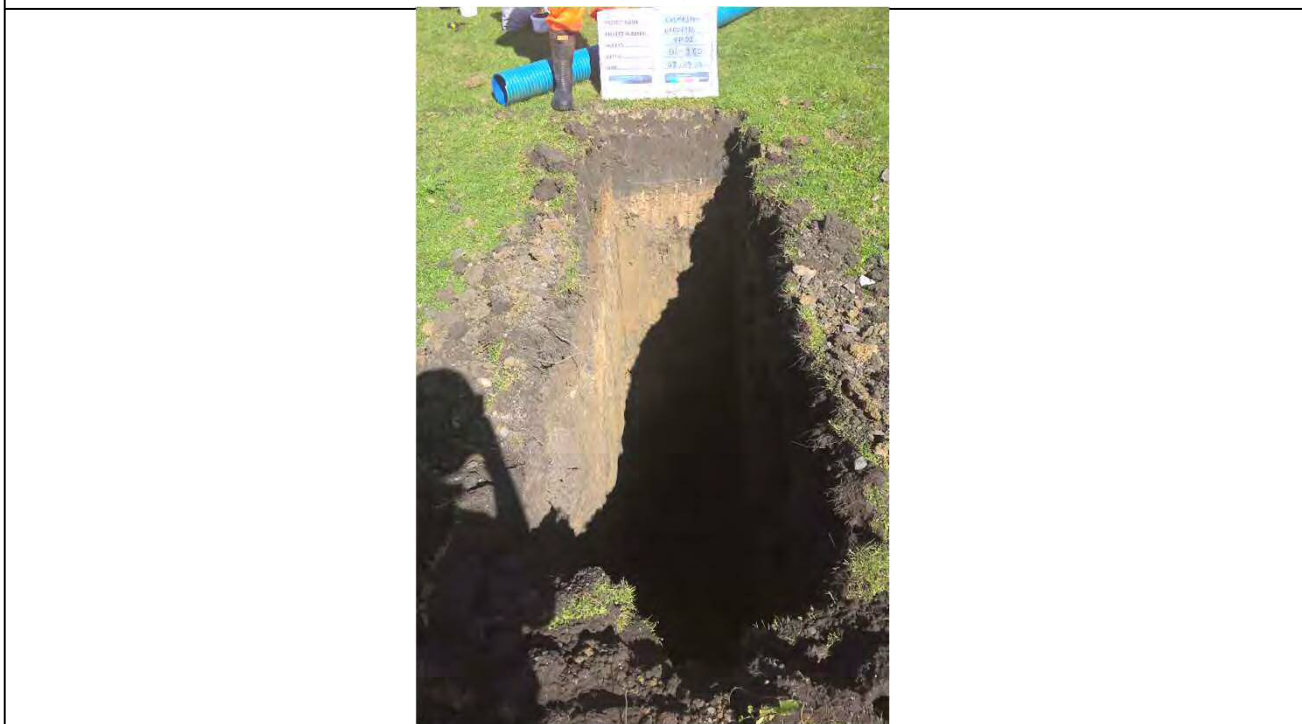
(WS07 0.5 m Pit with SPT into bedrock)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP02
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 19.079	Easting (OS) 318164.82	Northing (OS) 169230.889	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP02
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 19.079	Easting (OS) 318164.82	Northing (OS) 169230.889	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm				Exploratory Hole ID TP02	
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 19.079	Easting (OS) 318164.82	Northing (OS) 169230.889	



(Pit base)



(Topsoil Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP02
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 19.079	Easting (OS) 318164.82	Northing (OS) 169230.889	



(0.4-3.5 m Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP03
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 20.514	Easting (OS) 318154.371	Northing (OS) 169170.188	



(Face A)



(Face A)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP03
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 20.514	Easting (OS) 318154.371	Northing (OS) 169170.188	



(Face B)



(Face C)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP03
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 20.514	Easting (OS) 318154.371	Northing (OS) 169170.188	



(Face D)



(Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm				Exploratory Hole ID TP03	
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 20.514	Easting (OS) 318154.371	Northing (OS) 169170.188	



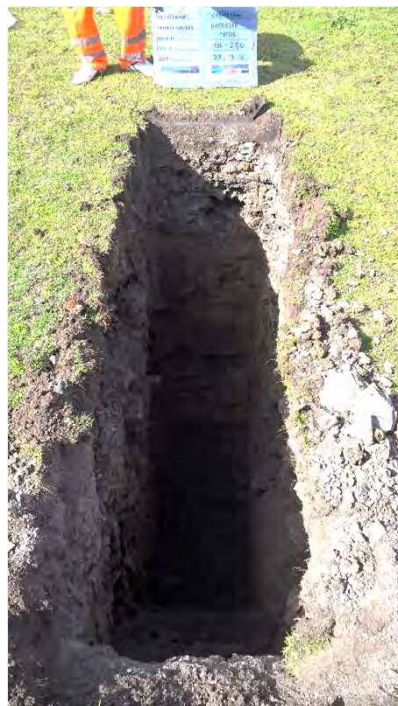
(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP04
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 23.89	Easting (OS) 318218.107	Northing (OS) 169149.796	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP04
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 23.89	Easting (OS) 318218.107	Northing (OS) 169149.796	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP04
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 23.89	Easting (OS) 318218.107	Northing (OS) 169149.796	



(Base of pit)



(Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm				Exploratory Hole ID TP04	
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 23.89	Easting (OS) 318218.107	Northing (OS) 169149.796	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP05
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 24.68	Easting (OS) 318148.505	Northing (OS) 169040.964	



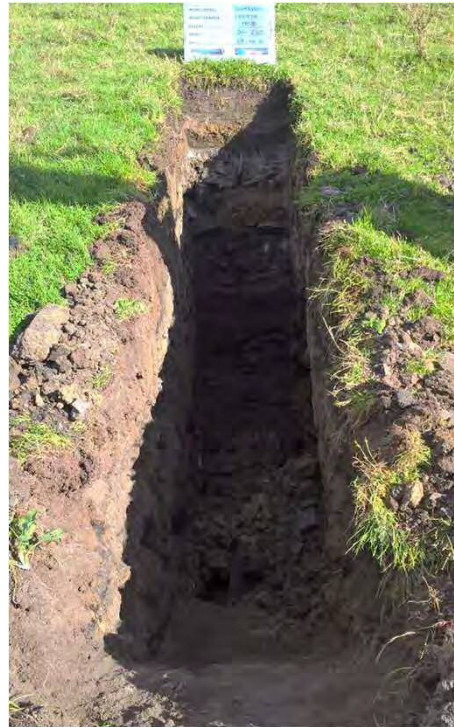
(Face A)



(Face A)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP05
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 24.68	Easting (OS) 318148.505	Northing (OS) 169040.964	



(Face B)



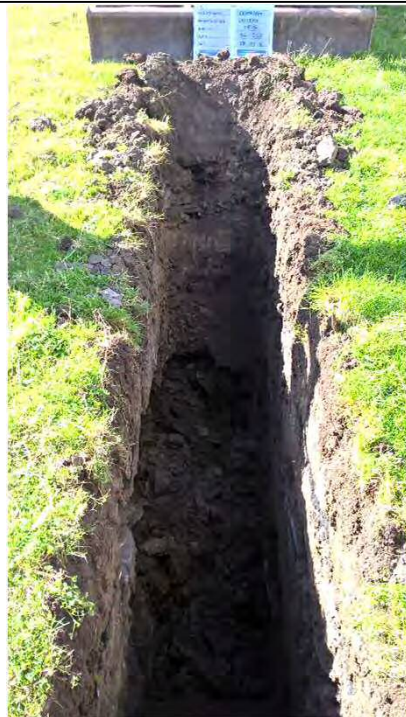
(Face C)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP05
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 24.68	Easting (OS) 318148.505	Northing (OS) 169040.964	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP05
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 24.68	Easting (OS) 318148.505	Northing (OS) 169040.964	



(Base of pit)



(Topsoil spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP05
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 24.68	Easting (OS) 318148.505	Northing (OS) 169040.964	



(0.4 – 2.1 m Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP06
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 26.754	Easting (OS) 318120.814	Northing (OS) 168957.698	



(Face A)



(Face A)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmesto Farm					Exploratory Hole ID TP06
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 26.754	Easting (OS) 318120.814	Northing (OS) 168957.698	



(Face B)



(Face C)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP06
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 26.754	Easting (OS) 318120.814	Northing (OS) 168957.698	



(Face D)



(Topsoil Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP06
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 26.754	Easting (OS) 318120.814	Northing (OS) 168957.698	



(0.3-1.0 m Spoil)



(1.0-1.9 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP06
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 26.754	Easting (OS) 318120.814	Northing (OS) 168957.698	



(1.9-2.9 m Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP07
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 17.776	Easting (OS) 318082.723	Northing (OS) 169130.107	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston					Exploratory Hole ID TP07
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 17.776	Easting (OS) 318082.723	Northing (OS) 169130.07	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP07
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 17.776	Easting (OS) 318082.723	Northing (OS) 169130.107	



(Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP08
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 13.981	Easting (OS) 318000.873	Northing (OS) 169130.659	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP08
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 13.981	Easting (OS) 318000.873	Northing (OS) 169130.659	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP08
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 13.981	Easting (OS) 318000.873	Northing (OS) 169130.659	



(Base of pit)



(GL-0.3 m Spoil)

Client Welsh Government	Checker OP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP08
Job No UA008386	Date 08/09/16	Ground Level (mAOD) 13.981	Easting (OS) 318000.873	Northing (OS) 169130.659	



(0.3-0.6 Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP09
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 14.522	Easting (OS) 317993.688	Northing (OS) 169072.995	



(Face A)



(Face B)

Client	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP09
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 14.522	Easting (OS) 317993.688	Northing (OS) 169072.995	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP09
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 14.522	Easting (OS) 317993.688	Northing (OS) 169072.995	



(Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver
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Project Cosmeston Farm					Exploratory Hole ID TP10
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.238	Easting (OS) 318002.874	Northing (OS) 168997.867	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP10
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.238	Easting (OS) 318002.874	Northing (OS) 168997.867	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP10
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.238	Easting (OS) 318002.874	Northing (OS) 168997.867	



(Pit base – Bedrock)



(Topsoil Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP10
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.238	Easting (OS) 318002.874	Northing (OS) 168997.867	



(0.3 - 0.5 m Spoil)



(0.75 – 1.1 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP10
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.238	Easting (OS) 318002.874	Northing (OS) 168997.867	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP11
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 19.096	Easting (OS) 318030.07	Northing (OS) 168947.07	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP11
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 19.096	Easting (OS) 318030.07	Northing (OS) 168947.07	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver
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Project Cosmeston Farm					Exploratory Hole ID TP11
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 19.096	Easting (OS) 318030.07	Northing (OS) 168947.07	



(Pit base – Bedrock)



(Topsoil Spoil)

Client Welsh Government	Checker IP	Approver JV
----------------------------	---------------	----------------

Project Cosmeston					Exploratory Hole ID TP11
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 19.096	Easting (OS) 318030.07	Northing (OS) 168947.07	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm				Exploratory Hole ID TP12
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.425	Easting (OS) 317974.282	Northing (OS) 168964.178



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP12
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.425	Easting (OS) 317974.282	Northing (OS) 168964.178	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
----------------------------	---------------	----------------

Project Cosmesto Farm					Exploratory Hole ID TP12
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.425	Easting (OS) 317974.282	Northing (OS) 168964.178	



(Pit base - Bedrock)



(Topsoil Spoil)

Client Welsh Government	Checker IP	Approver JV
----------------------------	---------------	----------------

Project Cosmeston Farm					Exploratory Hole ID TP12
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.425	Easting (OS) 317974.282	Northing (OS) 168964.178	



(0.3 – 0.5 m Spoil)



(0.6 – 0.7 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP12
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.425	Easting (OS) 317974.282	Northing (OS) 168964.178	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP13
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.509	Easting (OS) 317981.972	Northing (OS) 168922.5	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP13
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.509	Easting (OS) 317981.972	Northing (OS) 168922.5	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP13
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.509	Easting (OS) 317981.972	Northing (OS) 168922.5	



(Topsoil Spoil)



(0.6 – 1.2 Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP13
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.509	Easting (OS) 317981.972	Northing (OS) 168922.5	



(Backfill)



Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP14
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.549	Easting (OS) 317974.718	Northing (OS) 168855.458	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP14
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.549	Easting (OS) 317974.718	Northing (OS) 168855.458	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP14
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.549	Easting (OS) 317974.718	Northing (OS) 168855.458	



(Topsoil Spoil)



(0.3 – 1.5 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston				Exploratory Hole ID TP14	
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.549	Easting (OS) 317974.718	Northing (OS) 168855.458	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP15
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 20.081	Easting (OS) 318020.777	Northing (OS) 168873.457	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP15
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 20.081	Easting (OS) 318020.777	Northing (OS) 168873.457	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston					Exploratory Hole ID TP15
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 20.081	Easting (OS) 318020.777	Northing (OS) 168873.457	



(Topsoil Spoil)



(0.2 – 1.2 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP15
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 20.081	Easting (OS) 318020.777	Northing (OS) 168873.457	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP16
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.35	Easting (OS) 317924.545	Northing (OS) 168824.196	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP16
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.35	Easting (OS) 317924.545	Northing (OS) 168824.196	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP16
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.35	Easting (OS) 317924.545	Northing (OS) 168824.196	



(Topsoil Spoil)



(0.3 – 0.9 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP16
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 17.35	Easting (OS) 317924.545	Northing (OS) 168824.196	



(0.9 – 1.4 m Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP17
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.798	Easting (OS) 317895.013	Northing (OS) 168779.367	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP17
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.798	Easting (OS) 317895.013	Northing (OS) 168779.367	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP17
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.798	Easting (OS) 317895.013	Northing (OS) 168779.367	



(Topsoil Spoil)



(0.3 – 1.6 Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston					Exploratory Hole ID TP17
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 18.798	Easting (OS) 317895.013	Northing (OS) 168779.367	



(1.6 – 2.2 Spoil)



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP18
Job No UA008386	Date 06/09/16	Ground Level (mAOD) 15.471	Easting (OS) 317869.45	Northing (OS) 168873.667	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP18
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 15.471	Easting (OS) 317869.45	Northing (OS) 168873.667	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP18
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 15.471	Easting (OS) 317869.45	Northing (OS) 168873.667	



(Topsoil Spoil)



(0.3 – 0.9 m Topsoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP18
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 15.471	Easting (OS) 317869.45	Northing (OS) 168873.667	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP19
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 14.54	Easting (OS) 317814.163	Northing (OS) 168898.895	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP19
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 14.54	Easting (OS) 317814.163	Northing (OS) 168898.895	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP19
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 14.54	Easting (OS) 317814.163	Northing (OS) 168898.895	



(Topsoil Spoil)



(0.3 – 0.6 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP19
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 14.54	Easting (OS) 317814.163	Northing (OS) 168898.895	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP20
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 16.35	Easting (OS) 317826.921	Northing (OS) 168843.354	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP20
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 16.35	Easting (OS) 317826.921	Northing (OS) 168843.354	



(Face C)



(Face D)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP20
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 16.35	Easting (OS) 317826.921	Northing (OS) 168843.354	



(Topsoil Spoil)



(0.3 – 1.6 m Spoil)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP20
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 16.35	Easting (OS) 317826.921	Northing (OS) 168843.354	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP21
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 13.884	Easting (OS) 317839.664	Northing (OS) 168916.938	



(Face A)



(Face B)

Client Welsh Government	Checker IP	Approver JV
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Project Cosmeston Farm					Exploratory Hole ID TP21
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 13.884	Easting (OS) 317839.664	Northing (OS) 168916.938	



(Topsoil Spoil)



(0.3 – 0.55 m Spoil)

Client Welsh Government	Checker IP	Approver
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Project Cosmeston Farm				Exploratory Hole ID TP21	
Job No UA008386	Date 07/09/16	Ground Level (mAOD) 13.884	Easting (OS) 317839.664	Northing (OS) 168916.938	



(Backfill)

Client Welsh Government	Checker IP	Approver JV
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ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
Client
Welsh Government

Job No
10011193
Easting (OS mE)
318569.28

Ground Level (mAOD)
26.29
Northing (OS mN)
169429.19

Start Date
13/12/17
End Date
13/12/17

Hole ID
TP101



TP101 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318490.15

Ground Level (mAOD)
28.56
 Northing (OS mN)
169393.23

Start Date
13/12/17
 End Date
13/12/17

Hole ID
TP102



TP102 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318438.04

Ground Level (mAOD)
29.38
 Northing (OS mN)
169361.56

Start Date
13/12/17
 End Date
13/12/17

Hole ID
TP103



TP103 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318577.70

Ground Level (mAOD)
28.09
 Northing (OS mN)
169340.61

Start Date
13/12/17
 End Date
13/12/17

Hole ID
TP104



TP104 – Longwall Face B



TP104 – Longwall Face B and Spoil

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318513.14

Ground Level (mAOD)
30.67
 Northing (OS mN)
169315.88

Start Date
13/12/17
 End Date
13/12/17

Hole ID
TP105



TP105 – Longwall Face B



TP105 – Longwall Face B and Spoil

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318461.16

Ground Level (mAOD)
32.70
 Northing (OS mN)
169277.30

Start Date
13/12/17
 End Date
13/12/17

Hole ID
TP106



TP106 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318487.14

Ground Level (mAOD)
33.25
 Northing (OS mN)
169217.88

Start Date
12/12/17
 End Date
12/12/17

Hole ID
TP107



TP107 – Longwall Face B



TP107 – Spoil Pile

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318444.84

Ground Level (mAOD)
33.73
 Northing (OS mN)
169173.23

Start Date
15/12/17
 End Date
15/12/17

Hole ID
TP108



TP108 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318512.21

Ground Level (mAOD)
34.60
 Northing (OS mN)
169140.85

Start Date
12/12/17
 End Date
12/12/17

Hole ID
TP109



TP109 – Longwall Face B

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318561.84

Ground Level (mAOD)
34.16
 Northing (OS mN)
169148.13

Start Date
12/12/17
 End Date
12/12/17

Hole ID
TP110



TP110 – Longwall Face B and Spoil Pile



TP110 – Shortwall Face C

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318535.05

Ground Level (mAOD)
36.36
 Northing (OS mN)
169062.94

Start Date
12/12/17
 End Date
12/12/17

Hole ID
TP111



TP111 – Longwall Face B



TP111 – Shortwall Face C

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318535.05

Ground Level (mAOD)
36.36
 Northing (OS mN)
169062.94

Start Date
12/12/17
 End Date
12/12/17

Hole ID
TP111



TP111 – Spoil Pile

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
Client
Welsh Government

Job No
10011193
Easting (OS mE)
318439.74

Ground Level (mAOD)
33.74
Northing (OS mN)
168988.51

Start Date
14/12/17
End Date
14/12/17

Hole ID
TP112



TP112 – Longwall Face C (after 5 minutes of open pit)

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318442.26

Ground Level (mAOD)
34.26
 Northing (OS mN)
169099.06

Start Date
14/12/17
 End Date
14/12/17

Hole ID
TP113



TP113 – Longwall Face C

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318392.22

Ground Level (mAOD)
31.97
 Northing (OS mN)
169126.98

Start Date
14/12/17
 End Date
14/12/17

Hole ID
TP114



TP114 – Longwall Face C

ARCADIS Trial Pit Photography Sheet

Project
Cosmeston
 Client
Welsh Government

Job No
10011193
 Easting (OS mE)
318360.77

Ground Level (mAOD)
30.66
 Northing (OS mN)
169224.25

Start Date
14/12/17
 End Date
14/12/17

Hole ID
TP115



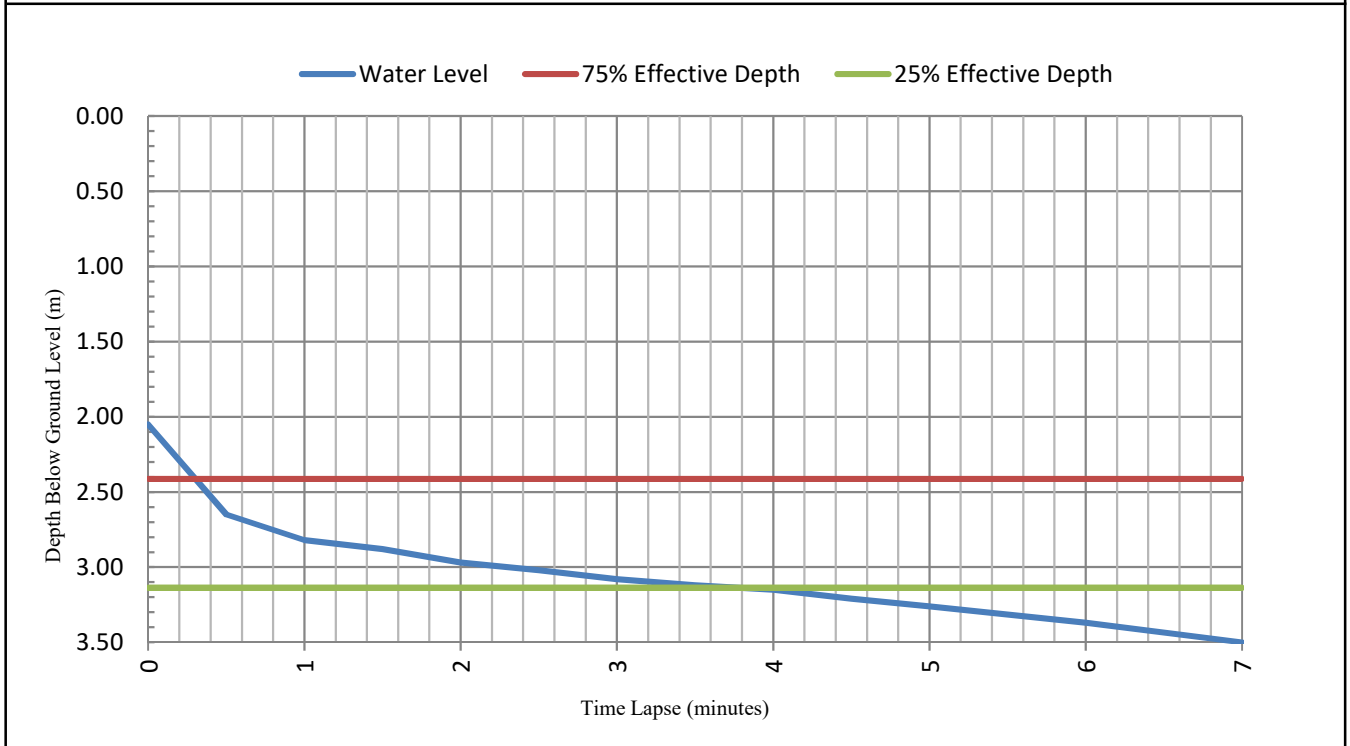
TP115 – Longwall Face C

SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP02 - SA Cycle 1
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 19.08	Co-Ordinates Easting: 318164.82 Northing: 169230.89	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.20	Length	3.20
Width	0.80	Width	0.80
Depth	3.50	Depth	3.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	2.05		
0.5	2.65		
1	2.82		
1.5	2.88		
2	2.97		
2.5	3.02		
3	3.08		
3.5	3.12		
4	3.15		
4.5	3.21		
5	3.26		
6	3.37		
7	3.50		



Soil Infiltration Rate, f , = 9.86×10^{-3}

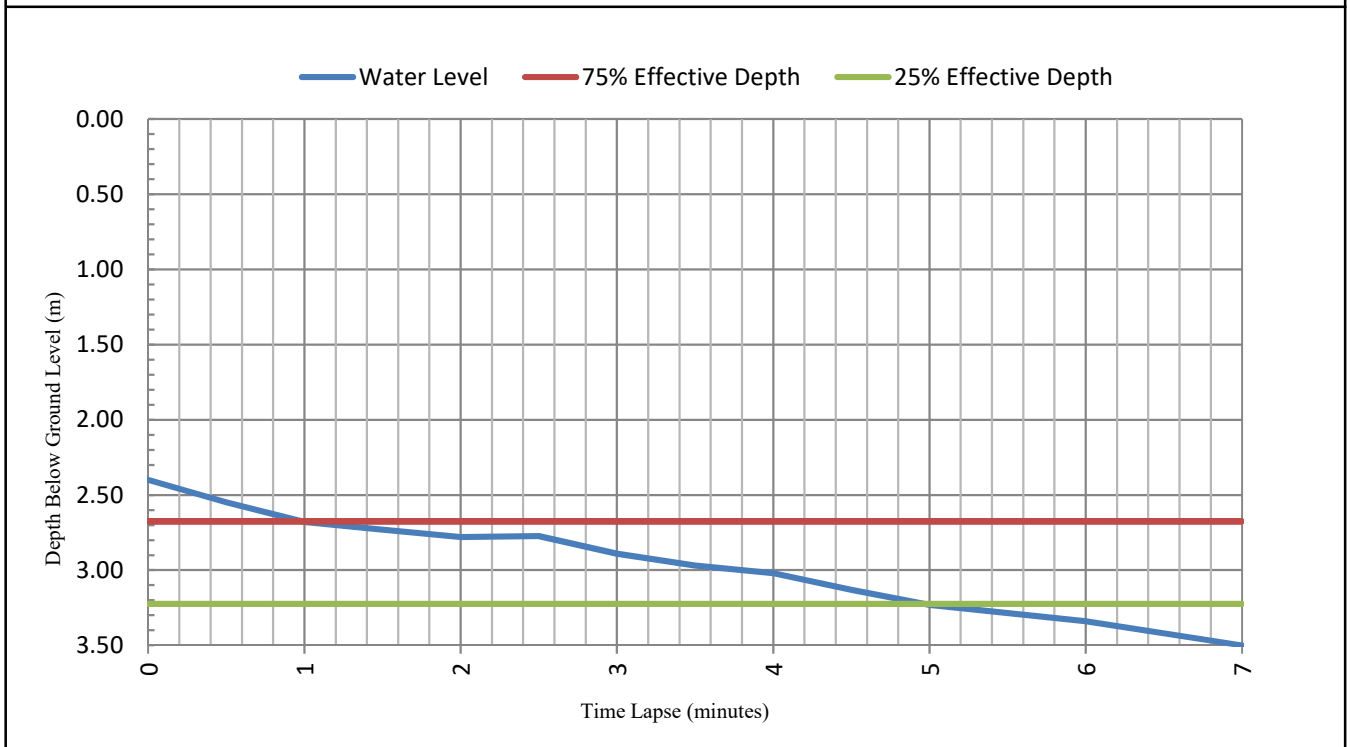
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 19.08	Co-Ordinates Easting: 318164.82 Northing: 169230.89	TP02 - SA Cycle 2

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.20	Length	3.20
Width	0.80	Width	0.80
Depth	3.50	Depth	3.50

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	2.40		
0.5	2.55		
1	2.68		
1.5	2.73		
2	2.78		
2.5	2.77		
3	2.89		
3.5	2.97		
4	3.02		
4.5	3.13		
5	3.23		
6	3.34		
7	3.50		



Soil Infiltration Rate, f , = 1.34×10^{-3}

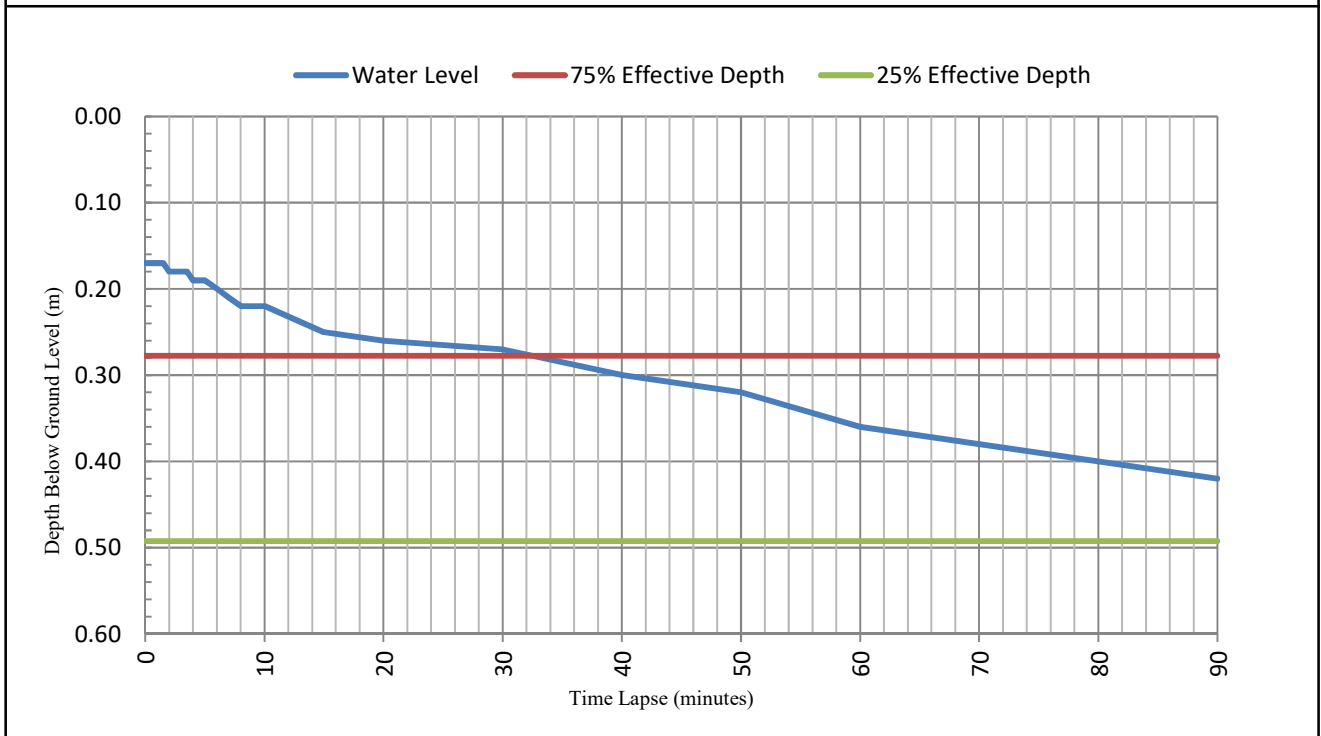
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 14.54	Co-Ordinates Easting: 317814.16 Northing: 168898.9	TP19 - SA Cycle 1

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.40	Length	3.40
Width	0.80	Width	0.80
Depth	0.60	Depth	0.60

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.17	15	0.25
0.5	0.17	20	0.26
1	0.17	30	0.27
1.5	0.17	40	0.30
2	0.18	50	0.32
2.5	0.18	60	0.36
3	0.18	90	0.42
3.5	0.18		
4	0.19		
4.5	0.19		
5	0.19		
6	0.20		
7	0.21		
8	0.22		
9	0.22		
10	0.22		



Infiltration rate not calculated as 25% effective depth not attained.

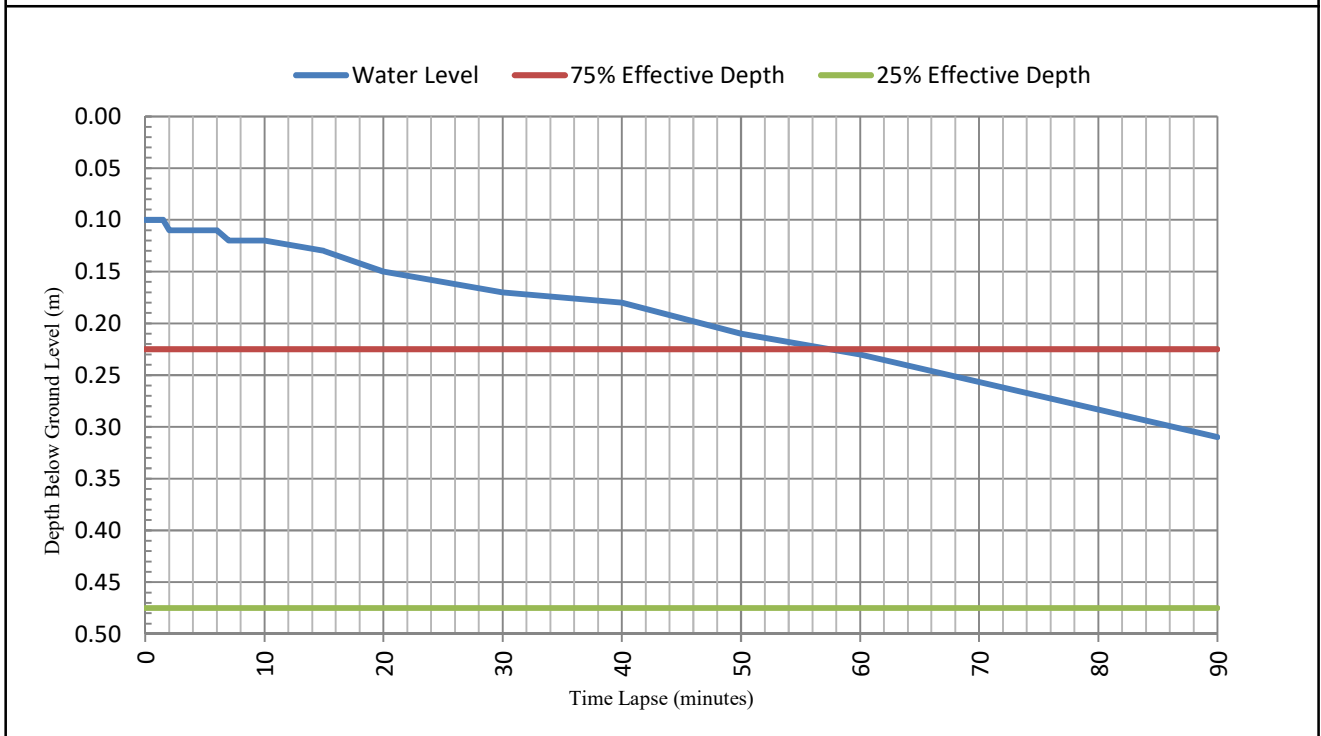
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP19 - SA Cycle 2
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 14.54	Co-Ordinates Easting: 317814.16 Northing: 168898.9	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.40	Length	3.40
Width	0.80	Width	0.80
Depth	0.60	Depth	0.60

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.10	15	0.13
0.5	0.10	20	0.15
1	0.10	30	0.17
1.5	0.10	40	0.18
2	0.11	50	0.21
2.5	0.11	60	0.23
3	0.11	90	0.31
3.5	0.11		
4	0.11		
4.5	0.11		
5	0.11		
6	0.11		
7	0.12		
8	0.12		
9	0.12		
10	0.12		



Infiltration rate not calculated as 25% effective depth not attained.

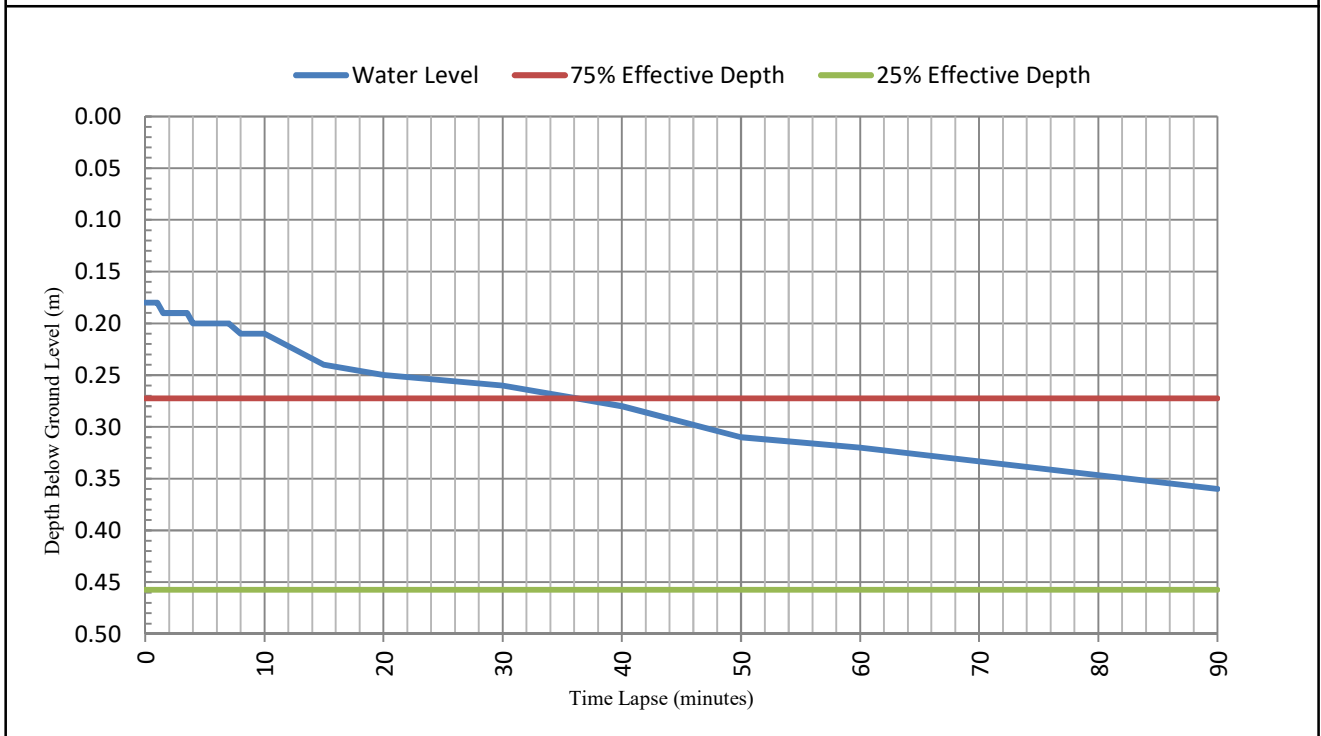
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP21 - SA Cycle 1
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 13.88	Co-Ordinates Easting: 317839.66 Northing: 168916.94	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.00	Length	2.90
Width	0.80	Width	0.60
Depth	0.55	Depth	0.55

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.18	15	0.24
0.5	0.18	20	0.25
1	0.18	30	0.26
1.5	0.19	40	0.28
2	0.19	50	0.31
2.5	0.19	60	0.32
3	0.19	90	0.36
3.5	0.19		
4	0.20		
4.5	0.20		
5	0.20		
6	0.20		
7	0.20		
8	0.21		
9	0.21		
10	0.21		



Infiltration rate not calculated as 25% effective depth not attained.

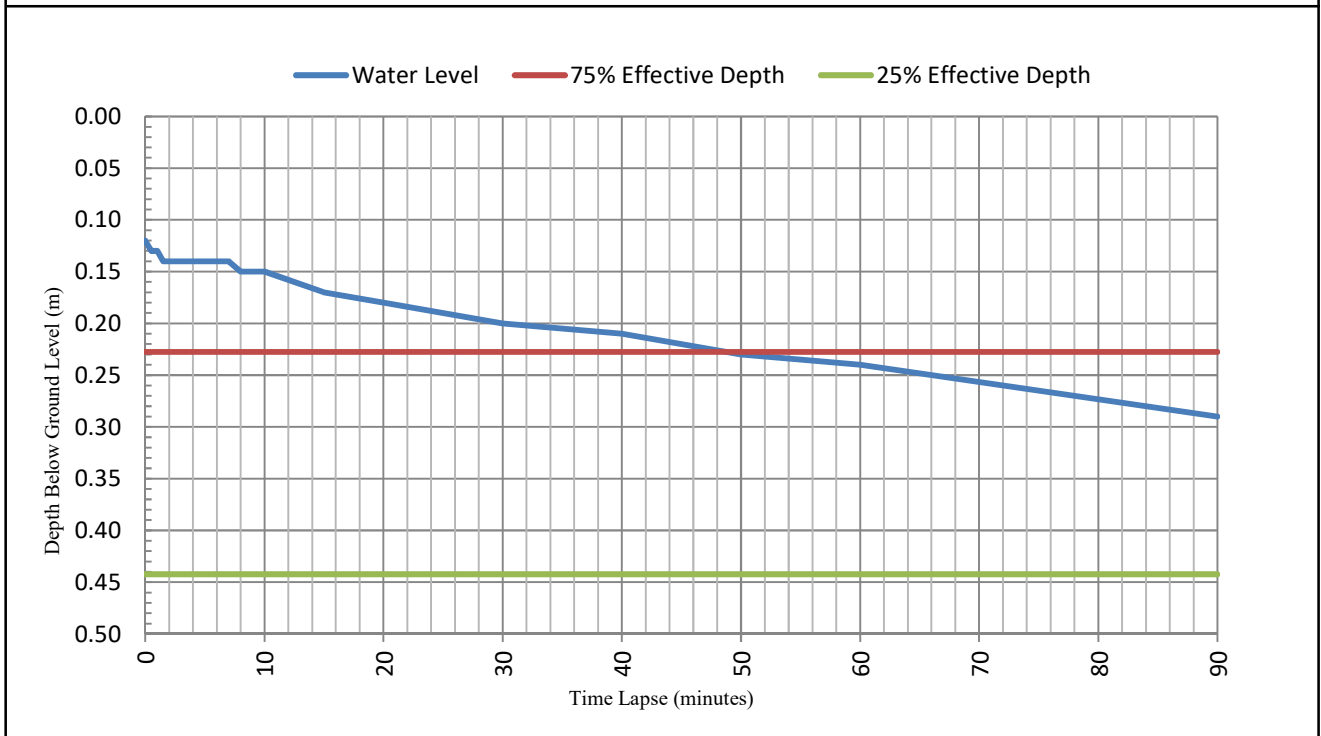
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP21 - SA Cycle 1
Job No. 10011193	Date 08/09/2016	Ground Level (mAOD) 13.88	Co-Ordinates Easting: 317839.66 Northing: 168916.94	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	3.00	Length	2.90
Width	0.80	Width	0.60
Depth	0.55	Depth	0.55

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.12	15	0.17
0.5	0.13	20	0.18
1	0.13	30	0.20
1.5	0.14	40	0.21
2	0.14	50	0.23
2.5	0.14	60	0.24
3	0.14	90	0.29
3.5	0.14		
4	0.14		
4.5	0.14		
5	0.14		
6	0.14		
7	0.14		
8	0.15		
9	0.15		
10	0.15		



Infiltration rate not calculated as 25% effective depth not attained.

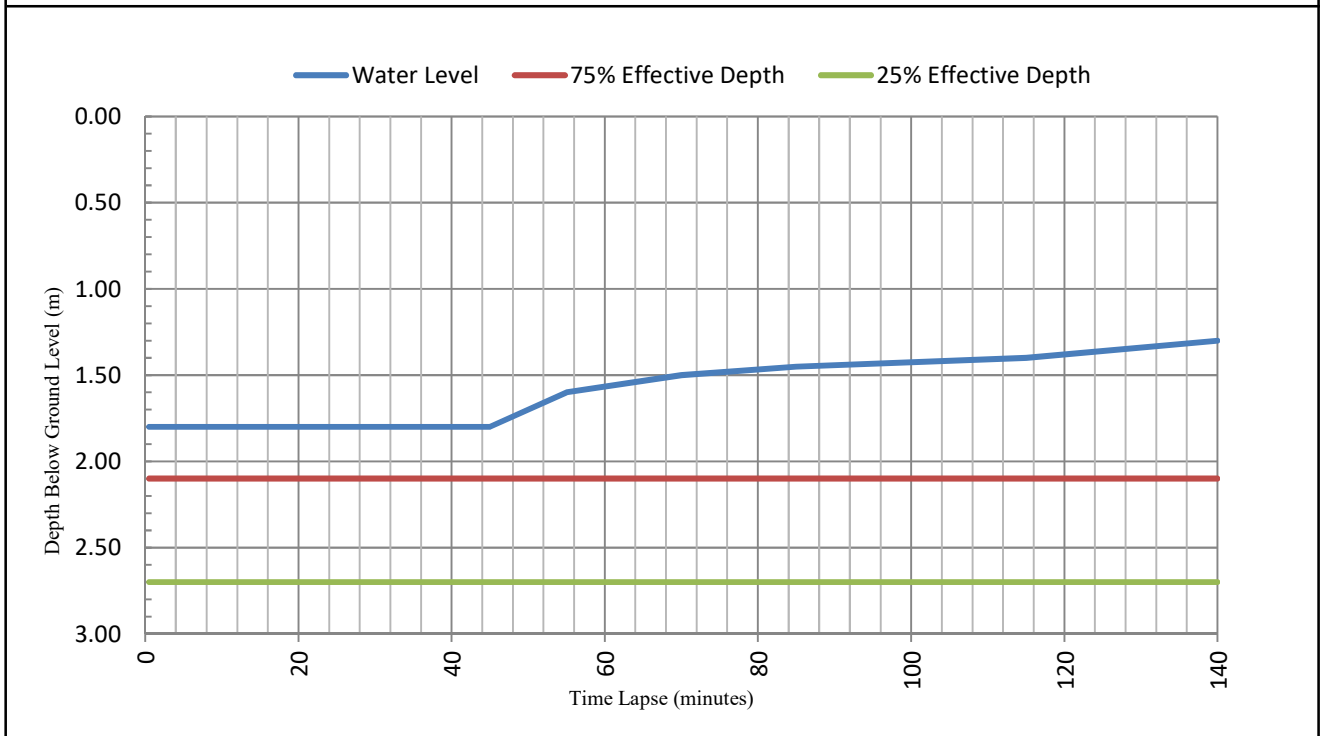
All dimensions in metres	Client Welsh Government	Logged By RF
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP101
Job No. 10011193	Date 13/12/2017	Ground Level (mAOD) 26.289	Co-Ordinates Easting: 318569.2788 Northing: 169429.1944	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.90	Length	2.90
Width	0.60	Width	0.60
Depth	3.00	Depth	3.00

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0.5	1.80	45	1.80
1	1.80	55	1.60
1.5	1.80	70	1.50
2	1.80	85	1.45
2.5	1.80	115	1.40
3	1.80	140	1.30
4	1.80		
5	1.80		
6	1.80		
7	1.80		
8	1.80		
9	1.80		
10	1.80		
15	1.80		
20	1.80		
30	1.80		



Cycle aborted due to increase in water level; Infiltration rate not calculated as 25% effective depth not attained.

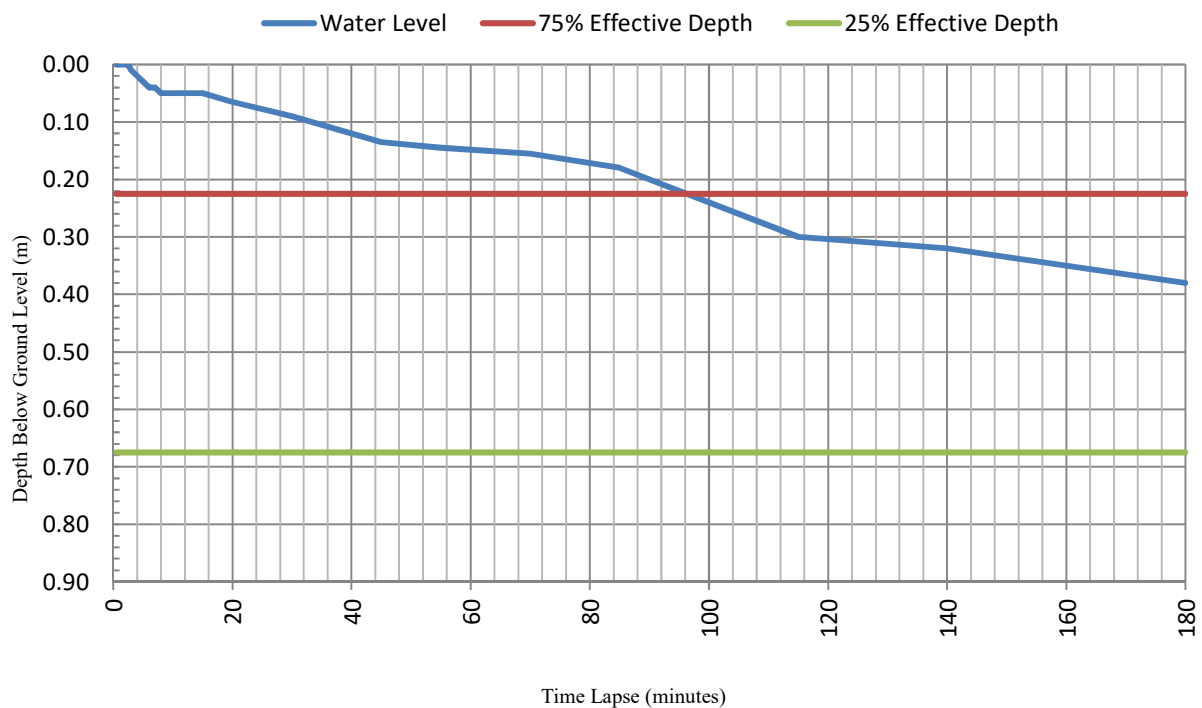
All dimensions in metres	Client Welsh Government	Logged By WB
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP103 Cycle 1
Job No. 10011193	Date 13/12/2017	Ground Level (mAOD) 29.3754	Co-Ordinates Easting: 318438.0374 Northing: 169361.5609	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.40	Length	2.40
Width	0.60	Width	0.60
Depth	0.90	Depth	0.90

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0.5	0.00	45	0.14
1	0.00	55	0.15
1.5	0.00	70	0.16
2	0.00	85	0.18
2.5	0.00	115	0.30
3	0.01	140	0.32
4	0.02	180	0.38
5	0.03		
6	0.04		
7	0.04		
8	0.05		
9	0.05		
10	0.05		
15	0.05		
20	0.07		
30	0.09		



Infiltration rate not calculated as 25% effective depth not attained.

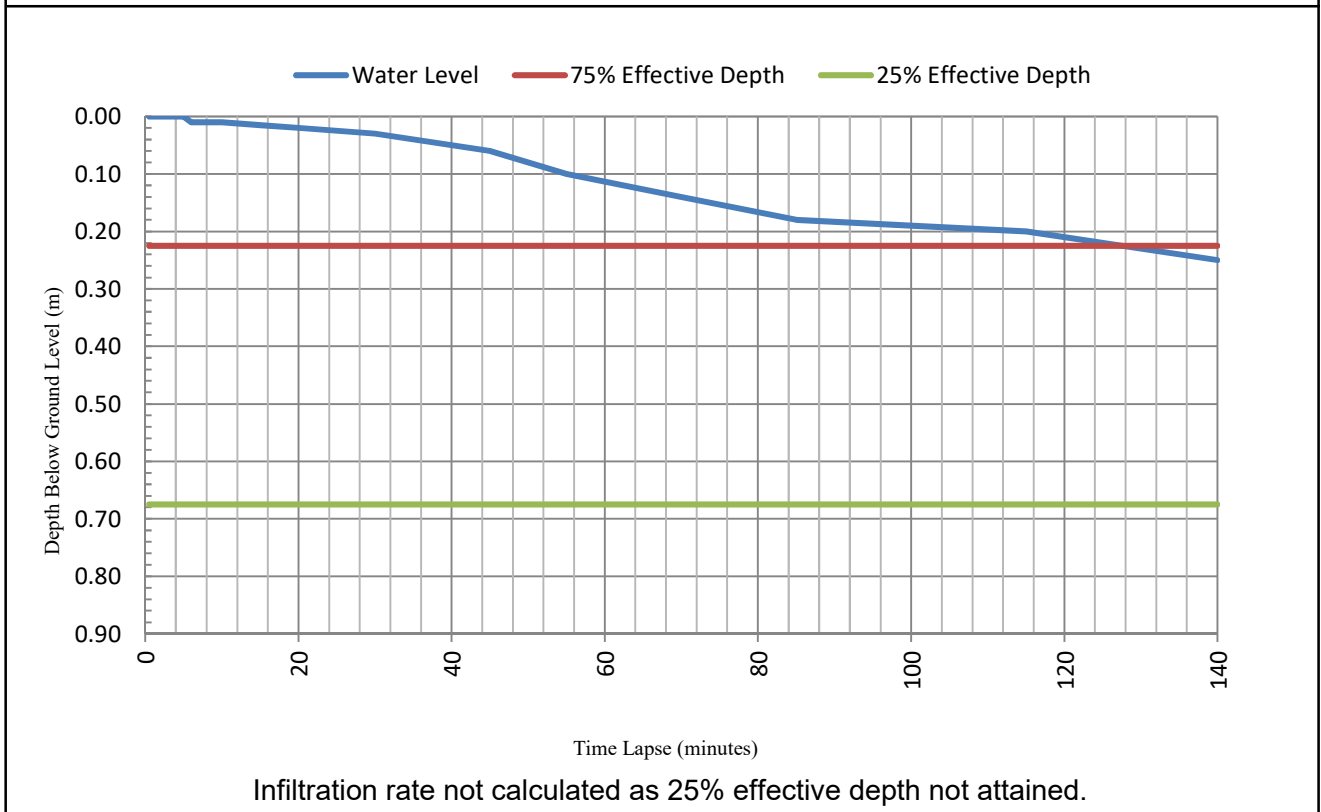
All dimensions in metres	Client Welsh Government	Logged By WB
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP103 Cycle 2
Job No. 10011193	Date 13/12/2017	Ground Level (mAOD) 29.3754	Co-Ordinates Easting: 318438.0374 Northing: 169361.5609	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.40	Length	2.40
Width	0.60	Width	0.60
Depth	0.90	Depth	0.90

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0.5	0.00	45	0.06
1	0.00	55	0.10
1.5	0.00	70	0.14
2	0.00	85	0.18
2.5	0.00	115	0.20
3	0.00	140	0.25
4	0.00		
5	0.00		
6	0.01		
7	0.01		
8	0.01		
9	0.01		
10	0.01		
15	0.02		
20	0.02		
30	0.03		



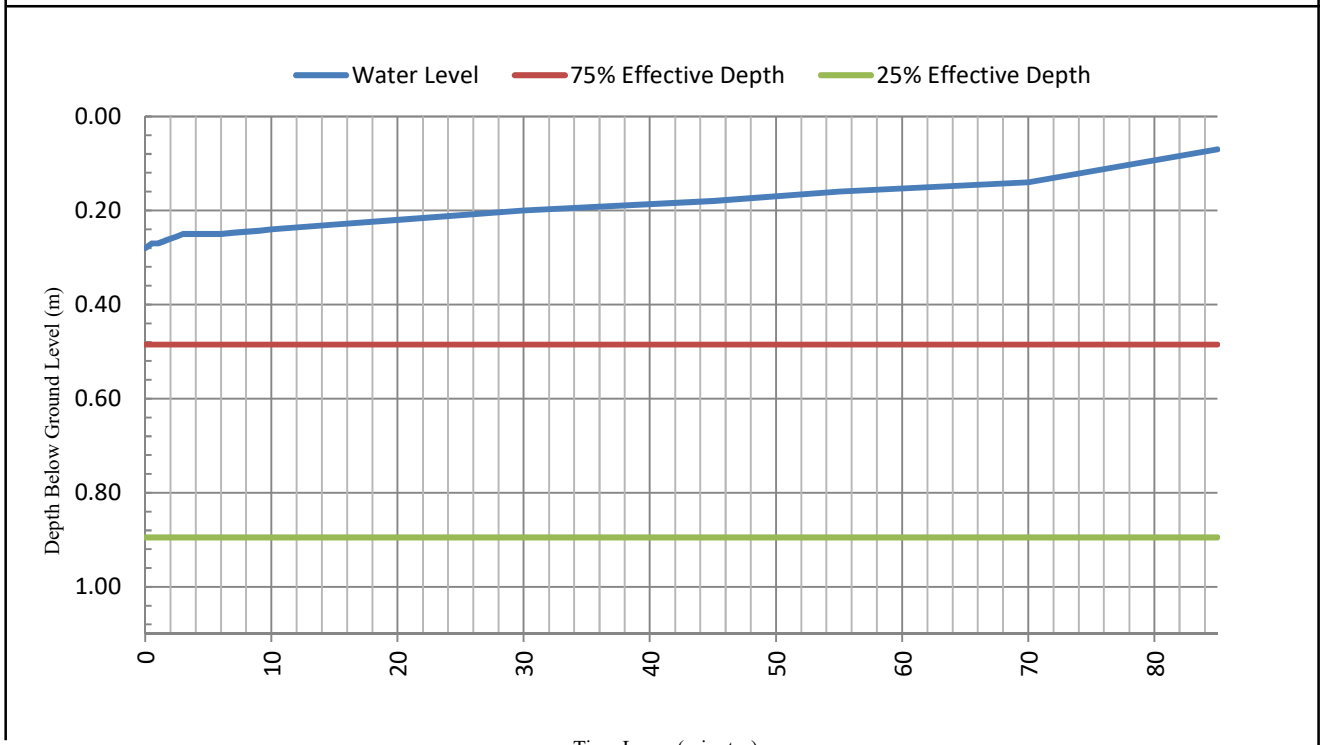
All dimensions in metres	Client Welsh Government	Logged By WB
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP112
Job No. 10011193	Date 14/12/2017	Ground Level (mAOD) 33.7422	Co-Ordinates Easting: 318439.7355 Northing: 168988.5054	

Pit Dimension Prior To Test		Pit Dimension After Test	
Length	2.40	Length	2.40
Width	0.60	Width	0.60
Depth	1.10	Depth	1.10

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.28	30	0.20
0.5	0.27	45	0.18
1	0.27	55	0.16
1.5	0.27	70	0.14
2	0.26	85	0.07
2.5	0.26		
3	0.25		
4	0.25		
5	0.25		
6	0.25		
7	0.25		
8	0.25		
9	0.24		
10	0.24		
15	0.23		
20	0.22		



Cycle aborted due to increase in water level; Infiltration rate not calculated as 25% effective depth not attained.

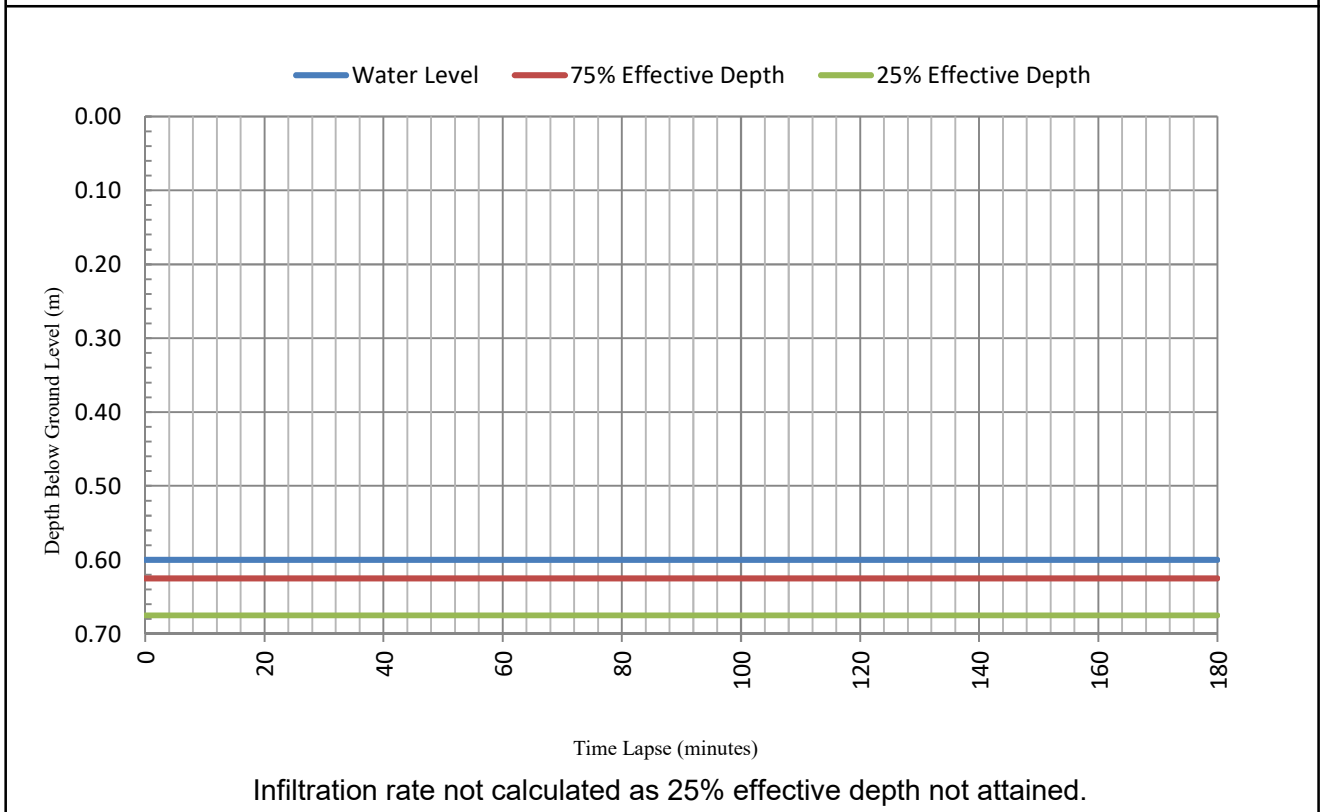
All dimensions in metres	Client Welsh Government	Logged By WB
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SOAKAWAY INFILTRATION TEST

Project Cosmeston Farm				Trial Pit No TP115
Job No. 10011193	Date 14/12/2017	Ground Level (mAOD) 30.6564	Co-Ordinates Easting: 318360.7656 Northing: 169224.2532	

Pit Dimension Prior To Test	Pit Dimension After Test
Length 2.50	Length 2.50
Width 0.60	Width 0.60
Depth 0.70	Depth 0.70

Time Lapsed (minutes)	Depth to Water (m bgl)	Time Lapsed (minutes)	Depth to Water (m bgl)
0	0.60	30	0.60
0.5	0.60	45	0.60
1	0.60	55	0.60
1.5	0.60	70	0.60
2	0.60	85	0.60
2.5	0.60	115	0.60
3	0.60	140	0.60
4	0.60	180	0.60
5	0.60		
6	0.60		
7	0.60		
8	0.60		
9	0.60		
10	0.60		
15	0.60		
20	0.60		



All dimensions in metres	Client Welsh Government	Logged By WB
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APPENDIX D

CERTIFICATION OF FIELD APPARATUS

SPT Calibration Report



Hammer Energy Measurement Report

Type of Hammer: DART
 Client: GSTL
 Test No: EQU1542
 Test Depth (m): 10.50
 Date of Test: **15 April 2016**
 Valid until: **15 April 2017**
 Hammer ID: **219**

Mass of the hammer: $m = 63.5\text{kg}$
 Falling height: $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter: $d_r = 0.052\text{m}$
 Length of the instrumented rod: 0.558m
 Area: $A = 11.61\text{cm}^2$
 Modulus: $E_a = 206843\text{MPa}$

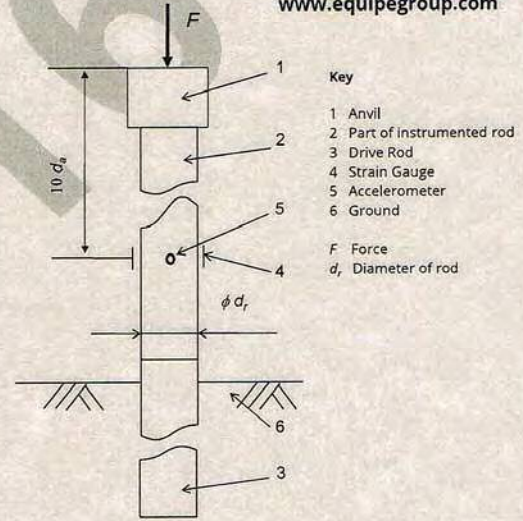
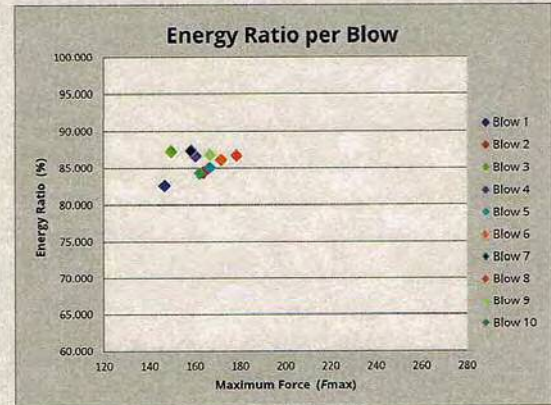
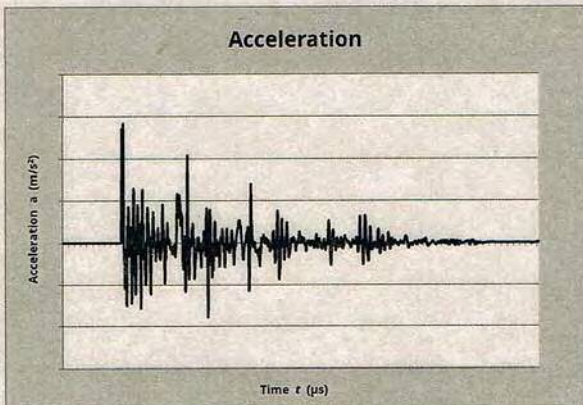
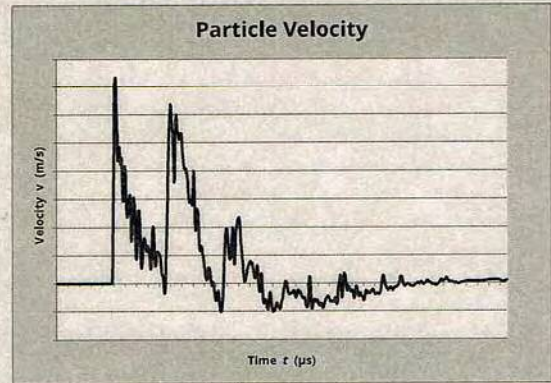
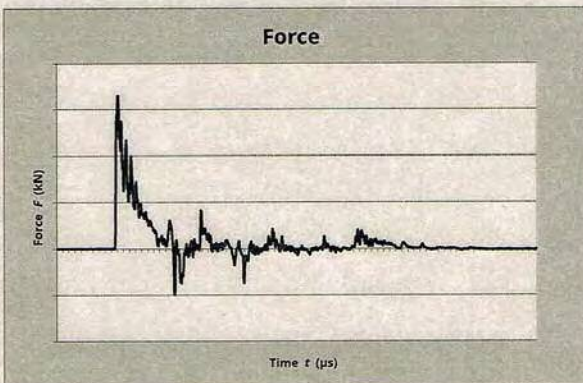


Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005 + A1 : 2011



Observations:
 1.

$E_{\text{meas}} = 0.383\text{ kN-m}$
 $E_{\text{theor}} = 0.473\text{ kN-m}$

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$ = **81.01%**

Equipe SPT Analyzer Operators:

AF

Prepared by:

[Signature]

Checked by:

[Signature]

Date

20/04/2016

SPT Calibration Report

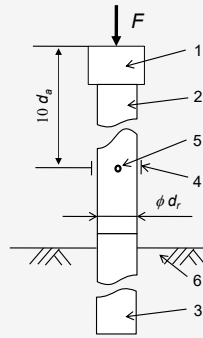
Hammer Energy Measurement Report

Type of Hammer DART
Client GSTL
Test No EQU1799

Test Depth (m) 8.40
Mass of the hamn $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_o = 206843\text{ MPa}$

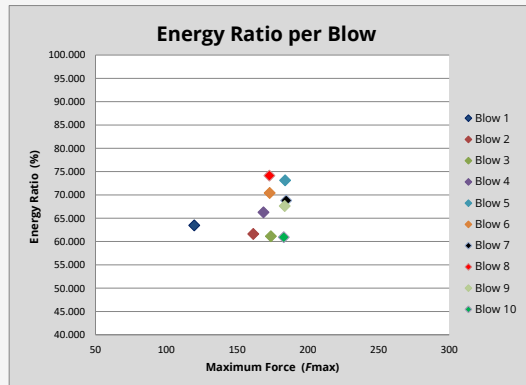
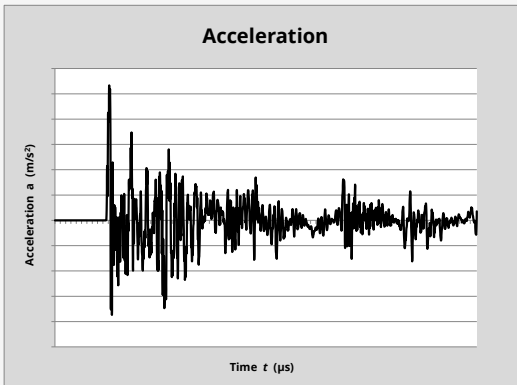
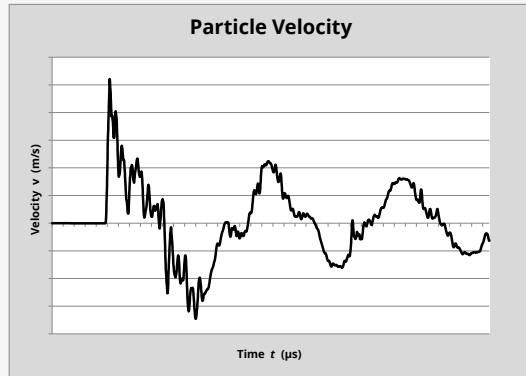
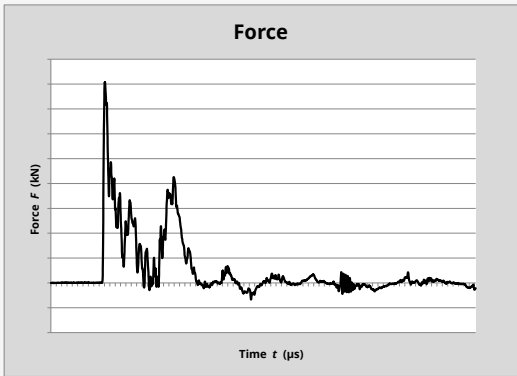


- Key**
- 1 Anvil
 - 2 Part of instrumented rod
 - 3 Drive Rod
 - 4 Strain Gauge
 - 5 Accelerometer
 - 6 Ground

F Force
 d_r Diameter of rod

Fig. B.1 and B.2
BS EN ISO 22476-3: 2005 + A1: 2011

DATE OF TEST	VALID UNTIL	HAMMER ID
10 April 2017	10 April 2018	219



Observations:

1.

$E_{\text{meas}} = 0.315\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

Energy Ratio = $\frac{E_{\text{meas}}}{E_{\text{theor}}}$

66.50%
© Copyright 2017

Equipe SPT Analyzer Operators: CS

Prepared by:

Checked by:

Date:

12/04/2017

SPT Calibration Report

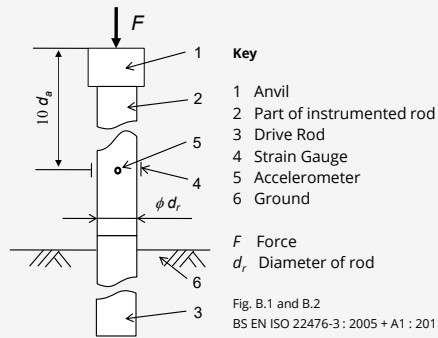
Hammer Energy Measurement Report

Type of Hammer DART
Client GSTL
Test No EQU1932

Test Depth (m) 8.50
Mass of the hamn $m = 63.5\text{kg}$
Falling height $h = 0.76\text{m}$
 $E_{\text{theor}} = m \times g \times h = 473\text{J}$

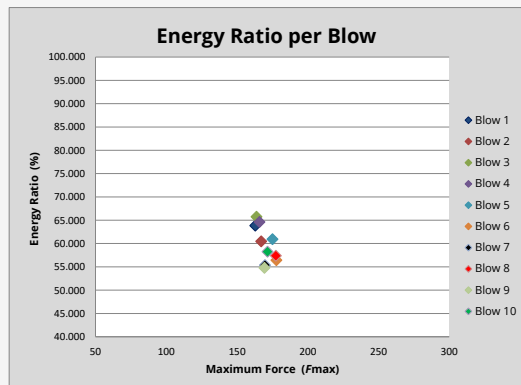
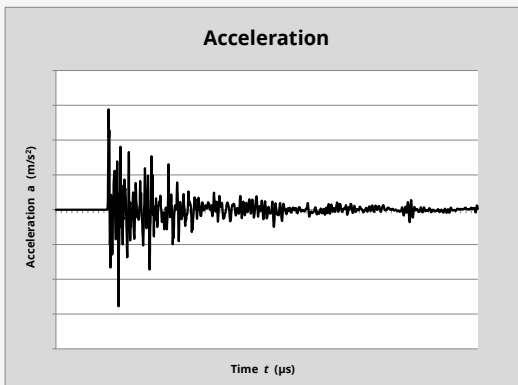
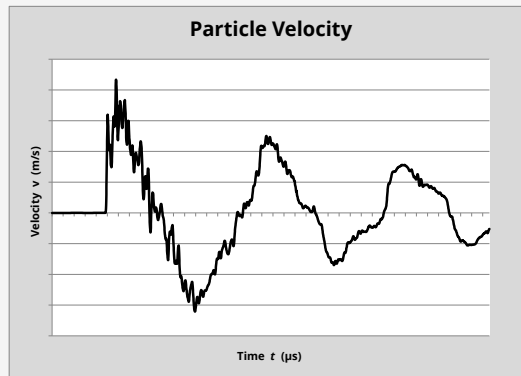
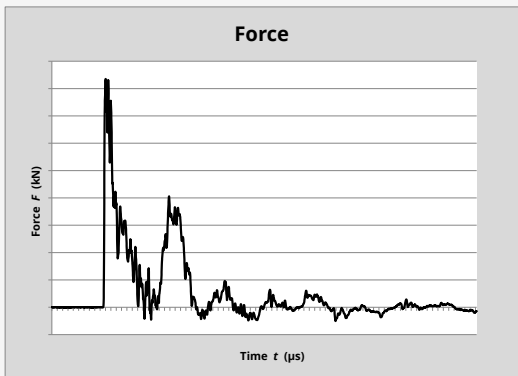
Characteristics of the instrumented rod

Diameter $d_r = 0.052\text{ m}$
Length of instrumented rod 0.558 m
Area $A = 11.61\text{ cm}^2$
Modulus $E_s = 206843\text{ MPa}$



DATE OF TEST **VALID UNTIL** **HAMMER ID**

14/11/2017 14/11/2018 365



Observations:

1.

$E_{\text{meas}} = 0.282\text{ kN-m}$

$E_{\text{theor}} = 0.473\text{ kN-m}$

$$\text{Energy Ratio} = \frac{E_{\text{meas}}}{E_{\text{theor}}}$$

59.56%
© Copyright 2017

Equipe SPT Analyzer Operators: AF

Prepared by:

Checked by:

Date:

17/11/2017

APPENDIX E

MONITORING DATA



Project: Cosmeston	Weather: Sunny
Job Number: UJA008386	Engineer: SC
Date: 23/09/2016	

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	PID (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS03	23/09/2016	1017	15		0.7	0	0.0	0.0	0.0	21.0	0	0		1.95		
						30	0.0	0.0	2.8	18.4	0	0				
						60	0.0	0.0	2.8	18.2	0	0				
						90	0.0	0.0	2.8	18.1	0	0				
						120	0.1	0.1	2.9	18.1	0	0				
						150	0.1	0.1	2.8	18.1	0	0				
						180	0.1	0.1	2.8	18.1	0	0				
						0	0.1	0.1	0.0	21.0	0	0				
						30	0.1	0.1	0.2	18.6	0	0				
WS01	23/09/2016	1018	15		0.5	60	0.1	0.1	0.2	18.5	0	0		2.15		
						90	0.1	0.1	0.20	18.5	0	0				
						120	0.1	0.1	0.20	18.4	0	0				
						150	0.1	0.1	0.20	18.4	0	0				
						180	0.1	0.1	0.20	18.4	0	0				

Notes:
OR = Over range

Ambient Concentration	
CH4	0
CO2	0
O2	21
H2S	0
CO	0

Previous weather conditions. Atmospheric pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open top, datum level, vegetation stress, odours, bubbles, etc.

Project:	Cosmeston Phase 2		
Job Number:	10011193	Date:	09/01/2018

Weather:	Mist and fine drizzle
Engineer:	Amy Mayer/Siân Carter

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)
WS01	09/01/2018 09:30	1006	8	Peak:	0.3	Initial	0	0	0	20.1	0	0	0.012			2.10	2.15	No water sample taken as per instruction
						30	0	0	0	20.1	0	0	0.012					
						60	0	0	0	20.3	0	0	0.012					
						90	0	0	0	20.3	0	0	0.012					
						Steady:	120	0	0	0	20.3	0	0	0.012				
						0.1	150	0	0	0	20.3	0	0	0.012				
						180	0	0	0	20.3	0	0	0.012					
WS101	09/01/2018 10:50	1006	8	Peak:	0.6	Initial	0	0	2.3	16.3	0	0	0.012			1.80	2.10	Insufficient water quantity to take sample
						30	0	0	2.1	16.2	0	0	0.012					
						60	0	0	2.1	14.1	0	0	0.010					
						90	0	0	2.1	14.1	0	0	0.009					
						Steady:	120	0	0	2.1	14.1	0	0	0.009				
						0.3	150	0	0	2.1	14.1	0	0	0.009				
						180	0	0	2.1	14.1	0	0	0.009					
WS104	09/01/2018 11:10	1006	8	Peak:	0.2	Initial	0	0	0.7	19.0	0	0	0.007			0.90	1.45	Water sample taken (2x 300ml bottle and 1x 40ml vial, insufficient water quantity for 4x bottles)
						30	0	0	1.2	18.0	0	0	0.007					
						60	0	0	1.2	18.0	0	0	0.009					
						90	0	0	1.2	18.0	0	0	0.009					
						Steady:	120	0	0	1.2	18.0	0	0	0.007				
						0.1	150	0	0	1.2	17.9	0	0	0.006				
						180	0	0	1.2	18.0	0	0	0.009					
WS109	09/01/2018 12:00	1006	8	Peak:	0.6	Initial	33.3	0	20	0.8	0	0	0.713			1.20	1.20	Landfill Site. Insufficient water quantity to take sample
						30	36.4	0	20.4	0.4	0	0	0.715					
						60	37.0	0	20.4	0.1	0	0	0.717					
						90	37.0	0	20.6	0.0	0	0	0.719					
						Steady:	120	37.1	0	20.5	0.0	0	0.718					
						0.4	150	37.1	0	20.8	0.0	0	0.719					
						180	37.1	0	21.4	0.0	0	0	0.721					
WS111	09/01/2018 12:30	1006	8	Peak:	1.0	Initial	1.8	71.7	8.9	5.4	0	0	0.174			1.05	1.30	Landfill Site. Water sample taken (1x 300 ml bottle, insufficient water quantity for 4x bottles)
						30	3.0	71.7	12.3	0.5	0	0	0.174					
						60	3.1	71.7	12.4	0.0	0	0	0.174					
						90	3.1	71.4	12.5	0.0	0	0	0.174					
						Steady:	120	3.1	72.1	12.5	0.0	0	0.174					
						0.6	150	3.1	72.4	12.5	0.0	0	0.175					
						180	3.1	72.7	12.5	0.0	0	0	0.176					
WS110	09/01/2018 12:50	1006	8	Peak:	0.4	Initial	12.6	0	18.5	2.1	0	0	0.433			2.90	3.00	Landfill Site. Insufficient water quantity to take sample
						30	16.5	0	20.3	0.1	0	0	0.454					
						60	16.8	0	20.4	0.0	0	0	0.459					
						90	16.8	0	20.4	0.0	0	0	0.460					
						Steady:	120	16.7	0	20.3	0.1	0	0.459					
						0.3	150	16.8	0	20.3	0.1	0	0.459					
						180	16.8	0	20.4	0.0	0	0	0.460					

Notes:

Gas concentrations 0% unless otherwise specified.
WS03 could not be located (drilled >1 year ago, Sep 2016, vegetation growth and animal grazing have covered location)

Ambient Concentration	
CH4	0%
CO2	0%
O2	20.50%
H2S	0%
CO	0%

Previous weather conditions, Atmospheric pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open tap, datum level, vegetation stress, odours, bubbles, etc.

QA Checklist:	
Weather conditions logged for previous 24 hrs	x
Gas monitor calibrated	x
All filters in place	x
Flow reading stable and zeroed	x

Instrument Details:	Serial No.	Hyder/other ref.
Landfill Gas Analyser		Hired from Shaw City
PID	N/A	
Dip meter/ interface probe	Geo Sense Dip-30 3698	



Project:	Cosmeston Phase 2		
Job Number:	10011193	Date:	16/01/2018

Weather:	Showers/Windy
Engineer:	Siân Carter

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)	
WS01	16/01/2018 09:00	1002	6	Peak:	0.3	Initial	0	0	0	20.5	0	0	0.000			No GW	2.15		
						30	0	0	2.4	17.4	0	0	0.005						
						60	0	0	2.4	17.3	0	0	0.004						
						90	0	0	2.4	17.2	0	0	0.004						
						Steady:	120	0	0	2.4	17.2	0	0						0.004
						150	0	0	2.4	17.2	0	0	0.004						
						180	0	0	2.4	17.2	0	0	0.004						
WS101	16/01/2018 10:50	1002	6	Peak:	1.3	Initial	0	0	0	20.3	0	0	0.000			1.80	2.10		
						30	0	0	0.6	20.1	0	0	0.003						
						60	0	0	0.6	20.1	0	0	0.010						
						90	0	0	0.6	20.1	0	0	0.006						
						Steady:	120	0	0	0.5	20.1	0	0						0.003
						150	0	0	0.5	20.1	0	0	0.004						
						180	0	0	0.4	20.2	0	0	0.004						
WS104	16/01/2018 11:10	1002	6	Peak:	0.4	Initial	0	0	0	20.4	0	0	0.000			0.65	1.45		
						30	0	0	2.2	8.3	0	0	0.003						
						60	0	0	2.2	8.0	0	0	0.001						
						90	0	0	2.1	8.7	0	0	0.003						
						Steady:	120	0	0	1.9	9.6	0	0						0.002
						150	0	0	1.3	12.4	0	0	0.003						
						180	0	0	0.8	14.9	0	0	0.003						
WS109	16/01/2018 09:30	1002	6	Peak:	2.4	Initial	0	0	0	20.4	0	0	0.000			1.20	1.20		
						30	36.4	0	17.7	0.5	0	0	0.720						
						60	37.3	0	17.8	0.2	0	0	0.724						
						90	37.4	0	18.1	0.0	0	0	0.724						
						Steady:	120	37.3	0	18.5	0.0	0	0.723						
						150	37.3	0	18.8	0.0	0	0	0.723						
						180	37.2	0	19.1	0.0	0	0	0.722						
WS111	16/01/2018 10:50	1002	6	Peak:	0.4	Initial	0.0	0.0	0	20.4	0	0	0.000			1.10	1.30	1 x 300ml water sample taken	
						30	0.0	0.0	0.2	20.3	0	0	0.006						
						60	0.0	0.0	0.1	20.3	0	0	0.005						
						90	0.0	0.0	0.1	20.3	0	0	0.005						
						Steady:	120	0.0	0.0	0.1	20.3	0	0						0.004
						150	0.0	0.0	0.1	20.3	0	0	0.004						
						180	0.0	0.0	0.1	20.3	0	0	0.004						
WS110	16/01/2018 09:50	1002	6	Peak:	0.9	Initial	0.0	0	0	20.4	0	0	0.000			2.90	3.00		
						30	1.2	29.7	0.2	20.3	0	0	0.018						
						60	1.6	31.2	0.2	20.3	0	0	0.012						
						90	2.3	32.3	0.4	20.1	0	0	0.021						
						Steady:	120	2.6	35.7	0.8	19.4	0	0						0.048
						150	3.3	37.6	0.8	17.6	0	0	0.063						
						180	3.5	52	0.8	13.3	0	0	0.090						

Notes:

Gas concentrations 0% unless otherwise specified.
WS03 could not be located (drilled >1 year ago, Sep 2016, vegetation growth and animal grazing have covered location)

Ambient Concentration	
CH4	0%
CO2	0%
O2	0.00%
H2S	0%
CO	0%

Previous weather conditions, Atmospheric pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open tap, datum level, vegetation stress, odours, bubbles, etc.

QA Checklist:	
Weather conditions logged for previous 24 hrs	x
Gas monitor calibrated	x
All filters in place	x
Flow reading stable and zeroed	x

Instrument Details:	Serial No.	Hyder/other ref.
Landfill Gas Analyser		Hired from Shaw City
PID	N/A	
Dip meter/ interface probe	Geo Sense Dip-30 3698	



Project:	Cosmeston Phase 2		
Job Number:	10011193	Date:	25/01/2018

Weather:	Sun & Showers
Engineer:	Siân Carter

Monitoring Point Reference	Date/ Time	Atmos. Pressure (mbar)	Temp. (°C)	Well Pressure (Pa)	Flow Rate (l/h)	Time (sec)	CH4 (% v/v)	LEL (%)	CO2 (% v/v)	O2 (% v/v)	H2S (ppm)	CO (ppm)	Hex. (%)	PID cf	VOC (ppm)	Depth to Water (m)	Depth to base (m)	Comments (all readings from GL, note datum height if different)	
WS01	25/01/2018 09:00	1006	7	Peak:	0.3	Initial	0	0	0	20.4	0	0	0.000			No GW	2.15		
						30	0	0	2.3	17.9	0	0	0.004						
						60	0	0	2.3	17.8	0	0	0.004						
						90	0	0	2.4	17.8	0	0	0.003						
						Steady:	120	0	0	2.2	17.6	0	0						0.002
						0.1	150	0	0	2.1	17.7	0	0						0.002
							180	0	0	2	17.7	0	0						0.002
WS101	25/01/2018 10:50	1006	7	Peak:	0.6	Initial	0	0	0	20.4	0	0	0.000			1.85	2.10		
						30	0	0	1.7	16.3	0	0	0.003						
						60	0	0	1.6	16.4	0	0	0.003						
						90	0	0	1.3	17.2	0	0	0.001						
						Steady:	120	0	0	1.3	17.8	0	0						0.001
						0.2	150	0	0	0.9	18.7	0	0						0.001
							180	0	0	0.8	19.1	0	0						0.001
WS104	25/01/2018 11:10	1006	7	Peak:	0.3	Initial	0	0	0	20.4	0	0	0.000			0.80	1.45		
						30	0	0	1.9	13.8	0	0	0.002						
						60	0	0	1.9	14.1	0	0	0.001						
						90	0	0	1.8	14.9	0	0	0.001						
						Steady:	120	0	0	1.7	15.2	0	0						0.001
						0.1	150	0	0	1.7	16.7	0	0						0.001
							180	0	0	1.5	17.4	0	0						0.001
WS109	25/01/2018 09:20	1006	7	Peak:	0.9	Initial	0	0	0	20.5	0	0	0.000			1.10	1.20		
						30	35.4	0	17.3	0.4	0	0	0.705						
						60	36.3	0	17.5	0.1	0	0	0.709						
						90	36.3	0	17.6	0.0	0	0	0.711						
						Steady:	120	36.4	0	17.7	0.0	0	0.710						
						0.5	150	36.4	0	17.8	0.0	0	0						0.709
							180	36.3	0	18	0.0	0	0						0.708
WS111	25/01/2018 10:00	1006	7	Peak:	0.3	Initial	0.0	0.0	0	20.5	0	0	0.000			1.15	1.30		
						30	0.0	0.0	6.9	5.1	0	0	0.013						
						60	0.0	0.0	7	4.5	0	0	0.012						
						90	0.0	0.0	7.1	4.4	0	0	0.012						
						Steady:	120	0.0	0.0	7.1	4.3	0	0						0.011
						0.1	150	0.0	0.0	7.1	4.3	0	0						0.010
							180	0.0	0.0	7.1	4.3	0	0						0.010
WS110	25/01/2018 09:40	1006	7	Peak:	0.7	Initial	0.0	0	0	20.5	0	0	0.000			2.95	3.00		
						30	0.0	0	4	9.1	0	0	0.035						
						60	0.0	0	2.3	14.6	0	0	0.024						
						90	0.0	0	0.9	18.1	0	0	0.020						
						Steady:	120	0.0	0	0.4	19.7	0	0						0.017
						0.3	150	0.0	0	0.2	20.0	0	0						0.015
							180	0.0	0	0.2	20.1	0	0						0.014

Notes:

Gas concentrations 0% unless otherwise specified.
WS03 could not be located (drilled >1 year ago, Sep 2016, vegetation growth and animal grazing have covered location)

Ambient Concentration	
CH4	0%
CO2	0%
O2	0.00%
H2S	0%
CO	0%

Previous weather conditions, Atmospheric pressure trend and rate, flooding, soil moisture, water draw in tube, wind direction/strength, condition of monitoring point, missing/open tap, datum level, vegetation stress, odours, bubbles, etc.

QA Checklist:	
Weather conditions logged for previous 24 hrs	x
Gas monitor calibrated	x
All filters in place	x
Flow reading stable and zeroed	x

Instrument Details:	Serial No.	Hyder/other ref.
Landfill Gas Analyser		Hired from Shaw City
PID	N/A	
Dip meter/ interface probe	Geo Sense Dip-30 3698	



APPENDIX F

GEOTECHNICAL LABORATORY TEST DATA



Contract Number: 32431

Client's Reference: **UA008386**

Report Date: **11-10-2016**

Client **Arcadis**
Fortran Rd
St Mellons
Cardiff
CF3 0EY

Contract Title: **Cosmeston**
For the attention of: **Sian Carter**

Date Received: **20-09-2016**
Date Commenced: **20-09-2016**
Date Completed: **11-10-2016**

Test Description	Qty
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	7
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	7
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	1
Water Soluble Sulphate 2:1 extract 1377 : 1990 Part 3 : 5 - @ Non Accredited Test	6
pH Value of Soil... 1377 : 1990 Part 3 : 9 - @ Non Accredited Test	6
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) 1377 : 1990 Part 4 : 3.3 - * UKAS	2
Disposal of Samples on Project	1

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
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@ - denotes non accredited tests

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Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

**Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5**

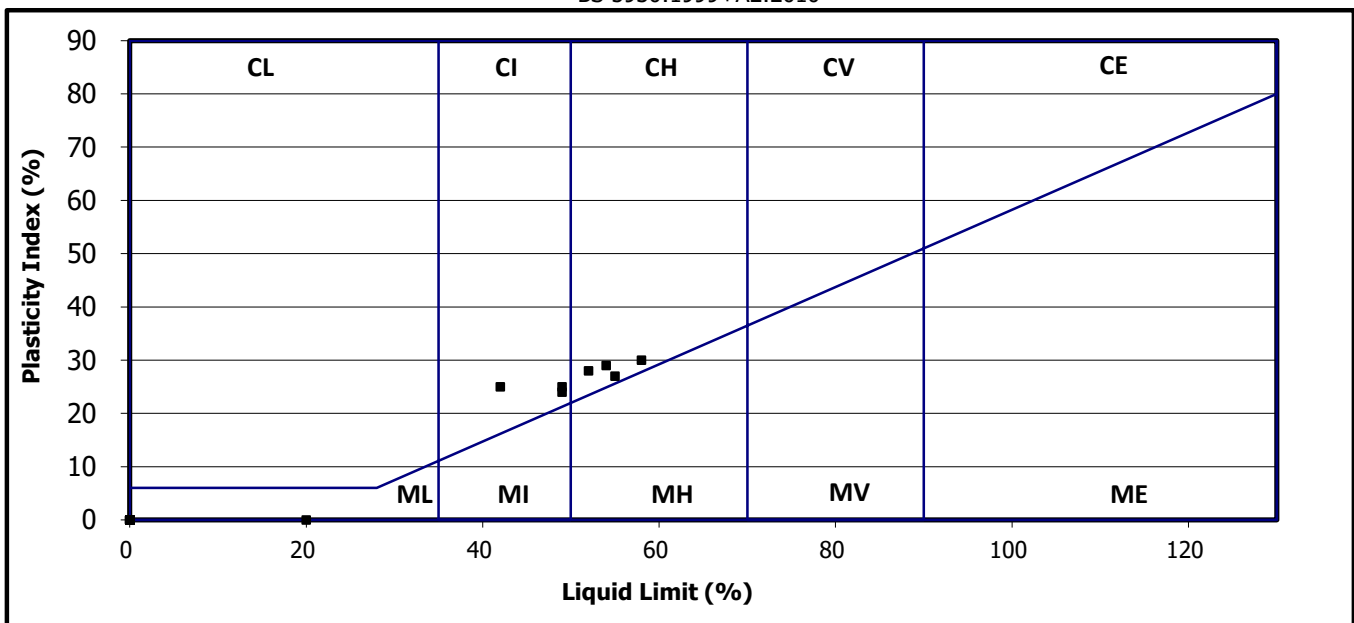
Client ref: UA008386
Location: Cosmeston
Contract Number: 32431

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
TP02/5	B	2.30 - 3.50	34	58	28	30	90	CH High Plasticity
TP11/3	B	0.35 - 0.90	22	42	17	25	93	CI Intermediate Plasticity
TP18/3	B	0.30 - 0.90	32	54	25	29	96	CH High Plasticity
TP19/3	B	0.30 - 0.60	29	52	24	28	87	CH High Plasticity
WS01/5	B	2.20 - 2.50	23	49	25	24	82	CI Intermediate Plasticity
WS03/2	B	0.20 - 1.20	22	49	24	25	86	CI Intermediate Plasticity
WS06/4	B	0.40 - 0.60	25	55	28	27	90	CH High Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

BS 5930:1999+A2:2010



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Ben Sharp (Contracts Manager)
 Date: 11.10.16



Test Report:

Particle Size Distribution Test

BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

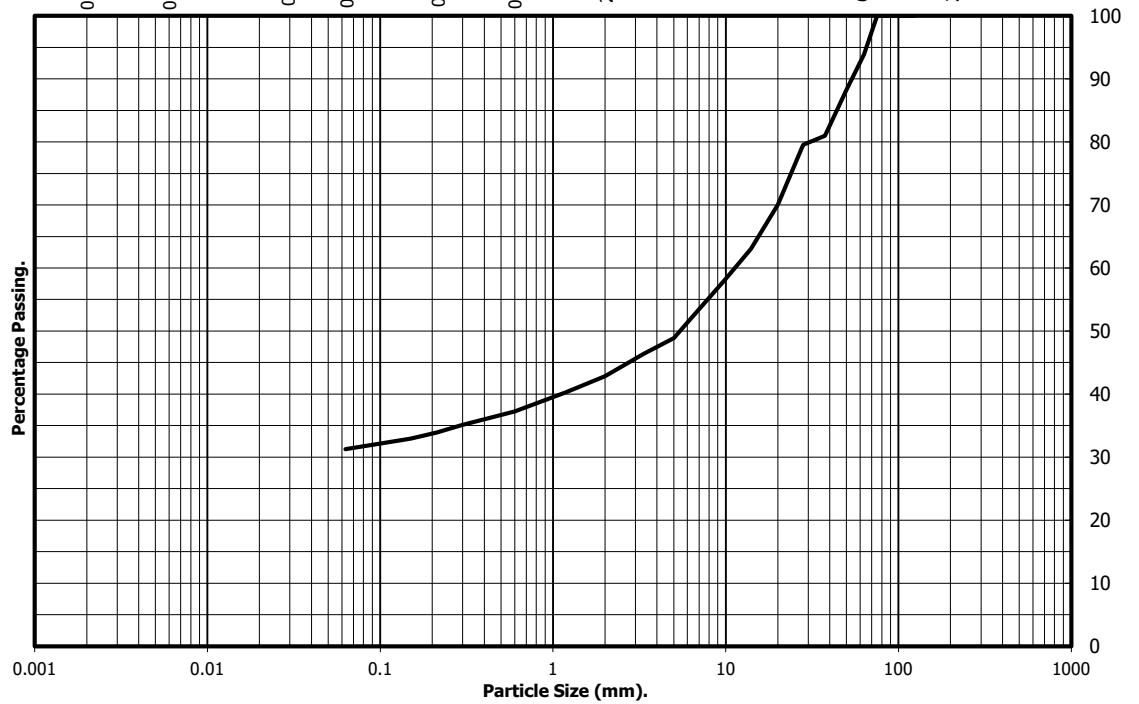
Client ref: **UA008386**
 Contract Number: **32431**
 Hole Number: **TP04**

Sample Number: **3**
 Depth from (m): **0.30**
 Depth to (m): **1.00**
 Sample Type: **B**

Location: **Cosmeston**
 Description: **Brown fine to coarse sandy clayey silty fine to coarse GRAVEL with cobbles.**

CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve	% Passing
125	100
90	100
75	100
63	94
50	88
37.5	81
28	80
20	70
14	63
10	58
6.3	52
5.0	49
3.35	46
2.00	43
1.18	40
0.60	37
0.425	36
0.300	35
0.212	34
0.150	33
0.063	31



Particle Diameter	% Passing
0.02	#
0.006	#
0.002	#

	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	31	12	51	6	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Ben Sharp (Contracts Manager)

Date: **11.10.16**





Unit 4
Heol Aur
Dafen Ind Estate
Dafen
Carmarthenshire
SA14 8QN
Tel: 01554 784040
01554 750752
Fax: 01554 770529
01554 784041
Web: www.geo.uk.com

Certificate of Analysis

Date: 28-09-16

Client: Arcadis

Our Reference: 32431-

Client Reference: UA008386

Contract Title: Cosmeston

Description: (Total Samples) 5

Date Started: 26-09-16

Date Completed: 28-09-16

Test Procedures: (B.S. 1377 : PART 3 : 1990)

Notes:

Solid samples will be disposed 1 month and liquids 2 weeks

Approved By:

Authorised Signatories:

Emma Sharp
Laboratory Office Manager

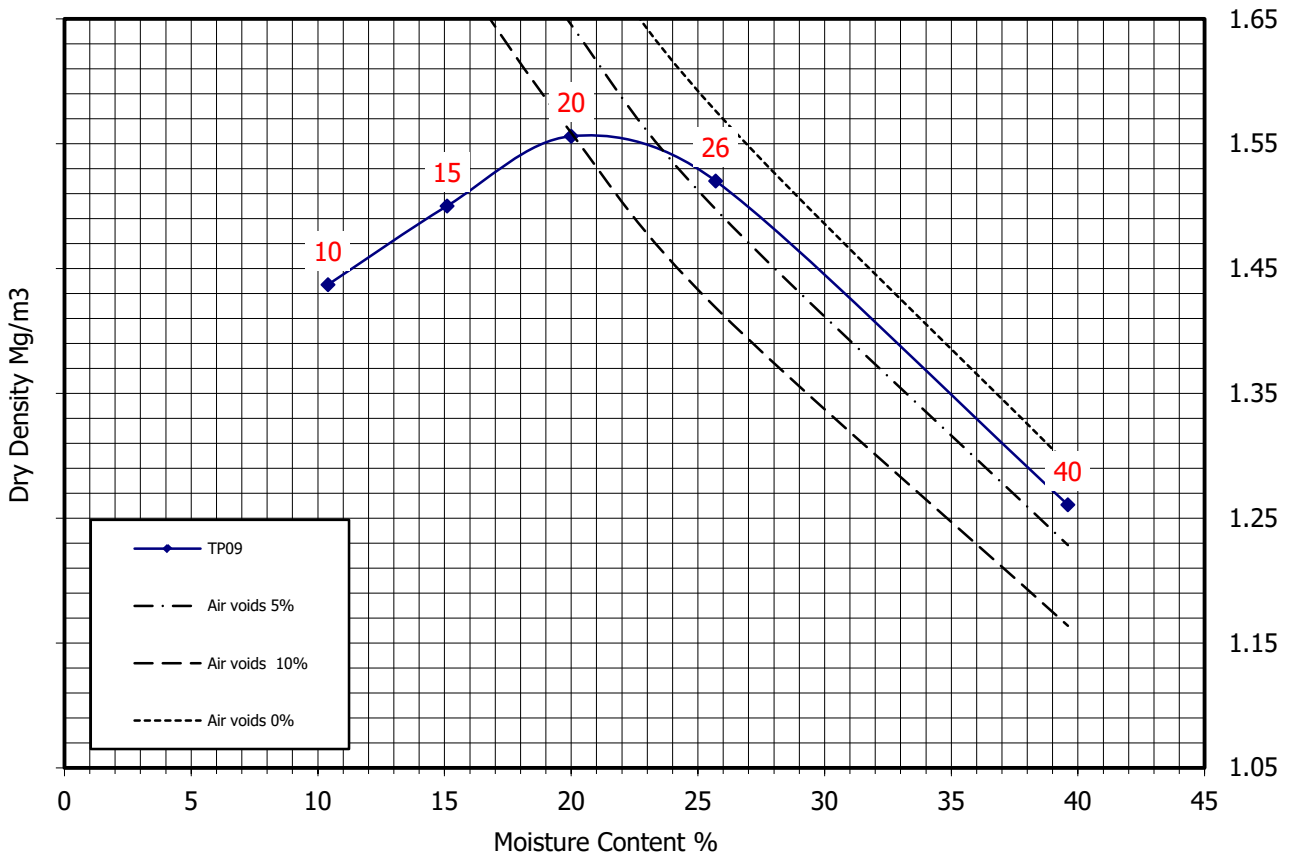
Ben Sharp
Contracts Manager

Paul Evans
Quality Manager

Dry Density/Moisture Content Relationship

BS 1377:Part 4:1990

Client ref: **UA008386**
 Location: **Blacktoft to Yokefleet**
 Contract Number: **32431**
 Hole Number: **TP09**
 Sample Number: **1**
 Depth (m): **0.00 - 0.30**
 Sample Type: **B**
 Sample Description: **Brown slightly fine to coarse gravelly silty CLAY with rootlets.**



Compaction Point:	1	2	3	4	5
Moisture Content:	10	15	20	25.7	39.6
Bulk Density (Mg/m³):	1.59	1.73	1.87	1.91	1.76
Dry Density (Mg/m³):	1.44	1.50	1.56	1.52	1.26

Initial Moisture Content: **40** Method of Compaction: **2.5kg Rammer**
 Particle Density (Mg/m³): **2.65 Assumed** Material Retained on 37.5 mm Test Sieve (%): **0**
 Maximum Dry Density (mg/m³): **1.56** Material Retained on 20.0 mm Test Sieve (%): **1**
 Optimum Moisture Content (%): **20** Sample Preparation Clause: **3.2.4.1**

Remarks:

Checked By:
Ben Sharp

Approved By:
Paul Evans

Date Approved: **11.10.16**



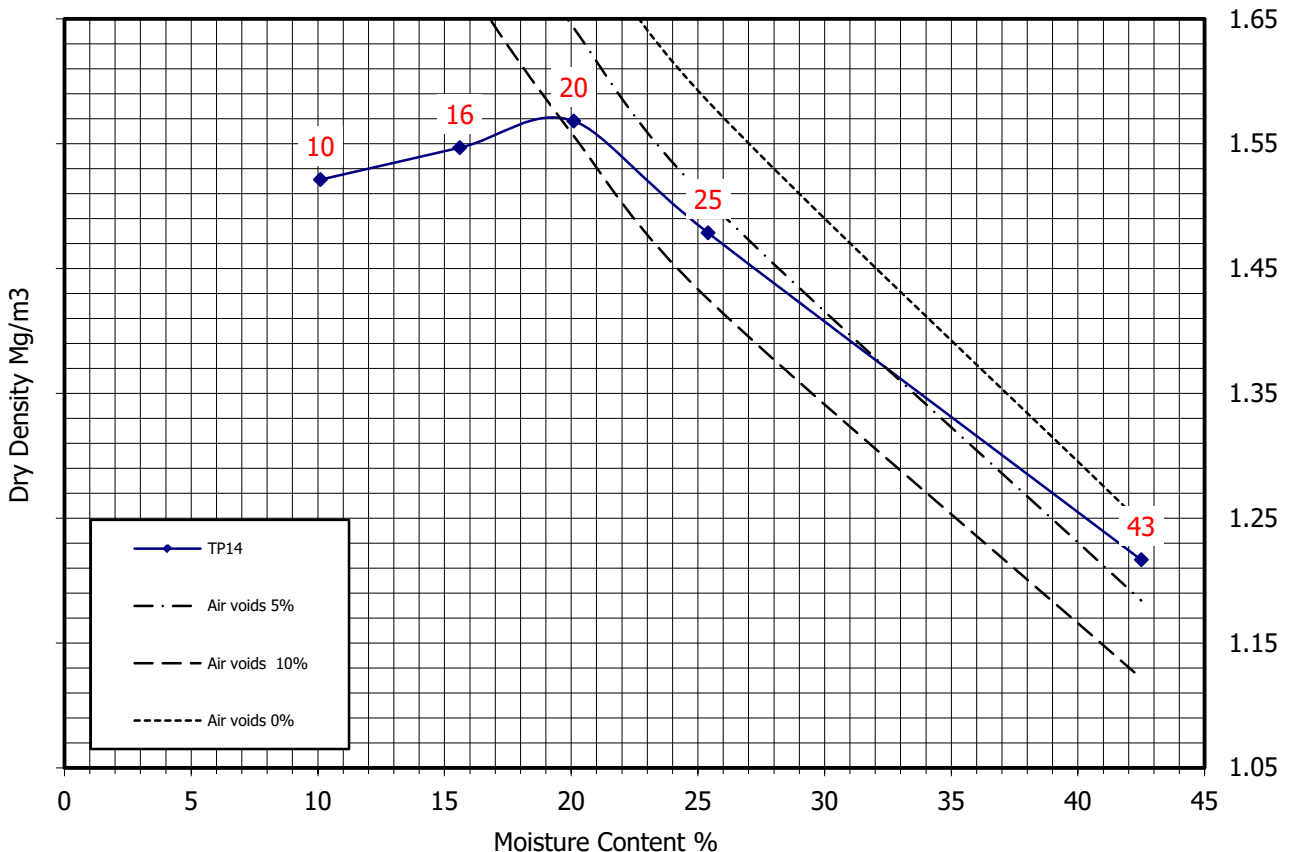
2788



Dry Density/Moisture Content Relationship

BS 1377:Part 4:1990

Client ref: **UA008386**
 Location: **Blacktoft to Yokefleet**
 Contract Number: **32431**
 Hole Number: **TP14**
 Sample Number: **1**
 Depth (m): **0.00 - 0.30**
 Sample Type: **B**
 Sample Description: **Brown very silty CLAY with rootlets.**



Compaction Point:	1	2	3	4	5
Moisture Content:	10	16	20	25.4	42.5
Bulk Density (Mg/m ³):	1.67	1.79	1.88	1.85	1.73
Dry Density (Mg/m ³):	1.52	1.55	1.57	1.48	1.22

Initial Moisture Content: **43** Method of Compaction: **2.5kg Rammer**
 Particle Density (Mg/m³): **2.65 Assumed** Material Retained on 37.5 mm Test Sieve (%): **0**
 Maximum Dry Density (mg/m³): **1.57** Material Retained on 20.0 mm Test Sieve (%): **0**
 Optimum Moisture Content (%): **20** Sample Preparation Clause: **3.2.4.1**

Remarks:

Checked By:
Ben Sharp

Date Approved:

Approved By:
Paul Evans

11.10.16



2788





Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 37495

Client Ref: **10011193 - 08**

Report Date:

Client PO: **14002356**

Client **Arcadis**
Fortran Rd
St Mellons
Cardiff
CF3 0EY

Contract Title: **Cosmeston**
For the attention of: **Christopher Pristavec**

Date Received: **05-12-2017**
Date Commenced: **05-12-2017**
Date Completed:

Test Description	Qty
Mobilisation to Site	2
Provision of WS tracked rig with 2 man crew & hand tools excludes liners and breaker and mob	4
Provision of geotechnical engineer to supervise works and log pits. Price includes day rate supervision	8
DP Cone Tip	8
Clear Core Wall Liners 1m Length	24
Hire of RD4000 - NR approved Cable detector	1
Day rate to provide Technician and equipment including mobilisation but excluding provision of machine as kentledge (to be provided by others) & Determination of the vertical deformation and strength characteristics of soil by the plate loading test, using a 600 mm diameter steel plate. The test comprises 4 No. loading and 1 No. unloading cycles, as specified by the Client. As many tests are required by client that can be done in one day.	1

- * UKAS

Notes: — Observations and Interpretations are outside the UKAS Accreditation

- * - denotes test included in laboratory scope of accreditation
- # - denotes test carried out by approved contractor
- @ - denotes non accredited tests

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Approved Signatories:

Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative Assistant)
Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 37495

Test Description	Qty
Postcrete	6

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Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative Assistant)

Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd

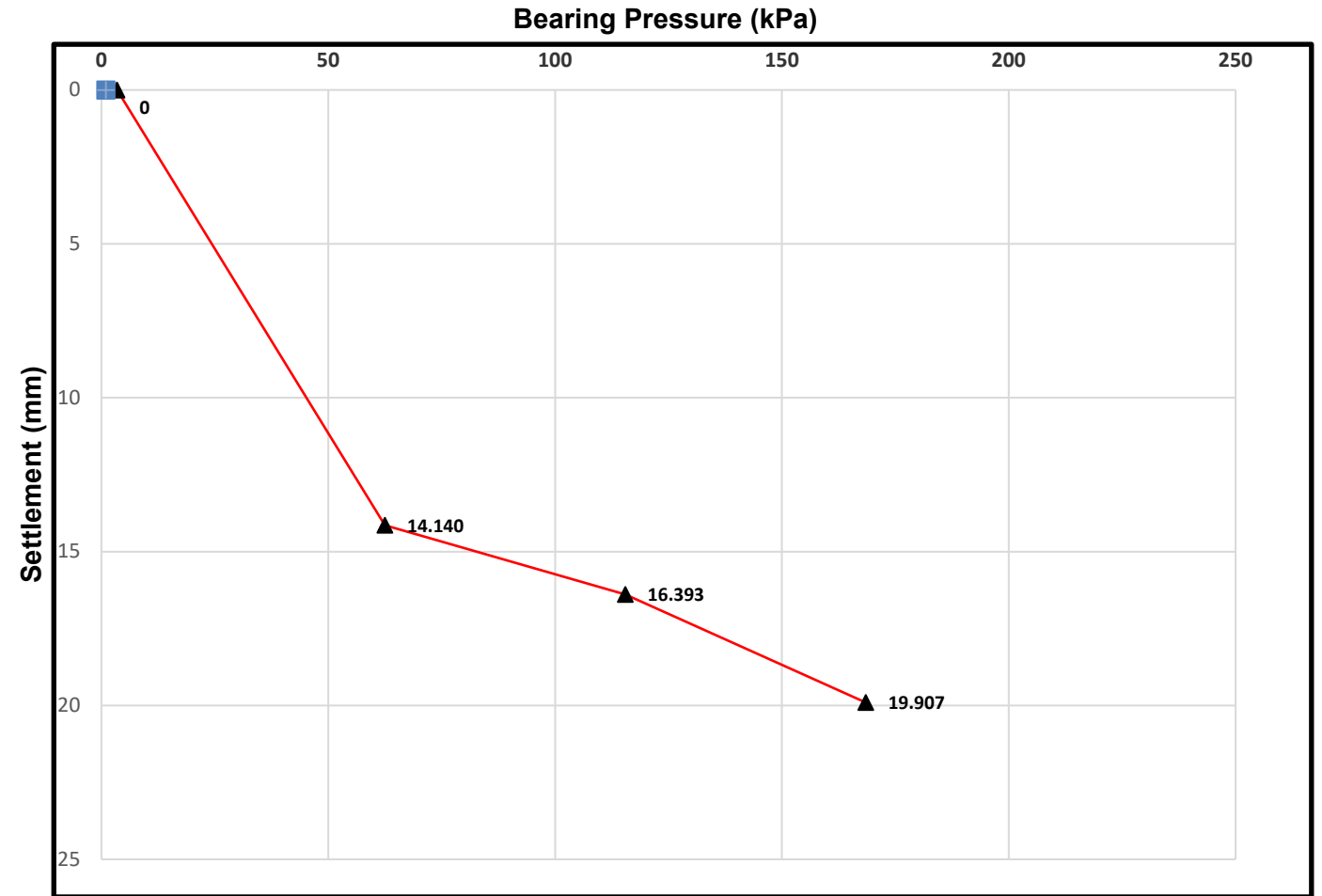
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk



Determination of the Vertical Deformation Tests BS 1377: Part 9: 1990 Clause 4.8

Contract Number	37495-051217
Client Reference	10011193 - 08
Test Date	11/12/2017
Test Location	PL101
Test Depth (m)	1.20
Kentledge Type	Tracked Excavator



Maximum Applied Pressure (kn/m2)	168.51
Maximum Deformation (mm)	19.91
Plate Area (m2)	0.16331
Assumed Poissons Ratio	0.25
Remarks	

Ground to soft max travel reached

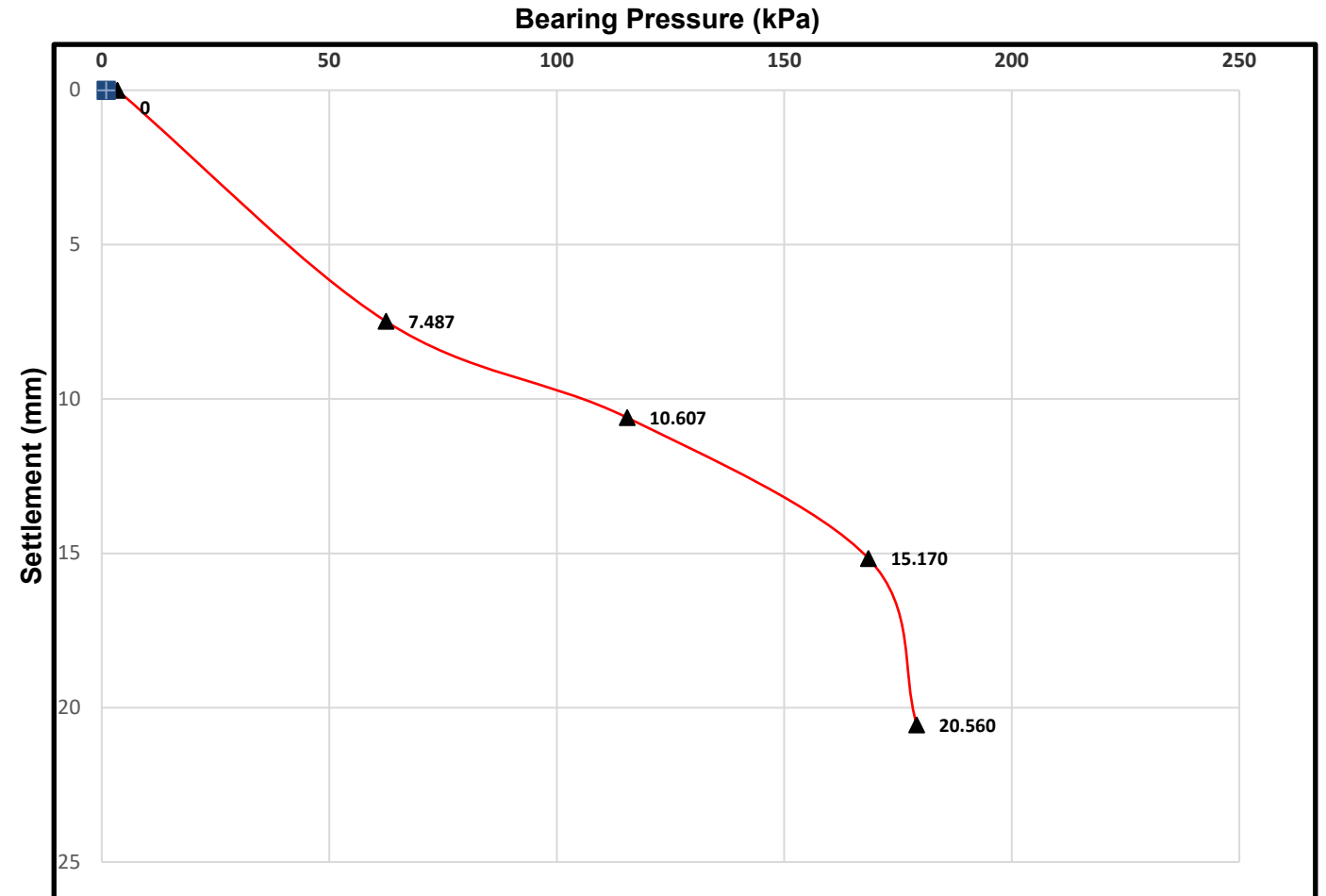
Test Operator	Checked and Authorised by		Vaughan Edwards	
Ben Steele	Date	12/12/2017		





Determination of the Vertical Deformation Tests BS 1377: Part 9: 1990 Clause 4.8

Contract Number	37495-051217
Client Reference	10011193 - 08
Test Date	11/12/2017
Test Location	PL102
Test Depth (m)	1.20
Kentledge Type	Tracked Excavator



Maximum Applied Pressure (kn/m2)	179.11
Maximum Deformation (mm)	20.56
Plate Area (m2)	0.16331
Assumed Poissons Ratio	0.25
Remarks	

Ground to soft max travel reached

Test Operator	Checked and Authorised by		Vaughan Edwards	
Ben Steele	Date	12/12/2017		





Contract Number: 37675

Client Ref: **UA008386-02**

Report Date: **13-01-2018**

Client PO: **14002356**

Client **Arcadis**
Fortran Rd
St Mellons
Cardiff
CF3 0EY

Contract Title: **Cosmeston Phase 2**
For the attention of: **Team Arcadis**

Date Received: **21-12-2017**
Date Commenced: **21-12-2017**
Date Completed: **13-01-2018**

Test Description	Qty
Moisture Content BS 1377 : Part 2 : 3.2 - * UKAS	9
4 Point Liquid & Plastic Limit (LL/PL) BS 1377 Part 2 : 4.3 & 5.3 - * UKAS	6
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) 1377 : 1990 Part 4 : 3.3 - * UKAS	3
BRE Suite D Ph Total Sulphate, Aqueous Sulphate, Total Sulphur, Aqueous Nitrate, Aqueous Mag, Chloride, - @ Non Accredited Test	2
Disposal of Samples on Project	1

Notes: Observations and Interpretations are outside the UKAS Accreditation
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Approved Signatories:

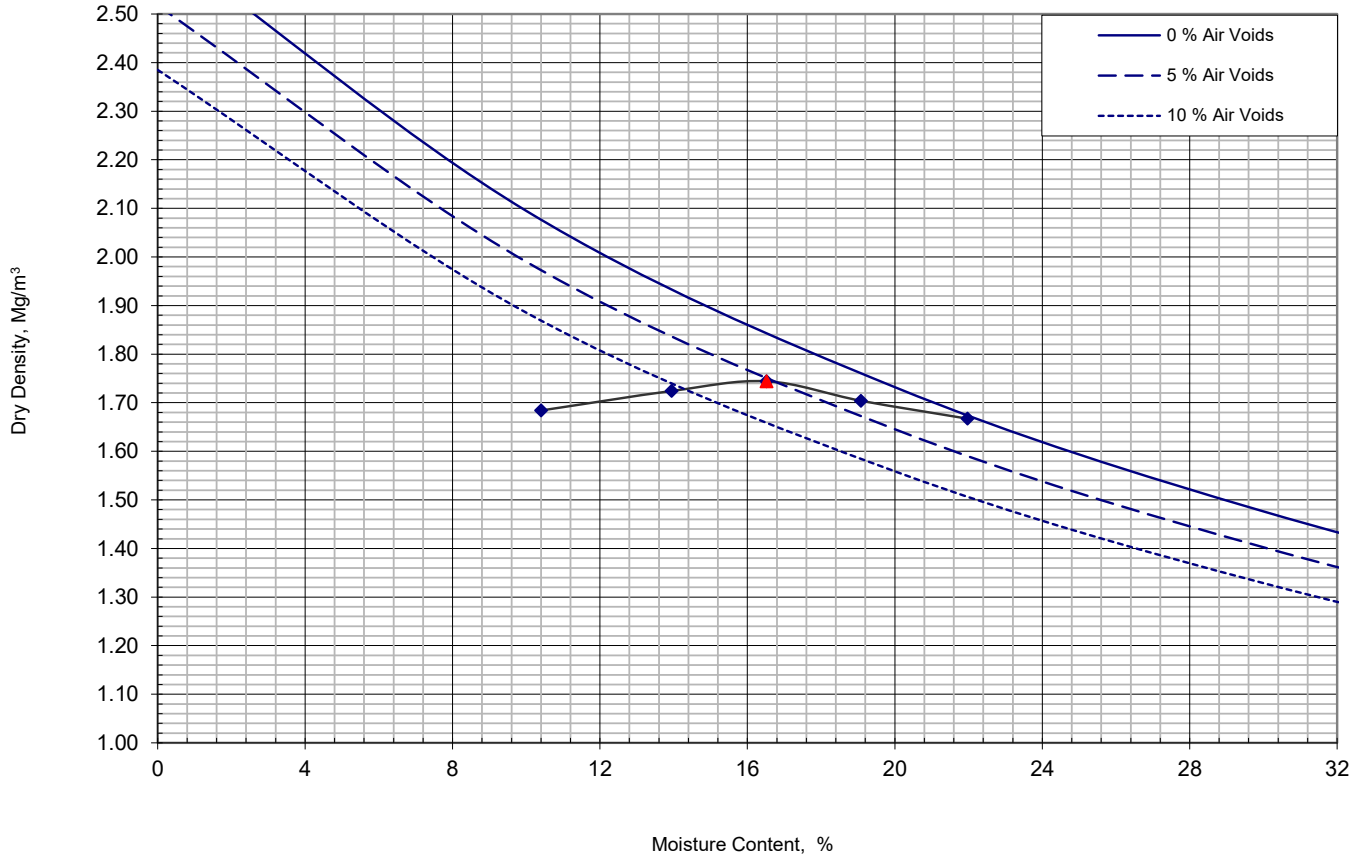
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative Assistant)
Vaughan Edwards (Managing Director) - Wayne Honey (Administrative/Quality Assistant)



**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	37675
Borehole / Pit No	TP105
Sample No	3
Depth Top	0.90
Depth Base	1.30
Sample Type	B

Site Name	Cosmeston Phase 2
Soil Description	Brown slightly fine gravelly sandy silty CLAY
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.4



Compaction Point	1	2	3	4	5						
Moisture Content	10	14	17	19	22						
Bulk Density	1.86	1.96	2.03	2.03	2.03						
Dry Density	1.68	1.72	1.74	1.70	1.67						

Initial Moisture Content	22	%
Maximum Dry Density	1.74	Mg/m3
Optimum Moisture Content	17	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators	Checked	12/01/2018	Sean Penn	
CA	Approved	13/01/2018	Ben Sharp	

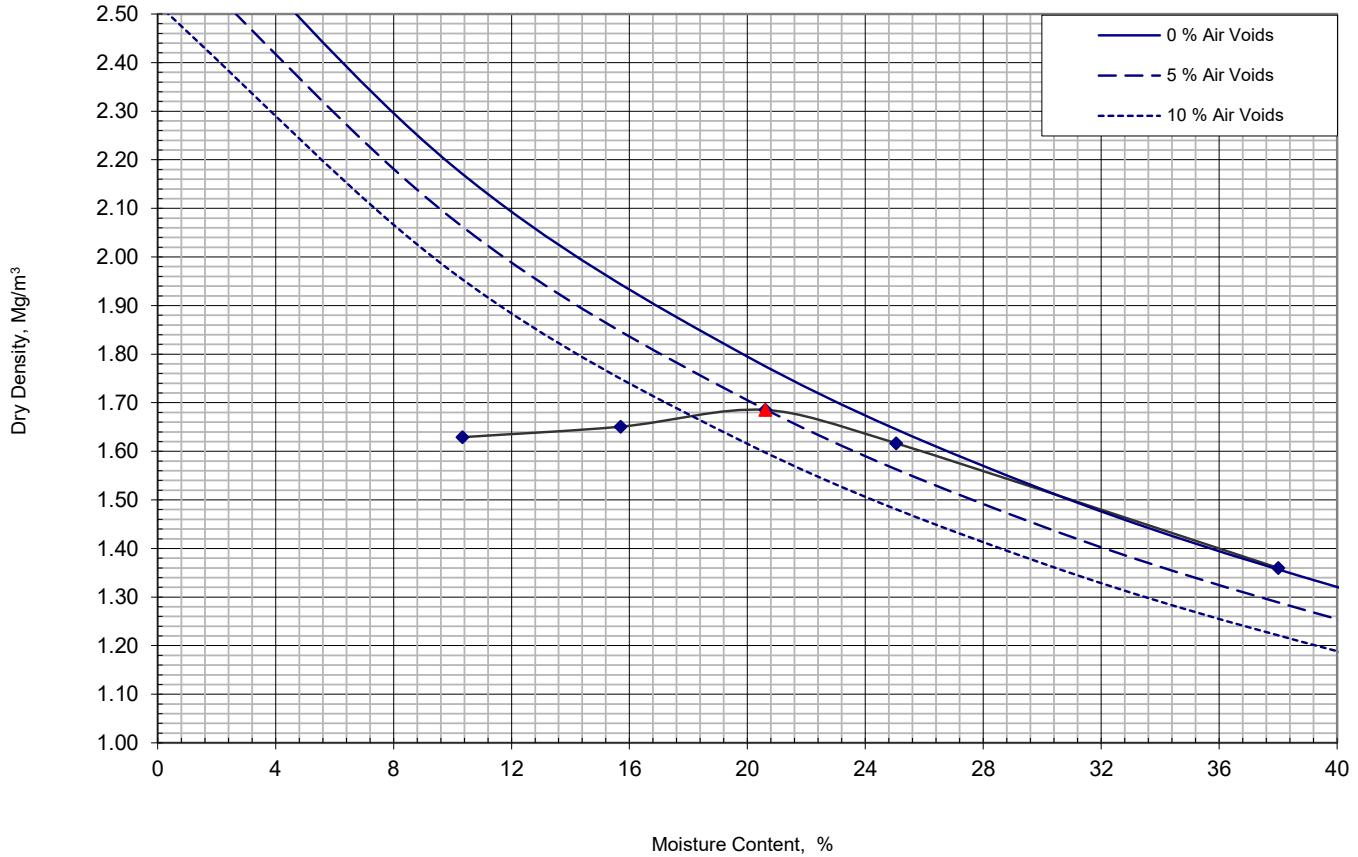




**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	37675
Borehole / Pit No	TP111
Sample No	3
Depth Top	0.70
Depth Base	1.20
Sample Type	B

Site Name	Cosmeston Phase 2
Soil Description	Brown slightly fine gravelly silty CLAY
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.4



Compaction Point	1	2	3	4	5						
Moisture Content	10	16	21	25	38						
Bulk Density	1.80	1.91	2.03	2.02	1.88						
Dry Density	1.63	1.65	1.69	1.62	1.36						

Initial Moisture Content	38	%
Maximum Dry Density	1.69	Mg/m3
Optimum Moisture Content	21	%
Particle Density	2.8 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators	Checked	12/01/2018	Sean Penn	
CA	Approved	13/01/2018	Ben Sharp	

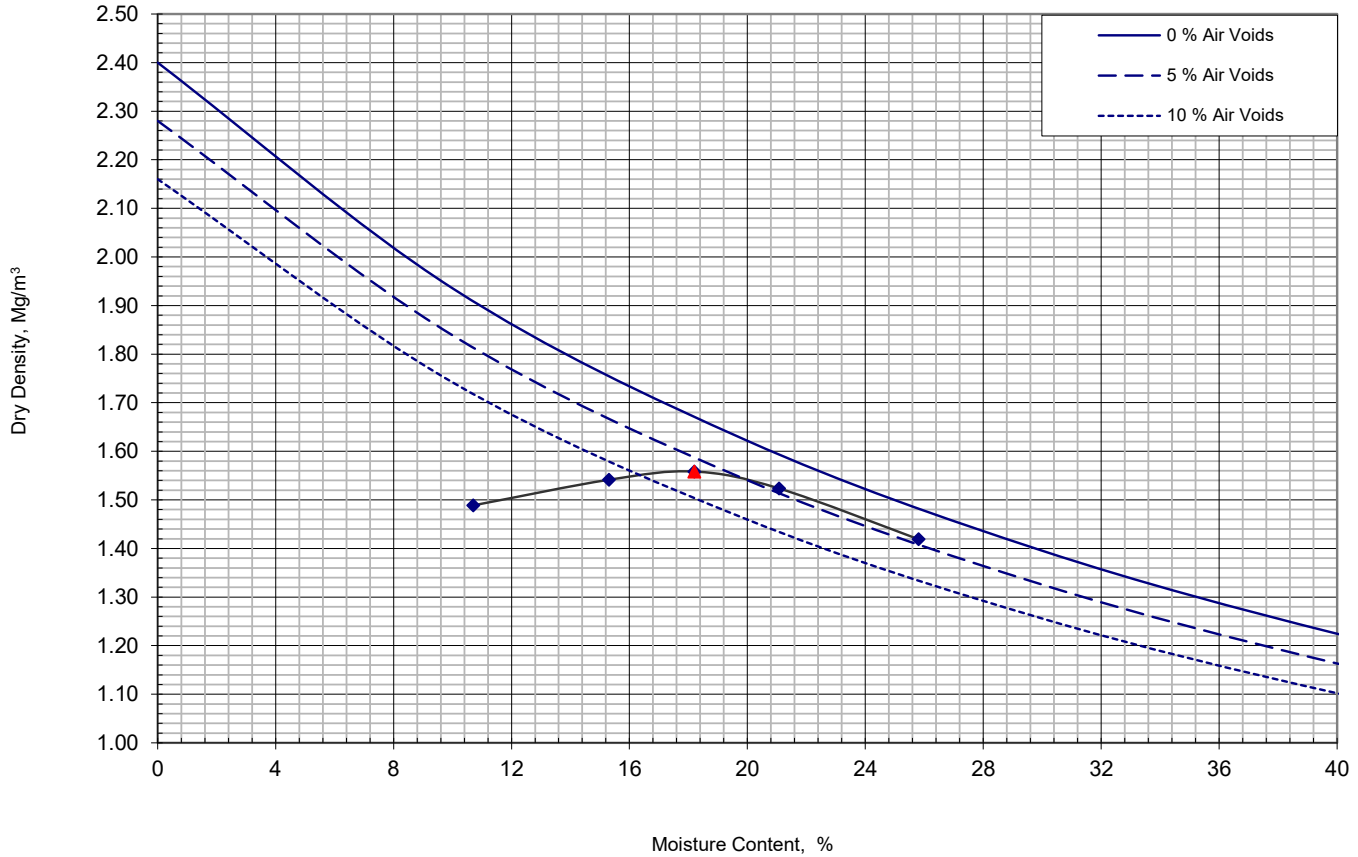




**Dry Density / Moisture Content Relationship
BS 1377:Part 4:1990**

Contract Number	37675
Borehole / Pit No	TP114
Sample No	
Depth Top	0.70
Depth Base	1.10
Sample Type	B

Site Name	Cosmeston Phase 2
Soil Description	Brown fine to medium gravelly silty CLAY
Compaction Method	2.5 Kg Rammer
Compaction Clause	BS1377:Part 4:1990, Clause 3.4



Compaction Point	1	2	3	4	5						
Moisture Content	11	15	18	21	26						
Bulk Density	1.65	1.78	1.84	1.84	1.79						
Dry Density	1.49	1.54	1.56	1.52	1.42						

Initial Moisture Content	26	%
Maximum Dry Density	1.56	Mg/m3
Optimum Moisture Content	18	%
Particle Density	2.4 Assumed	Mg/m3
Material Retained 37.5mm	0	%
Material Retained 20mm	0	%

Operators	Checked	12/01/2018	Sean Penn	
CA	Approved	13/01/2018	Ben Sharp	



APPENDIX G

GEO-ENVIRONMENTAL LABORATORY TEST DATA



4041

Sian Carter

Arcadis Consulting (UK) Ltd
 HCL House
 St Mellon's Business Park
 Cardiff
 CF3 OEY



i2 Analytical Ltd.
 7 Woodshots Meadow,
 Croxley Green
 Business Park,
 Watford,
 Herts,
 WD18 8YS

t: 029 2092 6873**e:** Sian.Carter@arcadis.com**t:** 01923 225404**f:** 01923 237404**e:** reception@i2analytical.com

Preliminary Report Number : 16-27453

Project / Site name:	Cosmeston	Samples received on:	12/09/2016
Your job number:	UA008386	Samples instructed on:	12/09/2016
Your order number:		Analysis completed by:	not complete
Report Issue Number:	0	Report issued on:	20/09/2016
Samples Analysed:	5 leachate samples - 24 soil samples		

Signed: _____

Rexona Rahman
 Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed: _____

Emma Winter
 Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627556	627557	627558	627559	627560
Sample Reference				WS01	WS03	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.50	0.00-0.20	2.30-2.40	0.00-0.50	0.10-0.40
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	05/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	17	16	18	18
Total mass of sample received	kg	0.001	NONE	1.5	1.2	1.2	1.3	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.1	8.7	8.2	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032	0.014	0.056	0.023	0.0094
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.021	0.029	-	0.037	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.87	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.47	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.38	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	2.7	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.54	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	6.3	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	5.2	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	3.2	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	4.4	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	5.7	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	2.1	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	3.1	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	1.6	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.59	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.7	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	38.8	< 1.60

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	18	3.4	10	10
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	2.2	0.7	0.6	2.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	27	12	13	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	34	35	25	48	37
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	34	8.9	33	34
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	38	24	33	47
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	4.0	< 1.0	2.4	2.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	110	19	64	75



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627556				627557		627558		627559		627560	
Sample Reference	WS01				WS03		WS03		WS04		WS05	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.20-0.50				0.00-0.20		2.30-2.40		0.00-0.50		0.10-0.40	
Date Sampled	05/09/2016				05/09/2016		05/09/2016		05/09/2016		05/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	27	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	66	22
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	93	22

Environmental Forensics**Organochlorine Pesticides**

Aldrin	µg/kg	10	NONE	To follow	-	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	To follow	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Dieldrin	µg/kg	10	NONE	To follow	-	-	-	-
Endosulphan A	µg/kg	10	NONE	To follow	-	-	-	-
Endosulphan B	µg/kg	10	NONE	To follow	-	-	-	-
Endrin	µg/kg	10	NONE	To follow	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	To follow	-	-	-	-
Heptachlor	µg/kg	10	NONE	To follow	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	To follow	-	-	-	-
Isodrin	µg/kg	10	NONE	To follow	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	To follow	-	-	-	-
o,p-DDE	µg/kg	10	NONE	To follow	-	-	-	-
o,p-DDT	µg/kg	10	NONE	To follow	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	To follow	-	-	-	-
p,p-DDE	µg/kg	10	NONE	To follow	-	-	-	-
p,p-DDT	µg/kg	10	NONE	To follow	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	To follow	-	-	-	-
Trifluralin	µg/kg	10	NONE	To follow	-	-	-	-

Organophosphorous pesticides

Azinphos-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Diazinon	µg/kg	10	NONE	To follow	-	-	-	-
Dichlorvos	µg/kg	10	NONE	To follow	-	-	-	-
Dimethoate	µg/kg	10	NONE	To follow	-	-	-	-
E-mevinphos	µg/kg	10	NONE	To follow	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	To follow	-	-	-	-
Fenitrothion	µg/kg	10	NONE	To follow	-	-	-	-
Fenthion	µg/kg	10	NONE	To follow	-	-	-	-
Malathion	µg/kg	10	NONE	To follow	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	To follow	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Phorate	µg/kg	10	NONE	To follow	-	-	-	-



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M-CERTS



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627556	627557	627558	627559	627560
Sample Reference				WS01	WS03	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.50	0.00-0.20	2.30-2.40	0.00-0.50	0.10-0.40
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	05/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627561				627562		627563		627564		627565	
Sample Reference	WS06				WS06		WS07		WS07		TP08	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.20				0.40-0.60		0.00-0.20		0.20-0.50		0.00-0.30	
Date Sampled	05/09/2016				05/09/2016		05/09/2016		05/09/2016		06/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	21	17	26	22	21				
Total mass of sample received	kg	0.001	NONE	1.4	1.5	1.4	1.2	1.5				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	8.0	7.4	8.0	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.0092	0.062	0.035	0.0091
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	0.039	-	0.021

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.61	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.53	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.37	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.43	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.27	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.33	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	2.96	< 1.60	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	13	16	11	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.2	1.6	2.5	1.9	2.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.8	0.9	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	23	33	27	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	39	35	40	40	48
Lead (aqua regia extractable)	mg/kg	1	MCERTS	35	27	60	32	48
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	45	41	57	63	41
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	2.7	3.4	1.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	91	67	180	150	140



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627561				627562				627563				627564				627565			
Sample Reference	WS06				WS06				WS07				WS07				TP08			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.00-0.20				0.40-0.60				0.00-0.20				0.20-0.50				0.00-0.30			
Date Sampled	05/09/2016				05/09/2016				05/09/2016				05/09/2016				06/09/2016			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

Petroleum Hydrocarbons

Analytical Parameter	Units	Limit of detection	Accreditation Status	627561	627562	627563	627564	627565
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	-	< 2.0	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	< 8.0	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	< 8.0	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	< 10	-	< 10	-	< 10

Analytical Parameter	Units	Limit of detection	Accreditation Status	627561	627562	627563	627564	627565
TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	-	< 2.0	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	< 10	-	< 10	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	< 10	-	< 10	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10	-	< 10	-	< 10

Environmental Forensics

Organochlorine Pesticides

Analytical Parameter	Units	Limit of detection	Accreditation Status	627561	627562	627563	627564	627565
Aldrin	µg/kg	10	NONE	-	-	-	-	To follow
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	-	-	-	-	To follow
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-	To follow
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-	To follow
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-	To follow
Dieldrin	µg/kg	10	NONE	-	-	-	-	To follow
Endosulphan A	µg/kg	10	NONE	-	-	-	-	To follow
Endosulphan B	µg/kg	10	NONE	-	-	-	-	To follow
Endrin	µg/kg	10	NONE	-	-	-	-	To follow
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-	To follow
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-	To follow
Heptachlor	µg/kg	10	NONE	-	-	-	-	To follow
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-	To follow
Isodrin	µg/kg	10	NONE	-	-	-	-	To follow
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-	To follow
o,p-DDE	µg/kg	10	NONE	-	-	-	-	To follow
o,p-DDT	µg/kg	10	NONE	-	-	-	-	To follow
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-	To follow
p,p-DDE	µg/kg	10	NONE	-	-	-	-	To follow
p,p-DDT	µg/kg	10	NONE	-	-	-	-	To follow
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-	To follow
Trifluralin	µg/kg	10	NONE	-	-	-	-	To follow

Organophosphorous pesticides

Analytical Parameter	Units	Limit of detection	Accreditation Status	627561	627562	627563	627564	627565
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	To follow
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-	To follow
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-	To follow
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-	To follow
Diazinon	µg/kg	10	NONE	-	-	-	-	To follow
Dichlorvos	µg/kg	10	NONE	-	-	-	-	To follow
Dimethoate	µg/kg	10	NONE	-	-	-	-	To follow
E-mevinphos	µg/kg	10	NONE	-	-	-	-	To follow
Z-mevinphos	µg/kg	10	NONE	-	-	-	-	To follow
Fenitrothion	µg/kg	10	NONE	-	-	-	-	To follow
Fenthion	µg/kg	10	NONE	-	-	-	-	To follow
Malathion	µg/kg	10	NONE	-	-	-	-	To follow
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-	To follow
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	To follow
Phorate	µg/kg	10	NONE	-	-	-	-	To follow



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M-CERTS



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627561	627562	627563	627564	627565
Sample Reference				WS06	WS06	WS07	WS07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.20	0.40-0.60	0.00-0.20	0.20-0.50	0.00-0.30
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627566	627567	627568	627569	627570
Sample Reference				TP08	TP09	TP10	TP11	TP12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-1.30	0.00-0.30	0.00-0.30	0.00-0.20	0.00-0.30
Date Sampled				06/09/2016	06/09/2016	06/09/2016	06/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	13	20	21	23	24
Total mass of sample received	kg	0.001	NONE	1.0	1.4	1.5	1.4	1.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	7.7	7.6	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0091	0.011	0.012	0.017	0.032
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.30
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.95
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.73
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.55
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.62
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.91
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.27
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.53
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.27
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.27

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	5.40

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.5	13	16	19	19
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	2.9	2.4	3.8	4.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.6	0.5	0.6	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.8	26	27	24	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	42	43	45	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.7	49	46	46	61
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	40	44	54	44
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	3.1	4.0	2.7	1.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	130	110	140	160



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627566			627567			627568			627569			627570		
Sample Reference	TP08			TP09			TP10			TP11			TP12		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.70-1.30			0.00-0.30			0.00-0.30			0.00-0.20			0.00-0.30		
Date Sampled	06/09/2016			06/09/2016			06/09/2016			06/09/2016			06/09/2016		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	627566	627567	627568	627569	627570
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	< 10

Parameter	Units	Limit of detection	Accreditation Status	627566	627567	627568	627569	627570
TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	< 10	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	< 10	23
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	23

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627566	627567	627568	627569	627570
Aldrin	µg/kg	10	NONE	-	-	-	To follow	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	-	-	-	To follow	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	To follow	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	To follow	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	To follow	-
Dieldrin	µg/kg	10	NONE	-	-	-	To follow	-
Endosulphan A	µg/kg	10	NONE	-	-	-	To follow	-
Endosulphan B	µg/kg	10	NONE	-	-	-	To follow	-
Endrin	µg/kg	10	NONE	-	-	-	To follow	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	To follow	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	To follow	-
Heptachlor	µg/kg	10	NONE	-	-	-	To follow	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	To follow	-
Isodrin	µg/kg	10	NONE	-	-	-	To follow	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	To follow	-
o,p-DDE	µg/kg	10	NONE	-	-	-	To follow	-
o,p-DDT	µg/kg	10	NONE	-	-	-	To follow	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	To follow	-
p,p-DDE	µg/kg	10	NONE	-	-	-	To follow	-
p,p-DDT	µg/kg	10	NONE	-	-	-	To follow	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	To follow	-
Trifluralin	µg/kg	10	NONE	-	-	-	To follow	-

Organophosphorous pesticides

Parameter	Units	Limit of detection	Accreditation Status	627566	627567	627568	627569	627570
Azinphos-methyl	µg/kg	10	NONE	-	-	-	To follow	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	To follow	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	To follow	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	To follow	-
Diazinon	µg/kg	10	NONE	-	-	-	To follow	-
Dichlorvos	µg/kg	10	NONE	-	-	-	To follow	-
Dimethoate	µg/kg	10	NONE	-	-	-	To follow	-
E-mevinphos	µg/kg	10	NONE	-	-	-	To follow	-
Z-mevinphos	µg/kg	10	NONE	-	-	-	To follow	-
Fenitrothion	µg/kg	10	NONE	-	-	-	To follow	-
Fenthion	µg/kg	10	NONE	-	-	-	To follow	-
Malathion	µg/kg	10	NONE	-	-	-	To follow	-
Parathion-ethyl	µg/kg	10	NONE	-	-	-	To follow	-
Parathion-methyl	µg/kg	10	NONE	-	-	-	To follow	-
Phorate	µg/kg	10	NONE	-	-	-	To follow	-



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M-CERTS



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627566	627567	627568	627569	627570
Sample Reference				TP08	TP09	TP10	TP11	TP12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-1.30	0.00-0.30	0.00-0.30	0.00-0.20	0.00-0.30
Date Sampled				06/09/2016	06/09/2016	06/09/2016	06/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627571	627572	627573	627574	627575
Sample Reference				TP18	TP21	TP13	TP14	TP15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.20
Date Sampled				06/09/2016	06/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	24	21	18	27	20
Total mass of sample received	kg	0.001	NONE	1.2	1.5	1.4	1.1	1.5

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	7.3	8.1	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.017	0.019	0.017	0.018	0.011
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.025	-	0.028	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.28	0.28	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.60	1.8	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.52	1.2	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.31	1.4	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.38	1.1	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.36	2.1	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.26	0.75	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.31	1.3	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.55	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.15	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.48	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	3.02	11.2	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	16	14	8.6	14
Boron (water soluble)	mg/kg	0.2	MCERTS	3.9	2.5	2.4	3.2	2.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	0.7	0.8	0.6	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	30	22	22	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	37	43	37	36
Lead (aqua regia extractable)	mg/kg	1	MCERTS	65	49	65	51	49
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	41	52	47	38	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.9	3.3	< 1.0	< 1.0	3.3
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	110	150	150	160



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627571			627572			627573			627574			627575		
Sample Reference	TP18			TP21			TP13			TP14			TP15		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.00-0.30			0.00-0.30			0.00-0.30			0.00-0.30			0.00-0.20		
Date Sampled	06/09/2016			06/09/2016			07/09/2016			07/09/2016			07/09/2016		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	9.4	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	< 10	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	26	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	26	-

Environmental Forensics**Organochlorine Pesticides**

Aldrin	µg/kg	10	NONE	To follow	-	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	To follow	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
Dieldrin	µg/kg	10	NONE	To follow	-	-	-	-
Endosulphan A	µg/kg	10	NONE	To follow	-	-	-	-
Endosulphan B	µg/kg	10	NONE	To follow	-	-	-	-
Endrin	µg/kg	10	NONE	To follow	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	To follow	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	To follow	-	-	-	-
Heptachlor	µg/kg	10	NONE	To follow	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	To follow	-	-	-	-
Isodrin	µg/kg	10	NONE	To follow	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	To follow	-	-	-	-
o,p-DDE	µg/kg	10	NONE	To follow	-	-	-	-
o,p-DDT	µg/kg	10	NONE	To follow	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	To follow	-	-	-	-
p,p-DDE	µg/kg	10	NONE	To follow	-	-	-	-
p,p-DDT	µg/kg	10	NONE	To follow	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	To follow	-	-	-	-
Trifluralin	µg/kg	10	NONE	To follow	-	-	-	-

Organophosphorous pesticides

Azinphos-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	To follow	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Diazinon	µg/kg	10	NONE	To follow	-	-	-	-
Dichlorvos	µg/kg	10	NONE	To follow	-	-	-	-
Dimethoate	µg/kg	10	NONE	To follow	-	-	-	-
E-mevinphos	µg/kg	10	NONE	To follow	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	To follow	-	-	-	-
Fenitrothion	µg/kg	10	NONE	To follow	-	-	-	-
Fenthion	µg/kg	10	NONE	To follow	-	-	-	-
Malathion	µg/kg	10	NONE	To follow	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	To follow	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	To follow	-	-	-	-
Phorate	µg/kg	10	NONE	To follow	-	-	-	-



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627571	627572	627573	627574	627575
Sample Reference				TP18	TP21	TP13	TP14	TP15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.20
Date Sampled				06/09/2016	06/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627576	627577	627578	627579
Sample Reference				TP16	TP17	TP19	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30
Date Sampled				07/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	24	23	24	20
Total mass of sample received	kg	0.001	NONE	1.4	1.2	1.3	1.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	6.9	7.6	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.025	0.015	0.014	0.011
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	0.26	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	0.98	< 0.10	0.54	< 0.10
Pyrene	mg/kg	0.1	MCERTS	0.77	< 0.10	0.40	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.60	< 0.10	0.26	< 0.10
Chrysene	mg/kg	0.05	MCERTS	0.46	< 0.05	0.30	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.49	< 0.10	0.36	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.20	< 0.10	0.19	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.38	< 0.10	0.26	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.26	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.27	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	4.67	< 1.60	2.31	< 1.60

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	9.2	15	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.6	3.0	3.0	2.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	< 0.2	0.6	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	26	31	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	23	38	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40	37	53	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	34	39	40
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.6	< 1.0	1.8	2.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	82	110	110



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MCCERTS



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627576			627577			627578			627579		
Sample Reference	TP16			TP17			TP19			TP20		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.00-0.30			0.00-0.30			0.00-0.30			0.00-0.30		
Date Sampled	07/09/2016			07/09/2016			07/09/2016			07/09/2016		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	627576	627577	627578	627579
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	< 10	< 10

Parameter	Units	Limit of detection	Accreditation Status	627576	627577	627578	627579
TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	< 10	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	< 10	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	< 10	< 10

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627576	627577	627578	627579
Aldrin	µg/kg	10	NONE	-	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-	-
Endosulphan A	µg/kg	10	NONE	-	-	-	-
Endosulphan B	µg/kg	10	NONE	-	-	-	-
Endrin	µg/kg	10	NONE	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-
Heptachlor	µg/kg	10	NONE	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-
Isodrin	µg/kg	10	NONE	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-
o,p-DDE	µg/kg	10	NONE	-	-	-	-
o,p-DDT	µg/kg	10	NONE	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-
p,p-DDE	µg/kg	10	NONE	-	-	-	-
p,p-DDT	µg/kg	10	NONE	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-	-

Organophosphorous pesticides

Parameter	Units	Limit of detection	Accreditation Status	627576	627577	627578	627579
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-
Diazinon	µg/kg	10	NONE	-	-	-	-
Dichlorvos	µg/kg	10	NONE	-	-	-	-
Dimethoate	µg/kg	10	NONE	-	-	-	-
E-mevinphos	µg/kg	10	NONE	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	-	-	-	-
Fenitrothion	µg/kg	10	NONE	-	-	-	-
Fenthion	µg/kg	10	NONE	-	-	-	-
Malathion	µg/kg	10	NONE	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	-	-	-
Phorate	µg/kg	10	NONE	-	-	-	-



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M-CERTS



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627576	627577	627578	627579
Sample Reference				TP16	TP17	TP19	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30
Date Sampled				07/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627580				627581				627582				627583				627584			
Sample Reference	WS03				WS04				WS07				TP08				TP21			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.00-0.20				0.00-0.50				0.00-0.20				0.00-0.30				0.00-0.30			
Date Sampled	07/09/2016				07/09/2016				07/09/2016				07/09/2016				07/09/2016			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status																	

General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
pH	pH Units	N/A	ISO 17025	8.0	8.0	8.1	7.9	7.6
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	2.6	8.7	28	1.7	3.9
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	100	88	120	92	44

Total Phenols

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10

Speciated PAHs

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Arsenic (dissolved)	µg/l	1.1	ISO 17025	1.3	< 1.1	< 1.1	< 1.1	1.2
Boron (dissolved)	µg/l	10	ISO 17025	39	22	76	58	65
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.9	< 0.4	< 0.4	2.2
Copper (dissolved)	µg/l	0.7	ISO 17025	16	7.1	25	21	18
Lead (dissolved)	µg/l	1	ISO 17025	1.8	1.2	< 1.0	< 1.0	1.3
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5	0.7	5.1	1.6	7.8
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.8	3.5	20	7.0	8.3



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627580				627581	627582	627583	627584
Sample Reference	WS03				WS04	WS07	TP08	TP21
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.00-0.20				0.00-0.50	0.00-0.20	0.00-0.30	0.00-0.30
Date Sampled	07/09/2016				07/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Environmental Forensics
Organochlorine Pesticides

	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Alpha-HCH (Alpha BHC)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Aldrin	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Beta-HCH (Beta-BHC)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Chlordane (sum of cis & trans isomers)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Delta-HCH (Delta-BHC)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Dieldrin	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Endosulphan A	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Endosulphan B	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Endrin	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
HCB (Hexachlorobenzene)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Heptachlor Epoxide	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Heptachlor	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Isodrin	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
o,p-DDE	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
o,p-DDT	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
o,p-TDE (o,p-DDD)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
p,p-DDE	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
p,p-DDT	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
pp-Methoxychlor	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
p,p-TDE (p,p-DDD)	µg/l	0.01	NONE	To follow	-	To follow	To follow	-
Trifluralin	µg/l	0.01	NONE	To follow	-	To follow	To follow	-



Preliminary Report Number : 16-27453

Project / Site name: Cosmeston

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
627556	WS01	None Supplied	0.20-0.50	Brown loam and clay with gravel and vegetation.
627557	WS03	None Supplied	0.00-0.20	Brown loam and clay with gravel and vegetation.
627558	WS03	None Supplied	2.30-2.40	Grey clay and sand.
627559	WS04	None Supplied	0.00-0.50	Brown loam and sand with gravel and vegetation.
627560	WS05	None Supplied	0.10-0.40	Brown loam and clay with gravel and vegetation.
627561	WS06	None Supplied	0.00-0.20	Brown loam and clay with gravel.
627562	WS06	None Supplied	0.40-0.60	Brown loam and clay with gravel.
627563	WS07	None Supplied	0.00-0.20	Brown loam and clay with vegetation.
627564	WS07	None Supplied	0.20-0.50	Brown loam and clay with vegetation.
627565	TP08	None Supplied	0.00-0.30	Brown loam and clay.
627566	TP08	None Supplied	0.70-1.30	Brown sandy clay.
627567	TP09	None Supplied	0.00-0.30	Brown loam and sand with gravel and vegetation.
627568	TP10	None Supplied	0.00-0.30	Brown loam and sand with gravel and vegetation.
627569	TP11	None Supplied	0.00-0.20	Brown loam and clay with vegetation.
627570	TP12	None Supplied	0.00-0.30	Brown loam and clay.
627571	TP18	None Supplied	0.00-0.30	Brown clay and sand with gravel and vegetation.
627572	TP21	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627573	TP13	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627574	TP14	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627575	TP15	None Supplied	0.00-0.20	Brown loam and clay with gravel and vegetation.
627576	TP16	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627577	TP17	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627578	TP19	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627579	TP20	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.



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MCERTS



Preliminary Report Number : 16-27453

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Leachate	Determination of Alkalinity by discreet analyser (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in leachate	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS

Iss No 16-27453-0 Cosmeston UA008386

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The results included within the report are representative of the samples submitted for analysis.

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MCERTS



Preliminary Report Number : 16-27453

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TO - Organochlorine pesticides in leachate	Determination of organochlorine pesticides in leachate by GC-MS	In-house method Determination of organochlorine pesticides in leachate by GC-MS		W	NONE
TO - Organochlorine pesticides in soil	Determination of OCPs by extraction with hexane followed by GC-MS.	In-house method		W	NONE
TO - Organophosphorous pesticides in soil	Determination of OPPs by extraction with DCM followed by GC-MS.	In-house method		W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 16-27453

Project / Site name:	Cosmeston	Samples received on:	12/09/2016
Your job number:	UA008386	Samples instructed on:	12/09/2016
Your order number:		Analysis completed by:	22/09/2016
Report Issue Number:	1	Report issued on:	22/09/2016
Samples Analysed:	5 leachate samples - 24 soil samples		

Signed: 

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed: 

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627556				627557		627558		627559		627560	
Sample Reference	WS01				WS03		WS03		WS04		WS05	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.20-0.50				0.00-0.20		2.30-2.40		0.00-0.50		0.10-0.40	
Date Sampled	05/09/2016				05/09/2016		05/09/2016		05/09/2016		05/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	14	17	16	18	18	18	18	18	
Total mass of sample received	kg	0.001	NONE	1.5	1.2	1.2	1.3	1.3	1.3	1.2	1.2	

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.1	8.7	8.2	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.032	0.014	0.056	0.023	0.0094
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.021	0.029	-	0.037	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.87	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.47	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.38	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	2.7	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.54	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	6.3	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	5.2	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	3.2	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	4.4	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	5.7	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	2.1	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	3.1	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	1.6	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.59	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	1.7	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	38.8	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	18	3.4	10	10
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	2.2	0.7	0.6	2.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	27	12	13	27
Copper (aqua regia extractable)	mg/kg	1	MCERTS	34	35	25	48	37
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	34	8.9	33	34
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	38	24	33	47
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	4.0	< 1.0	2.4	2.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	110	19	64	75

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627556	627557	627558	627559	627560
Sample Reference				WS01	WS03	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.50	0.00-0.20	2.30-2.40	0.00-0.50	0.10-0.40
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	05/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	27	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	66	22
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	93	22

Environmental Forensics
Organochlorine Pesticides

	Units	Limit of detection	Accreditation Status	627556	627557	627558	627559	627560
Aldrin	µg/kg	10	NONE	< 10	-	-	-	-
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	< 10	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Dieldrin	µg/kg	10	NONE	< 10	-	-	-	-
Endosulphan A	µg/kg	10	NONE	< 10	-	-	-	-
Endosulphan B	µg/kg	10	NONE	< 10	-	-	-	-
Endrin	µg/kg	10	NONE	< 10	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	< 10	-	-	-	-
Heptachlor	µg/kg	10	NONE	< 10	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	< 10	-	-	-	-
Isodrin	µg/kg	10	NONE	< 10	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	< 10	-	-	-	-
o,p-DDE	µg/kg	10	NONE	< 10	-	-	-	-
o,p-DDT	µg/kg	10	NONE	< 10	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	< 10	-	-	-	-
p,p-DDE	µg/kg	10	NONE	< 10	-	-	-	-
p,p-DDT	µg/kg	10	NONE	< 10	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	< 10	-	-	-	-
Trifluralin	µg/kg	10	NONE	< 10	-	-	-	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627556	627557	627558	627559	627560
Sample Reference				WS01	WS03	WS03	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.50	0.00-0.20	2.30-2.40	0.00-0.50	0.10-0.40
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	05/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Diazinon	µg/kg	10	NONE	< 10	-	-	-	-
Dichlorvos	µg/kg	10	NONE	< 10	-	-	-	-
Dimethoate	µg/kg	10	NONE	< 10	-	-	-	-
E-mevinphos	µg/kg	10	NONE	< 10	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	< 10	-	-	-	-
Fenitrothion	µg/kg	10	NONE	< 10	-	-	-	-
Fenthion	µg/kg	10	NONE	< 10	-	-	-	-
Malathion	µg/kg	10	NONE	< 10	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	< 10	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Phorate	µg/kg	10	NONE	< 10	-	-	-	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627561				627562		627563		627564		627565	
Sample Reference	WS06				WS06		WS07		WS07		TP08	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.20				0.40-0.60		0.00-0.20		0.20-0.50		0.00-0.30	
Date Sampled	05/09/2016				05/09/2016		05/09/2016		05/09/2016		06/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	21	17	26	22	21				
Total mass of sample received	kg	0.001	NONE	1.4	1.5	1.4	1.2	1.5				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	8.0	7.4	8.0	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.0092	0.062	0.035	0.0091
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	0.039	-	0.021

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.61	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.53	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.37	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.43	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.27	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.33	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	2.96	< 1.60	< 1.60

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	13	16	11	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.2	1.6	2.5	1.9	2.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	0.8	0.9	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	23	33	27	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	39	35	40	40	48
Lead (aqua regia extractable)	mg/kg	1	MCERTS	35	27	60	32	48
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	45	41	57	63	41
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	2.7	3.4	1.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	91	67	180	150	140

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	-	< 2.0	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	< 8.0	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	< 8.0	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	< 10	-	< 10	-	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627561	627562	627563	627564	627565
Sample Reference				WS06	WS06	WS07	WS07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.20	0.40-0.60	0.00-0.20	0.20-0.50	0.00-0.30
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	-	< 2.0	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	< 10	-	< 10	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	< 10	-	< 10	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10	-	< 10	-	< 10

Environmental Forensics
Organochlorine Pesticides

	Units	Limit of detection	Accreditation Status					
Aldrin	µg/kg	10	NONE	-	-	-	-	< 10
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	-	-	-	-	< 10
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-	< 10
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-	< 10
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-	< 10
Dieldrin	µg/kg	10	NONE	-	-	-	-	< 10
Endosulphan A	µg/kg	10	NONE	-	-	-	-	< 10
Endosulphan B	µg/kg	10	NONE	-	-	-	-	< 10
Endrin	µg/kg	10	NONE	-	-	-	-	< 10
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-	< 10
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-	< 10
Heptachlor	µg/kg	10	NONE	-	-	-	-	< 10
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-	< 10
Isodrin	µg/kg	10	NONE	-	-	-	-	< 10
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-	< 10
o,p-DDE	µg/kg	10	NONE	-	-	-	-	< 10
o,p-DDT	µg/kg	10	NONE	-	-	-	-	< 10
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-	< 10
p,p-DDE	µg/kg	10	NONE	-	-	-	-	< 10
p,p-DDT	µg/kg	10	NONE	-	-	-	-	< 10
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-	< 10
Trifluralin	µg/kg	10	NONE	-	-	-	-	< 10



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627561	627562	627563	627564	627565
Sample Reference				WS06	WS06	WS07	WS07	TP08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.20	0.40-0.60	0.00-0.20	0.20-0.50	0.00-0.30
Date Sampled				05/09/2016	05/09/2016	05/09/2016	05/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-	< 10
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-	< 10
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Diazinon	µg/kg	10	NONE	-	-	-	-	< 10
Dichlorvos	µg/kg	10	NONE	-	-	-	-	< 10
Dimethoate	µg/kg	10	NONE	-	-	-	-	< 10
E-mevinphos	µg/kg	10	NONE	-	-	-	-	< 10
Z-mevinphos	µg/kg	10	NONE	-	-	-	-	< 10
Fenitrothion	µg/kg	10	NONE	-	-	-	-	< 10
Fenthion	µg/kg	10	NONE	-	-	-	-	< 10
Malathion	µg/kg	10	NONE	-	-	-	-	< 10
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-	< 10
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Phorate	µg/kg	10	NONE	-	-	-	-	< 10



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627566				627567		627568		627569		627570	
Sample Reference	TP08				TP09		TP10		TP11		TP12	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.70-1.30				0.00-0.30		0.00-0.30		0.00-0.20		0.00-0.30	
Date Sampled	06/09/2016				06/09/2016		06/09/2016		06/09/2016		06/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	13	20	21	23	24				
Total mass of sample received	kg	0.001	NONE	1.0	1.4	1.5	1.4	1.4				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	7.7	7.6	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0091	0.011	0.012	0.017	0.032
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.30
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.95
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.73
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.55
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.62
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.91
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.27
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.53
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	0.27
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.27

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	5.40
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.5	13	16	19	19
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	2.9	2.4	3.8	4.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.6	0.5	0.6	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	8.8	26	27	24	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	42	43	45	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.7	49	46	46	61
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	40	44	54	44
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	3.1	4.0	2.7	1.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47	130	110	140	160

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627566	627567	627568	627569	627570
Sample Reference				TP08	TP09	TP10	TP11	TP12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-1.30	0.00-0.30	0.00-0.30	0.00-0.20	0.00-0.30
Date Sampled				06/09/2016	06/09/2016	06/09/2016	06/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	< 10	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	< 10	23
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	23

Environmental Forensics
Organochlorine Pesticides

Aldrin	µg/kg	10	NONE	-	-	-	< 10	-
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	-	-	-	< 10	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	< 10	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	< 10	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	< 10	-
Dieldrin	µg/kg	10	NONE	-	-	-	< 10	-
Endosulphan A	µg/kg	10	NONE	-	-	-	< 10	-
Endosulphan B	µg/kg	10	NONE	-	-	-	< 10	-
Endrin	µg/kg	10	NONE	-	-	-	< 10	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	< 10	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	< 10	-
Heptachlor	µg/kg	10	NONE	-	-	-	< 10	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	< 10	-
Isodrin	µg/kg	10	NONE	-	-	-	< 10	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	< 10	-
o,p-DDE	µg/kg	10	NONE	-	-	-	< 10	-
o,p-DDT	µg/kg	10	NONE	-	-	-	< 10	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	< 10	-
p,p-DDE	µg/kg	10	NONE	-	-	-	< 10	-
p,p-DDT	µg/kg	10	NONE	-	-	-	< 10	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	< 10	-
Trifluralin	µg/kg	10	NONE	-	-	-	< 10	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627566	627567	627568	627569	627570
Sample Reference				TP08	TP09	TP10	TP11	TP12
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70-1.30	0.00-0.30	0.00-0.30	0.00-0.20	0.00-0.30
Date Sampled				06/09/2016	06/09/2016	06/09/2016	06/09/2016	06/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	-	-	-	< 10	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	< 10	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	< 10	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	< 10	-
Diazinon	µg/kg	10	NONE	-	-	-	< 10	-
Dichlorvos	µg/kg	10	NONE	-	-	-	< 10	-
Dimethoate	µg/kg	10	NONE	-	-	-	< 10	-
E-mevinphos	µg/kg	10	NONE	-	-	-	< 10	-
Z-mevinphos	µg/kg	10	NONE	-	-	-	< 10	-
Fenitrothion	µg/kg	10	NONE	-	-	-	< 10	-
Fenthion	µg/kg	10	NONE	-	-	-	< 10	-
Malathion	µg/kg	10	NONE	-	-	-	< 10	-
Parathion-ethyl	µg/kg	10	NONE	-	-	-	< 10	-
Parathion-methyl	µg/kg	10	NONE	-	-	-	< 10	-
Phorate	µg/kg	10	NONE	-	-	-	< 10	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627571				627572		627573		627574		627575	
Sample Reference	TP18				TP21		TP13		TP14		TP15	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.30				0.00-0.30		0.00-0.30		0.00-0.30		0.00-0.20	
Date Sampled	06/09/2016				06/09/2016		07/09/2016		07/09/2016		07/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	24	21	18	27	20				
Total mass of sample received	kg	0.001	NONE	1.2	1.5	1.4	1.1	1.5				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.6	7.3	8.1	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.017	0.019	0.017	0.018	0.011
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.025	-	0.028	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.28	0.28	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.60	1.8	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.52	1.2	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.31	1.4	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.38	1.1	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.36	2.1	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.26	0.75	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	0.31	1.3	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.55	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	0.15	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.48	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	3.02	11.2	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	16	14	8.6	14
Boron (water soluble)	mg/kg	0.2	MCERTS	3.9	2.5	2.4	3.2	2.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	0.7	0.8	0.6	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	30	22	22	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	42	37	43	37	36
Lead (aqua regia extractable)	mg/kg	1	MCERTS	65	49	65	51	49
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	41	52	47	38	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.9	3.3	< 1.0	< 1.0	3.3
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	110	150	150	160

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	< 8.0	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	9.4	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	< 10	-

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627571	627572	627573	627574	627575
Sample Reference				TP18	TP21	TP13	TP14	TP15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.20
Date Sampled				06/09/2016	06/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	< 1.0	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	< 2.0	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	< 10	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	26	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	26	-

Environmental Forensics
Organochlorine Pesticides

	Units	Limit of detection	Accreditation Status	627571	627572	627573	627574	627575
Aldrin	µg/kg	10	NONE	< 10	-	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	< 10	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
Dieldrin	µg/kg	10	NONE	< 10	-	-	-	-
Endosulphan A	µg/kg	10	NONE	< 10	-	-	-	-
Endosulphan B	µg/kg	10	NONE	< 10	-	-	-	-
Endrin	µg/kg	10	NONE	< 10	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	< 10	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	< 10	-	-	-	-
Heptachlor	µg/kg	10	NONE	< 10	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	< 10	-	-	-	-
Isodrin	µg/kg	10	NONE	< 10	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	< 10	-	-	-	-
o,p-DDE	µg/kg	10	NONE	< 10	-	-	-	-
o,p-DDT	µg/kg	10	NONE	< 10	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	< 10	-	-	-	-
p,p-DDE	µg/kg	10	NONE	< 10	-	-	-	-
p,p-DDT	µg/kg	10	NONE	< 10	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	< 10	-	-	-	-
Trifluralin	µg/kg	10	NONE	< 10	-	-	-	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627571	627572	627573	627574	627575
Sample Reference				TP18	TP21	TP13	TP14	TP15
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.20
Date Sampled				06/09/2016	06/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	< 10	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Diazinon	µg/kg	10	NONE	< 10	-	-	-	-
Dichlorvos	µg/kg	10	NONE	< 10	-	-	-	-
Dimethoate	µg/kg	10	NONE	< 10	-	-	-	-
E-mevinphos	µg/kg	10	NONE	< 10	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	< 10	-	-	-	-
Fenitrothion	µg/kg	10	NONE	< 10	-	-	-	-
Fenthion	µg/kg	10	NONE	< 10	-	-	-	-
Malathion	µg/kg	10	NONE	< 10	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	< 10	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	< 10	-	-	-	-
Phorate	µg/kg	10	NONE	< 10	-	-	-	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627576				627577		627578		627579	
Sample Reference	TP16				TP17		TP19		TP20	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.30				0.00-0.30		0.00-0.30		0.00-0.30	
Date Sampled	07/09/2016				07/09/2016		07/09/2016		07/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status							
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	24	23	24	20			
Total mass of sample received	kg	0.001	NONE	1.4	1.2	1.3	1.4			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	6.9	7.6	7.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.025	0.015	0.014	0.011
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	0.26	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	0.98	< 0.10	0.54	< 0.10
Pyrene	mg/kg	0.1	MCERTS	0.77	< 0.10	0.40	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	0.60	< 0.10	0.26	< 0.10
Chrysene	mg/kg	0.05	MCERTS	0.46	< 0.05	0.30	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	0.49	< 0.10	0.36	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	0.20	< 0.10	0.19	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	0.38	< 0.10	0.26	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	0.26	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.27	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	4.67	< 1.60	2.31	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	9.2	15	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.6	3.0	3.0	2.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	< 0.2	0.6	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	27	26	31	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	23	38	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40	37	53	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	34	39	40
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.6	< 1.0	1.8	2.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	82	110	110

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	< 2.0	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	< 8.0	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	< 8.0	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	< 10	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
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Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627576	627577	627578	627579
Sample Reference				TP16	TP17	TP19	TP20
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30
Date Sampled				07/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	< 1.0	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	< 2.0	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	< 10	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	< 10	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	< 10	< 10

Environmental Forensics
Organochlorine Pesticides

Aldrin	µg/kg	10	NONE	-	-	-	-
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-	-
Endosulphan A	µg/kg	10	NONE	-	-	-	-
Endosulphan B	µg/kg	10	NONE	-	-	-	-
Endrin	µg/kg	10	NONE	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-
Heptachlor	µg/kg	10	NONE	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-
Isodrin	µg/kg	10	NONE	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-
o,p-DDE	µg/kg	10	NONE	-	-	-	-
o,p-DDT	µg/kg	10	NONE	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-
p,p-DDE	µg/kg	10	NONE	-	-	-	-
p,p-DDT	µg/kg	10	NONE	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-	-



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number				627576	627577	627578	627579	
Sample Reference				TP16	TP17	TP19	TP20	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.00-0.30	0.00-0.30	0.00-0.30	0.00-0.30	
Date Sampled				07/09/2016	07/09/2016	07/09/2016	07/09/2016	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-	
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-	
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-	
Diazinon	µg/kg	10	NONE	-	-	-	-	
Dichlorvos	µg/kg	10	NONE	-	-	-	-	
Dimethoate	µg/kg	10	NONE	-	-	-	-	
E-mevinphos	µg/kg	10	NONE	-	-	-	-	
Z-mevinphos	µg/kg	10	NONE	-	-	-	-	
Fenitrothion	µg/kg	10	NONE	-	-	-	-	
Fenthion	µg/kg	10	NONE	-	-	-	-	
Malathion	µg/kg	10	NONE	-	-	-	-	
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-	
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	
Phorate	µg/kg	10	NONE	-	-	-	-	



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627580				627581				627582				627583				627584			
Sample Reference	WS03				WS04				WS07				TP08				TP21			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.00-0.20				0.00-0.50				0.00-0.20				0.00-0.30				0.00-0.30			
Date Sampled	07/09/2016				07/09/2016				07/09/2016				07/09/2016				07/09/2016			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status																	

General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
pH	pH Units	N/A	ISO 17025	8.0	8.0	8.1	7.9	7.6
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Sulphate as SO ₄	mg/l	0.1	ISO 17025	2.6	8.7	28	1.7	3.9
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	100	88	120	92	44

Total Phenols

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10

Speciated PAHs

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Total PAH

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	627580	627581	627582	627583	627584
Arsenic (dissolved)	µg/l	1.1	ISO 17025	1.3	< 1.1	< 1.1	< 1.1	1.2
Boron (dissolved)	µg/l	10	ISO 17025	39	22	76	58	65
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.9	< 0.4	< 0.4	2.2
Copper (dissolved)	µg/l	0.7	ISO 17025	16	7.1	25	21	18
Lead (dissolved)	µg/l	1	ISO 17025	1.8	1.2	< 1.0	< 1.0	1.3
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5	0.7	5.1	1.6	7.8
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	5.8	3.5	20	7.0	8.3



Analytical Report Number: 16-27453

Project / Site name: Cosmeston

Lab Sample Number	627580				627581	627582	627583	627584
Sample Reference	WS03				WS04	WS07	TP08	TP21
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.00-0.20				0.00-0.50	0.00-0.20	0.00-0.30	0.00-0.30
Date Sampled	07/09/2016				07/09/2016	07/09/2016	07/09/2016	07/09/2016
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status					

Environmental Forensics
Organochlorine Pesticides

	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Alpha-HCH (Alpha BHC)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Aldrin	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Beta-HCH (Beta-BHC)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Chlordane (sum of cis & trans isomers)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Delta-HCH (Delta-BHC)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Dieldrin	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Endosulphan A	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Endosulphan B	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Endrin	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
HCB (Hexachlorobenzene)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Heptachlor Epoxide	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Heptachlor	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Isodrin	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
o,p-DDE	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
o,p-DDT	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
o,p-TDE (o,p-DDD)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
p,p-DDE	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
p,p-DDT	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
pp-Methoxychlor	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
p,p-TDE (p,p-DDD)	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-
Trifluralin	µg/l	0.01	NONE	< 0.01	-	< 0.01	< 0.01	-



Analytical Report Number : 16-27453

Project / Site name: Cosmeston

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
627556	WS01	None Supplied	0.20-0.50	Brown loam and clay with gravel and vegetation.
627557	WS03	None Supplied	0.00-0.20	Brown loam and clay with gravel and vegetation.
627558	WS03	None Supplied	2.30-2.40	Grey clay and sand.
627559	WS04	None Supplied	0.00-0.50	Brown loam and sand with gravel and vegetation.
627560	WS05	None Supplied	0.10-0.40	Brown loam and clay with gravel and vegetation.
627561	WS06	None Supplied	0.00-0.20	Brown loam and clay with gravel.
627562	WS06	None Supplied	0.40-0.60	Brown loam and clay with gravel.
627563	WS07	None Supplied	0.00-0.20	Brown loam and clay with vegetation.
627564	WS07	None Supplied	0.20-0.50	Brown loam and clay with vegetation.
627565	TP08	None Supplied	0.00-0.30	Brown loam and clay.
627566	TP08	None Supplied	0.70-1.30	Brown sandy clay.
627567	TP09	None Supplied	0.00-0.30	Brown loam and sand with gravel and vegetation.
627568	TP10	None Supplied	0.00-0.30	Brown loam and sand with gravel and vegetation.
627569	TP11	None Supplied	0.00-0.20	Brown loam and clay with vegetation.
627570	TP12	None Supplied	0.00-0.30	Brown loam and clay.
627571	TP18	None Supplied	0.00-0.30	Brown clay and sand with gravel and vegetation.
627572	TP21	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627573	TP13	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627574	TP14	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627575	TP15	None Supplied	0.00-0.20	Brown loam and clay with gravel and vegetation.
627576	TP16	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627577	TP17	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627578	TP19	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.
627579	TP20	None Supplied	0.00-0.30	Brown loam and clay with gravel and vegetation.



Analytical Report Number : 16-27453

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Leachate	Determination of Alkalinity by discreet analyser (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in leachate	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS

Iss No 16-27453-1 Cosmeston UA008386

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The results included within the report are representative of the samples submitted for analysis.



Analytical Report Number : 16-27453

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TO - Organochlorine pesticides in leachate	Determination of organochlorine pesticides in leachate by GC-MS	In-house method Determination of organochlorine pesticides in leachate by GC-MS		W	NONE
TO - Organochlorine pesticides in soil	Determination of OCPs by extraction with hexane followed by GC-MS.	In-house method		W	NONE
TO - Organophosphorous pesticides in soil	Determination of OPPs by extraction with DCM followed by GC-MS.	In-house method		W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Preliminary Report Number : 16-27480

Project / Site name:	Cosmeston	Samples received on:	12/09/2016
Your job number:	UA008386	Samples instructed on:	12/09/2016
Your order number:	PO0062396-1	Analysis completed by:	not complete
Report Issue Number:	0	Report issued on:	21/09/2016
Samples Analysed:	3 leachate samples - 10 soil samples		

Signed: _____

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed: _____


Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627679				627680		627681		627682		627683	
Sample Reference	TP06				TP06		TP05		TP05		TP04	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.25				1.00-1.90		0.00-0.30		0.60-2.10		0.00-0.30	
Date Sampled	08/09/2016				08/09/2016		08/09/2016		08/09/2016		08/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	17	14	16	12	18				
Total mass of sample received	kg	0.001	NONE	1.5	1.5	1.4	1.5	1.5				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile- Loose fibres	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.5	8.3	8.7	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.059	0.0093	0.071	0.023
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.026	0.018	0.025	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	53	11	110	15	37
Boron (water soluble)	mg/kg	0.2	MCERTS	2.3	0.8	2.4	1.3	2.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.3	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	15	37	18	29
Copper (aqua regia extractable)	mg/kg	1	MCERTS	46	33	49	33	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	10	69	15	51
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.6	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	43	29	55	33	42
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	1.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	64	160	64	110



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P00062396-1

Lab Sample Number	627679				627680				627681				627682				627683			
Sample Reference	TP06				TP06				TP05				TP05				TP04			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.00-0.25				1.00-1.90				0.00-0.30				0.60-2.10				0.00-0.30			
Date Sampled	08/09/2016				08/09/2016				08/09/2016				08/09/2016				08/09/2016			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	2.6	< 1.0	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	8.1	< 2.0	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	< 8.0	< 8.0	< 8.0	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	< 8.0	< 8.0	< 8.0	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	< 10	11	< 10	-	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	< 2.0	< 2.0	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	< 10	< 10	< 10	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	< 10	< 10	< 10	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10	< 10	< 10	-	< 10

Environmental Forensics

Organochlorine Pesticides

Aldrin	µg/kg	10	NONE	-	-	-	-	-
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	-	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-	-	-
Endosulphan A	µg/kg	10	NONE	-	-	-	-	-
Endosulphan B	µg/kg	10	NONE	-	-	-	-	-
Endrin	µg/kg	10	NONE	-	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-	-
Heptachlor	µg/kg	10	NONE	-	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-	-
Isodrin	µg/kg	10	NONE	-	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-	-
o,p-DDE	µg/kg	10	NONE	-	-	-	-	-
o,p-DDT	µg/kg	10	NONE	-	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-	-
p,p-DDE	µg/kg	10	NONE	-	-	-	-	-
p,p-DDT	µg/kg	10	NONE	-	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627679				627680				627681				627682				627683			
Sample Reference	TP06				TP06				TP05				TP05				TP04			
Sample Number	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Depth (m)	0.00-0.25				1.00-1.90				0.00-0.30				0.60-2.10				0.00-0.30			
Date Sampled	08/09/2016				08/09/2016				08/09/2016				08/09/2016				08/09/2016			
Time Taken	None Supplied				None Supplied				None Supplied				None Supplied				None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status																	

Organophosphorous pesticides

Pesticide	Units	Limit of detection	Accreditation Status	627679	627680	627681	627682	627683
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Diazinon	µg/kg	10	NONE	-	-	-	-	-
Dichlorvos	µg/kg	10	NONE	-	-	-	-	-
Dimethoate	µg/kg	10	NONE	-	-	-	-	-
E-mevinphos	µg/kg	10	NONE	-	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	-	-	-	-	-
Fenitrothion	µg/kg	10	NONE	-	-	-	-	-
Fenthion	µg/kg	10	NONE	-	-	-	-	-
Malathion	µg/kg	10	NONE	-	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	-
Phorate	µg/kg	10	NONE	-	-	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627684				627685		627686		627687		627688	
Sample Reference	TP04				TP02		TP02		TP03		WS02	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.30-1.00				0.00-0.40		0.60-1.20		0.00-0.30		0.00-0.10	
Date Sampled	08/09/2016				08/09/2016		08/09/2016		08/09/2016		08/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	9.4	23	16	19	15				
Total mass of sample received	kg	0.001	NONE	1.4	1.4	1.4	1.5	1.4				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	8.1	8.5	8.1	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.13	0.015	0.023	0.018	0.066
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	0.044	0.012	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	0.48	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.64	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	0.49	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	0.32	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.52	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.44	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.25	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	0.29	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	3.43	< 1.60	< 1.60	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	23	9.5	20	25
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	2.3	1.5	2.3	1.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2	< 0.2	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	32	25	33	30
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	51	30	41	38
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.9	180	23	34	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.0	< 0.3	< 0.3	1.0
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	42	29	34	35
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.0	3.7	< 1.0	< 1.0	2.7
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	38	180	75	97	96



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P00062396-1

Lab Sample Number				627684	627685	627686	627687	627688
Sample Reference				TP04	TP02	TP02	TP03	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-1.00	0.00-0.40	0.60-1.20	0.00-0.30	0.00-0.10
Date Sampled				08/09/2016	08/09/2016	08/09/2016	08/09/2016	08/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	-	< 10

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	-	< 10

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
Aldrin	µg/kg	10	NONE	-	To follow	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	-	To follow	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	To follow	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	To follow	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	To follow	-	-	-
Dieldrin	µg/kg	10	NONE	-	To follow	-	-	-
Endosulphan A	µg/kg	10	NONE	-	To follow	-	-	-
Endosulphan B	µg/kg	10	NONE	-	To follow	-	-	-
Endrin	µg/kg	10	NONE	-	To follow	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	To follow	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	To follow	-	-	-
Heptachlor	µg/kg	10	NONE	-	To follow	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	To follow	-	-	-
Isodrin	µg/kg	10	NONE	-	To follow	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	To follow	-	-	-
o,p-DDE	µg/kg	10	NONE	-	To follow	-	-	-
o,p-DDT	µg/kg	10	NONE	-	To follow	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	To follow	-	-	-
p,p-DDE	µg/kg	10	NONE	-	To follow	-	-	-
p,p-DDT	µg/kg	10	NONE	-	To follow	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	To follow	-	-	-
Trifluralin	µg/kg	10	NONE	-	To follow	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627684				627685	627686	627687	627688
Sample Reference	TP04				TP02	TP02	TP03	WS02
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.30-1.00				0.00-0.40	0.60-1.20	0.00-0.30	0.00-0.10
Date Sampled	08/09/2016				08/09/2016	08/09/2016	08/09/2016	08/09/2016
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Organophosphorous pesticides

Pesticide	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
Azinphos-methyl	µg/kg	10	NONE	-	To follow	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	To follow	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	To follow	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	To follow	-	-	-
Diazinon	µg/kg	10	NONE	-	To follow	-	-	-
Dichlorvos	µg/kg	10	NONE	-	To follow	-	-	-
Dimethoate	µg/kg	10	NONE	-	To follow	-	-	-
E-mevinphos	µg/kg	10	NONE	-	To follow	-	-	-
Z-mevinphos	µg/kg	10	NONE	-	To follow	-	-	-
Fenitrothion	µg/kg	10	NONE	-	To follow	-	-	-
Fenthion	µg/kg	10	NONE	-	To follow	-	-	-
Malathion	µg/kg	10	NONE	-	To follow	-	-	-
Parathion-ethyl	µg/kg	10	NONE	-	To follow	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	To follow	-	-	-
Phorate	µg/kg	10	NONE	-	To follow	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P0062396-1

Lab Sample Number	627689			627690	627691		
Sample Reference	TP06			TP04	TP02		
Sample Number	None Supplied			None Supplied	None Supplied		
Depth (m)	1.00-1.90			0.00-0.30	0.00-0.40		
Date Sampled	08/09/2016			08/09/2016	08/09/2016		
Time Taken	None Supplied			None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status				

General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
pH	pH Units	N/A	ISO 17025	7.7	8.1	8.1	
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010	
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	
Sulphate as SO ₄	mg/l	0.1	ISO 17025	4.4	12	4.3	
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	36	110	98	

Phenols by HPLC

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	

Total Phenols

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	

Speciated PAHs

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	

Total PAH

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	2.6	3.2	
Boron (dissolved)	µg/l	10	ISO 17025	< 10	28	29	
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.4	< 0.4	0.4	
Copper (dissolved)	µg/l	0.7	ISO 17025	6.4	< 0.7	16	
Lead (dissolved)	µg/l	1	ISO 17025	1.4	1.5	2.7	
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.3	2.4	1.5	
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	
Zinc (dissolved)	µg/l	0.4	ISO 17025	7.4	7.5	7.8	



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P00062396-1

Lab Sample Number	627689	627690	627691		
Sample Reference	TP06	TP04	TP02		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	1.00-1.90	0.00-0.30	0.00-0.40		
Date Sampled	08/09/2016	08/09/2016	08/09/2016		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691		
Alpha-HCH (Alpha BHC)	µg/l	0.01	NONE	-	-	To follow		
Aldrin	µg/l	0.01	NONE	-	-	To follow		
Beta-HCH (Beta-BHC)	µg/l	0.01	NONE	-	-	To follow		
Chlordane (sum of cis & trans isomers)	µg/l	0.01	NONE	-	-	To follow		
Delta-HCH (Delta-BHC)	µg/l	0.01	NONE	-	-	To follow		
Dieldrin	µg/l	0.01	NONE	-	-	To follow		
Endosulphan A	µg/l	0.01	NONE	-	-	To follow		
Endosulphan B	µg/l	0.01	NONE	-	-	To follow		
Endrin	µg/l	0.01	NONE	-	-	To follow		
Gamma-HCH (Lindane) (Gamma-BHC)	µg/l	0.01	NONE	-	-	To follow		
HCB (Hexachlorobenzene)	µg/l	0.01	NONE	-	-	To follow		
Heptachlor Epoxide	µg/l	0.01	NONE	-	-	To follow		
Heptachlor	µg/l	0.01	NONE	-	-	To follow		
Isodrin	µg/l	0.01	NONE	-	-	To follow		
o,p-DDE	µg/l	0.01	NONE	-	-	To follow		
o,p-DDT	µg/l	0.01	NONE	-	-	To follow		
o,p-TDE (o,p-DDD)	µg/l	0.01	NONE	-	-	To follow		
p,p-DDE	µg/l	0.01	NONE	-	-	To follow		
p,p-DDT	µg/l	0.01	NONE	-	-	To follow		
pp-Methoxychlor	µg/l	0.01	NONE	-	-	To follow		
p,p-TDE (p,p-DDD)	µg/l	0.01	NONE	-	-	To follow		
Trifluralin	µg/l	0.01	NONE	-	-	To follow		

Organophosphorus Pesticides (OPP)

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691		
Azinphos-methyl	µg/l	0.01	NONE	-	-	To follow		
Chlorfenvinphos I (cis)	µg/l	0.01	NONE	-	-	To follow		
Chlorfenvinphos II (trans)	µg/l	0.01	NONE	-	-	To follow		
Chlorfenvinphos-methyl	µg/l	0.01	NONE	-	-	To follow		
Diazinon	µg/l	0.01	NONE	-	-	To follow		
Dichlorvos	µg/l	0.01	NONE	-	-	To follow		
Dimethoate	µg/l	0.01	NONE	-	-	To follow		
Fenitrothion	µg/l	0.01	NONE	-	-	To follow		
Fenthion	µg/l	0.01	NONE	-	-	To follow		
Malathion	µg/l	0.01	NONE	-	-	To follow		
E-mevinphos	µg/l	0.01	NONE	-	-	To follow		
Z-mevinphos	µg/l	0.01	NONE	-	-	To follow		
Parathion-ethyl	µg/l	0.01	NONE	-	-	To follow		
Parathion-methyl	µg/l	0.01	NONE	-	-	To follow		
Phorate	µg/l	0.01	NONE	-	-	To follow		



Preliminary Report Number : 16-27480

Project / Site name: Cosmeston

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
627679	TP06	None Supplied	0.00-0.25	Brown loam and clay with gravel.
627680	TP06	None Supplied	1.00-1.90	Brown sand with gravel and rubble.
627681	TP05	None Supplied	0.00-0.30	Brown clay and loam with gravel.
627682	TP05	None Supplied	0.60-2.10	Brown clay and sand with gravel.
627683	TP04	None Supplied	0.00-0.30	Brown loam and clay with gravel.
627684	TP04	None Supplied	0.30-1.00	Brown loam and sand with gravel.
627685	TP02	None Supplied	0.00-0.40	Brown loam and clay with gravel.
627686	TP02	None Supplied	0.60-1.20	Brown loam and clay with gravel.
627687	TP03	None Supplied	0.00-0.30	Brown loam and clay with gravel.
627688	WS02	None Supplied	0.00-0.10	Brown loam and sand with gravel.



Preliminary Report Number : 16-27480

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Leachate	Determination of Alkalinity by discreet analyser (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE

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The results included within the report are representative of the samples submitted for analysis.

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Preliminary Report Number : 16-27480

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TO - Organochlorine pesticides in leachate	Determination of organochlorine pesticides in leachate by GC-MS	In-house method Determination of organochlorine pesticides in leachate by GC-MS		W	NONE
TO - Organochlorine pesticides in soil	Determination of OCPs by extraction with hexane followed by GC-MS.	In-house method		W	NONE
TO - Organophosphorous pesticides in leachate	Determination of organophosphorous pesticides in leachate by GC-MS	In-house method		W	NONE
TO - Organophosphorous pesticides in soil	Determination of OPPs by extraction with DCM followed by GC-MS.	In-house method		W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 16-27480

Project / Site name:	Cosmeston	Samples received on:	12/09/2016
Your job number:	UA008386	Samples instructed on:	12/09/2016
Your order number:	PO0062396-1	Analysis completed by:	22/09/2016
Report Issue Number:	1	Report issued on:	22/09/2016
Samples Analysed:	3 leachate samples - 10 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627679				627680		627681		627682		627683	
Sample Reference	TP06				TP06		TP05		TP05		TP04	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.25				1.00-1.90		0.00-0.30		0.60-2.10		0.00-0.30	
Date Sampled	08/09/2016				08/09/2016		08/09/2016		08/09/2016		08/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	17	14	16	12	18				
Total mass of sample received	kg	0.001	NONE	1.5	1.5	1.4	1.5	1.5				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile- Loose fibres	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8.5	8.3	8.7	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.059	0.0093	0.071	0.023
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	0.026	0.018	0.025	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	53	11	110	15	37
Boron (water soluble)	mg/kg	0.2	MCERTS	2.3	0.8	2.4	1.3	2.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.3	0.6
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	15	37	18	29
Copper (aqua regia extractable)	mg/kg	1	MCERTS	46	33	49	33	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	10	69	15	51
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.6	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	43	29	55	33	42
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	1.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	64	160	64	110



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627679				627680		627681		627682		627683	
Sample Reference	TP06				TP06		TP05		TP05		TP04	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.00-0.25				1.00-1.90		0.00-0.30		0.60-2.10		0.00-0.30	
Date Sampled	08/09/2016				08/09/2016		08/09/2016		08/09/2016		08/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	2.6	< 1.0	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	8.1	< 2.0	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	< 8.0	< 8.0	< 8.0	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	< 8.0	< 8.0	< 8.0	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	< 10	11	< 10	-	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	< 1.0	< 1.0	< 1.0	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	< 2.0	< 2.0	< 2.0	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	< 10	< 10	< 10	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	< 10	< 10	< 10	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10	< 10	< 10	-	< 10

Environmental Forensics

Organochlorine Pesticides

Aldrin	µg/kg	10	NONE	-	-	-	-	-
Alpha-HCH (Alpha-BHC)	µg/kg	10	NONE	-	-	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	-	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	-	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	-	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-	-	-
Endosulphan A	µg/kg	10	NONE	-	-	-	-	-
Endosulphan B	µg/kg	10	NONE	-	-	-	-	-
Endrin	µg/kg	10	NONE	-	-	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	-	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	-	-	-	-
Heptachlor	µg/kg	10	NONE	-	-	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	-	-	-	-
Isodrin	µg/kg	10	NONE	-	-	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	-	-	-	-
o,p-DDE	µg/kg	10	NONE	-	-	-	-	-
o,p-DDT	µg/kg	10	NONE	-	-	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	-	-	-	-
p,p-DDE	µg/kg	10	NONE	-	-	-	-	-
p,p-DDT	µg/kg	10	NONE	-	-	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	-	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627679				627680	627681	627682	627683
Sample Reference	TP06				TP06	TP05	TP05	TP04
Sample Number	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.00-0.25				1.00-1.90	0.00-0.30	0.60-2.10	0.00-0.30
Date Sampled	08/09/2016				08/09/2016	08/09/2016	08/09/2016	08/09/2016
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Organophosphorous pesticides

	Units	Limit of detection	Accreditation Status	627679	627680	627681	627682	627683
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Diazinon	µg/kg	10	NONE	-	-	-	-	-
Dichlorvos	µg/kg	10	NONE	-	-	-	-	-
Dimethoate	µg/kg	10	NONE	-	-	-	-	-
E-mevinphos	µg/kg	10	NONE	-	-	-	-	-
Z-mevinphos	µg/kg	10	NONE	-	-	-	-	-
Fenitrothion	µg/kg	10	NONE	-	-	-	-	-
Fenthion	µg/kg	10	NONE	-	-	-	-	-
Malathion	µg/kg	10	NONE	-	-	-	-	-
Parathion-ethyl	µg/kg	10	NONE	-	-	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	-
Phorate	µg/kg	10	NONE	-	-	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number	627684				627685		627686		627687		627688	
Sample Reference	TP04				TP02		TP02		TP03		WS02	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.30-1.00				0.00-0.40		0.60-1.20		0.00-0.30		0.00-0.10	
Date Sampled	08/09/2016				08/09/2016		08/09/2016		08/09/2016		08/09/2016	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	9.4	23	16	19	15				
Total mass of sample received	kg	0.001	NONE	1.4	1.4	1.4	1.5	1.4				

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.7	8.1	8.5	8.1	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.13	0.015	0.023	0.018	0.066
Fraction Organic Carbon (FOC)	N/A	0.001	NONE	-	0.044	0.012	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	0.48	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.64	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	0.49	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	0.32	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.52	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.44	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	0.25	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	0.29	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	3.43	< 1.60	< 1.60	< 1.60
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	23	9.5	20	25
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	2.3	1.5	2.3	1.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2	< 0.2	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	32	25	33	30
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	51	30	41	38
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.9	180	23	34	40
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1.0	< 0.3	< 0.3	1.0
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	42	29	34	35
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	2.0	3.7	< 1.0	< 1.0	2.7
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	38	180	75	97	96



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number				627684	627685	627686	627687	627688
Sample Reference				TP04	TP02	TP02	TP03	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-1.00	0.00-0.40	0.60-1.20	0.00-0.30	0.00-0.10
Date Sampled				08/09/2016	08/09/2016	08/09/2016	08/09/2016	08/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	ISO 17025	-	< 8.0	-	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	ISO 17025	-	< 8.0	-	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	-	< 10

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
TPH6 - Aromatic (C6 - C8)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aromatic (C8 - C10)	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
TPH6 - Aromatic (C10 - C12)	mg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	ISO 17025	-	< 2.0	-	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	ISO 17025	-	< 10	-	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	ISO 17025	-	< 10	-	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	-	< 10

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627684	627685	627686	627687	627688
Aldrin	µg/kg	10	NONE	-	< 10	-	-	-
Alpha-HCH (Alpha BHC)	µg/kg	10	NONE	-	< 10	-	-	-
Beta-HCH (Beta-BHC)	µg/kg	10	NONE	-	< 10	-	-	-
Chlordane (sum of cis & trans isomers)	µg/kg	10	NONE	-	< 10	-	-	-
Delta-HCH (Delta-BHC)	µg/kg	10	NONE	-	< 10	-	-	-
Dieldrin	µg/kg	10	NONE	-	< 10	-	-	-
Endosulphan A	µg/kg	10	NONE	-	< 10	-	-	-
Endosulphan B	µg/kg	10	NONE	-	< 10	-	-	-
Endrin	µg/kg	10	NONE	-	< 10	-	-	-
Gamma-HCH (Lindane) (Gamma-BHC)	µg/kg	10	NONE	-	< 10	-	-	-
HCB (Hexachlorobenzene)	µg/kg	10	NONE	-	< 10	-	-	-
Heptachlor	µg/kg	10	NONE	-	< 10	-	-	-
Heptachlor Epoxide	µg/kg	10	NONE	-	< 10	-	-	-
Isodrin	µg/kg	10	NONE	-	< 10	-	-	-
pp-Methoxychlor	µg/kg	10	NONE	-	< 10	-	-	-
o,p-DDE	µg/kg	10	NONE	-	< 10	-	-	-
o,p-DDT	µg/kg	10	NONE	-	< 10	-	-	-
o,p-TDE (o,p-DDD)	µg/kg	10	NONE	-	< 10	-	-	-
p,p-DDE	µg/kg	10	NONE	-	< 10	-	-	-
p,p-DDT	µg/kg	10	NONE	-	< 10	-	-	-
p,p-TDE (p,p-DDD)	µg/kg	10	NONE	-	< 10	-	-	-
Trifluralin	µg/kg	10	NONE	-	< 10	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: PO0062396-1

Lab Sample Number				627684	627685	627686	627687	627688
Sample Reference				TP04	TP02	TP02	TP03	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30-1.00	0.00-0.40	0.60-1.20	0.00-0.30	0.00-0.10
Date Sampled				08/09/2016	08/09/2016	08/09/2016	08/09/2016	08/09/2016
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Organophosphorous pesticides								
Azinphos-methyl	µg/kg	10	NONE	-	< 10	-	-	-
Chlorfenvinphos I (cis)	µg/kg	10	NONE	-	< 10	-	-	-
Chlorfenvinphos II (trans)	µg/kg	10	NONE	-	< 10	-	-	-
Chlorfenvinphos-methyl	µg/kg	10	NONE	-	< 10	-	-	-
Diazinon	µg/kg	10	NONE	-	< 10	-	-	-
Dichlorvos	µg/kg	10	NONE	-	< 10	-	-	-
Dimethoate	µg/kg	10	NONE	-	< 10	-	-	-
E-mevinphos	µg/kg	10	NONE	-	< 10	-	-	-
Z-mevinphos	µg/kg	10	NONE	-	< 10	-	-	-
Fenitrothion	µg/kg	10	NONE	-	< 10	-	-	-
Fenthion	µg/kg	10	NONE	-	< 10	-	-	-
Malathion	µg/kg	10	NONE	-	< 10	-	-	-
Parathion-ethyl	µg/kg	10	NONE	-	< 10	-	-	-
Parathion-methyl	µg/kg	10	NONE	-	< 10	-	-	-
Phorate	µg/kg	10	NONE	-	< 10	-	-	-



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P0062396-1

Lab Sample Number	627689			627690	627691		
Sample Reference	TP06			TP04	TP02		
Sample Number	None Supplied			None Supplied	None Supplied		
Depth (m)	1.00-1.90			0.00-0.30	0.00-0.40		
Date Sampled	08/09/2016			08/09/2016	08/09/2016		
Time Taken	None Supplied			None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status				

General Inorganics

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
pH	pH Units	N/A	ISO 17025	7.7	8.1	8.1	
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010	
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	
Sulphate as SO ₄	mg/l	0.1	ISO 17025	4.4	12	4.3	
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	36	110	98	

Phenols by HPLC

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	

Total Phenols

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	

Speciated PAHs

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	

Total PAH

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	

Heavy Metals / Metalloids

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691	
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1	2.6	3.2	
Boron (dissolved)	µg/l	10	ISO 17025	< 10	28	29	
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.4	< 0.4	0.4	
Copper (dissolved)	µg/l	0.7	ISO 17025	6.4	< 0.7	16	
Lead (dissolved)	µg/l	1	ISO 17025	1.4	1.5	2.7	
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.3	2.4	1.5	
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	
Zinc (dissolved)	µg/l	0.4	ISO 17025	7.4	7.5	7.8	



Analytical Report Number: 16-27480

Project / Site name: Cosmeston

Your Order No: P00062396-1

Lab Sample Number	627689	627690	627691		
Sample Reference	TP06	TP04	TP02		
Sample Number	None Supplied	None Supplied	None Supplied		
Depth (m)	1.00-1.90	0.00-0.30	0.00-0.40		
Date Sampled	08/09/2016	08/09/2016	08/09/2016		
Time Taken	None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Environmental Forensics

Organochlorine Pesticides

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691		
Alpha-HCH (Alpha BHC)	µg/l	0.01	NONE	-	-	< 0.01		
Aldrin	µg/l	0.01	NONE	-	-	< 0.01		
Beta-HCH (Beta-BHC)	µg/l	0.01	NONE	-	-	< 0.01		
Chlordane (sum of cis & trans isomers)	µg/l	0.01	NONE	-	-	< 0.01		
Delta-HCH (Delta-BHC)	µg/l	0.01	NONE	-	-	< 0.01		
Dieldrin	µg/l	0.01	NONE	-	-	< 0.01		
Endosulphan A	µg/l	0.01	NONE	-	-	< 0.01		
Endosulphan B	µg/l	0.01	NONE	-	-	< 0.01		
Endrin	µg/l	0.01	NONE	-	-	< 0.01		
Gamma-HCH (Lindane) (Gamma-BHC)	µg/l	0.01	NONE	-	-	< 0.01		
HCB (Hexachlorobenzene)	µg/l	0.01	NONE	-	-	< 0.01		
Heptachlor Epoxide	µg/l	0.01	NONE	-	-	< 0.01		
Heptachlor	µg/l	0.01	NONE	-	-	< 0.01		
Isodrin	µg/l	0.01	NONE	-	-	< 0.01		
o,p-DDE	µg/l	0.01	NONE	-	-	< 0.01		
o,p-DDT	µg/l	0.01	NONE	-	-	< 0.01		
o,p-TDE (o,p-DDD)	µg/l	0.01	NONE	-	-	< 0.01		
p,p-DDE	µg/l	0.01	NONE	-	-	< 0.01		
p,p-DDT	µg/l	0.01	NONE	-	-	< 0.01		
pp-Methoxychlor	µg/l	0.01	NONE	-	-	< 0.01		
p,p-TDE (p,p-DDD)	µg/l	0.01	NONE	-	-	< 0.01		
Trifluralin	µg/l	0.01	NONE	-	-	< 0.01		

Organophosphorus Pesticides (OPP)

Parameter	Units	Limit of detection	Accreditation Status	627689	627690	627691		
Azinphos-methyl	µg/l	0.01	NONE	-	-	< 0.01		
Chlorfenvinphos I (cis)	µg/l	0.01	NONE	-	-	< 0.01		
Chlorfenvinphos II (trans)	µg/l	0.01	NONE	-	-	< 0.01		
Chlorfenvinphos-methyl	µg/l	0.01	NONE	-	-	< 0.01		
Diazinon	µg/l	0.01	NONE	-	-	< 0.01		
Dichlorvos	µg/l	0.01	NONE	-	-	< 0.01		
Dimethoate	µg/l	0.01	NONE	-	-	< 0.01		
Fenitrothion	µg/l	0.01	NONE	-	-	< 0.01		
Fenthion	µg/l	0.01	NONE	-	-	< 0.01		
Malathion	µg/l	0.01	NONE	-	-	< 0.01		
E-mevinphos	µg/l	0.01	NONE	-	-	< 0.01		
Z-mevinphos	µg/l	0.01	NONE	-	-	< 0.01		
Parathion-ethyl	µg/l	0.01	NONE	-	-	< 0.01		
Parathion-methyl	µg/l	0.01	NONE	-	-	< 0.01		
Phorate	µg/l	0.01	NONE	-	-	0.02		



Analytical Report Number : 16-27480

Project / Site name: Cosmeston

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
627679	TP06	None Supplied	0.00-0.25	Brown loam and clay with gravel.
627680	TP06	None Supplied	1.00-1.90	Brown sand with gravel and rubble.
627681	TP05	None Supplied	0.00-0.30	Brown clay and loam with gravel.
627682	TP05	None Supplied	0.60-2.10	Brown clay and sand with gravel.
627683	TP04	None Supplied	0.00-0.30	Brown loam and clay with gravel.
627684	TP04	None Supplied	0.30-1.00	Brown loam and sand with gravel.
627685	TP02	None Supplied	0.00-0.40	Brown loam and clay with gravel.
627686	TP02	None Supplied	0.60-1.20	Brown loam and clay with gravel.
627687	TP03	None Supplied	0.00-0.30	Brown loam and clay with gravel.
627688	WS02	None Supplied	0.00-0.10	Brown loam and sand with gravel.



Analytical Report Number : 16-27480

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Leachate	Determination of Alkalinity by discreet analyser (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L023-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE

Iss No 16-27480-1 Cosmeston UA008386

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 16-27480

Project / Site name: Cosmeston

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
TO - Organochlorine pesticides in leachate	Determination of organochlorine pesticides in leachate by GC-MS	In-house method Determination of organochlorine pesticides in leachate by GC-MS		W	NONE
TO - Organochlorine pesticides in soil	Determination of OCPs by extraction with hexane followed by GC-MS.	In-house method		W	NONE
TO - Organophosphorous pesticides in leachate	Determination of organophosphorous pesticides in leachate by GC-MS	In-house method		W	NONE
TO - Organophosphorous pesticides in soil	Determination of OPPs by extraction with DCM followed by GC-MS.	In-house method		W	NONE
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 18-72599

Project / Site name:	Cosmeston Phase 2	Samples received on:	11/01/2018
Your job number:	UA008386-02	Samples instructed on:	11/01/2018
Your order number:	14004066	Analysis completed by:	22/01/2018
Report Issue Number:	1	Report issued on:	22/01/2018
Samples Analysed:	2 water samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-72599

Project / Site name: Cosmeston Phase 2

Your Order No: 14004066

Lab Sample Number				887159	887160			
Sample Reference				WS104	WS111			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.90	1.05			
Date Sampled				09/01/2018	09/01/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

	pH Units	N/A	ISO 17025	7.2	6.7			
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10			
Sulphate as SO ₄	µg/l	45	ISO 17025	55500	190000			
Sulphate as SO ₄	mg/l	0.045	ISO 17025	55.5	190			
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	230	640			

Phenols by HPLC

	µg/l	0.5	NONE	< 0.5	< 0.5			
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5			
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5			
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5			
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5			
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5			
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5			

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5			

Speciated PAHs

	µg/l	0.01	ISO 17025	< 0.01	0.45			
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	0.45			
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	0.81			
Fluorene	µg/l	0.01	ISO 17025	< 0.01	0.19			
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01			

Total PAH

Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	1.45			



Analytical Report Number: 18-72599

Project / Site name: Cosmeston Phase 2

Your Order No: 14004066

Lab Sample Number				887159	887160			
Sample Reference				WS104	WS111			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.90	1.05			
Date Sampled				09/01/2018	09/01/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	1.5	4.9			
Boron (dissolved)	µg/l	10	ISO 17025	21	57			
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08			
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0			
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.6	1.0			
Copper (dissolved)	µg/l	0.7	ISO 17025	8.2	7.3			
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0	14			
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5			
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5	13			
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0			
Zinc (dissolved)	µg/l	0.4	ISO 17025	6.2	19			

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	-			
Toluene	µg/l	1	ISO 17025	< 1.0	-			
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	-			
p & m-xylene	µg/l	1	ISO 17025	< 1.0	-			
o-xylene	µg/l	1	ISO 17025	< 1.0	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	-			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	-			
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	-			
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	-			
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	-			
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	-			

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	-			
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	-			
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	-			
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	-			
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	-			
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	-			



Analytical Report Number: 18-72599

Project / Site name: Cosmeston Phase 2

Your Order No: 14004066

Lab Sample Number				887159	887160		
Sample Reference				WS104	WS111		
Sample Number				None Supplied	None Supplied		
Depth (m)				0.90	1.05		
Date Sampled				09/01/2018	09/01/2018		
Time Taken				None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

VOCs

Analytical Parameter	Units	Limit of detection	Accreditation Status	887159	887160		
Chloromethane	µg/l	1	ISO 17025	< 1.0	-		
Chloroethane	µg/l	1	ISO 17025	< 1.0	-		
Bromomethane	µg/l	1	ISO 17025	< 1.0	-		
Vinyl Chloride	µg/l	1	NONE	< 1.0	-		
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	-		
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	-		
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	-		
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	-		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	-		
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	-		
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	-		
Trichloromethane	µg/l	1	ISO 17025	< 1.0	-		
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	-		
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	-		
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	-		
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	-		
Benzene	µg/l	1	ISO 17025	< 1.0	-		
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	-		
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	-		
Trichloroethene	µg/l	1	ISO 17025	< 1.0	-		
Dibromomethane	µg/l	1	ISO 17025	< 1.0	-		
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	-		
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	-		
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	-		
Toluene	µg/l	1	ISO 17025	< 1.0	-		
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	-		
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	-		
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	-		
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	-		
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	-		
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	-		
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	-		
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	-		
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	-		
Styrene	µg/l	1	ISO 17025	< 1.0	-		
Tribromomethane	µg/l	1	ISO 17025	< 1.0	-		
o-Xylene	µg/l	1	ISO 17025	< 1.0	-		
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	-		
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	-		
Bromobenzene	µg/l	1	ISO 17025	< 1.0	-		
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	-		
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	-		
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	-		
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	-		
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	-		
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	-		
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	-		
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	-		
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	-		
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	-		
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	-		
Butylbenzene	µg/l	1	ISO 17025	< 1.0	-		
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	-		
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	-		
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	-		
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	-		



Analytical Report Number: 18-72599

Project / Site name: Cosmeston Phase 2

Your Order No: 14004066

Lab Sample Number				887159	887160		
Sample Reference				WS104	WS111		
Sample Number				None Supplied	None Supplied		
Depth (m)				0.90	1.05		
Date Sampled				09/01/2018	09/01/2018		
Time Taken				None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

SVOCs							
Analytical Parameter	Units	Limit of detection	Accreditation Status	887159	887160		
Aniline	µg/l	0.05	NONE	< 0.05	-		
Phenol	µg/l	0.05	NONE	< 0.05	-		
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	-		
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	-		
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	-		
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	-		
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	-		
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	-		
2-Methylphenol	µg/l	0.05	NONE	< 0.05	-		
Hexachloroethane	µg/l	0.05	NONE	< 0.05	-		
Nitrobenzene	µg/l	0.05	NONE	< 0.05	-		
4-Methylphenol	µg/l	0.05	NONE	< 0.05	-		
Isophorone	µg/l	0.05	NONE	< 0.05	-		
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	-		
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	-		
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	-		
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	-		
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	-		
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	-		
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	-		
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	-		
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	-		
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	-		
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	-		
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	-		
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	-		
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	-		
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	-		
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	-		
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	-		
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	-		
Dibenzofuran	µg/l	0.05	NONE	< 0.05	-		
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	-		
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	-		
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	-		
Fluorene	µg/l	0.01	ISO 17025	< 0.01	-		
Azobenzene	µg/l	0.05	NONE	< 0.05	-		
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	-		
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	-		
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	-		
Anthracene	µg/l	0.01	ISO 17025	< 0.01	-		
Carbazole	µg/l	0.05	NONE	< 0.05	-		
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	-		
Anthraquinone	µg/l	0.05	NONE	< 0.05	-		
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	-		
Pyrene	µg/l	0.01	ISO 17025	< 0.01	-		
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	-		
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	-		
Chrysene	µg/l	0.01	ISO 17025	< 0.01	-		
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	-		
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	-		
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	-		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	-		
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	-		
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	-		

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 18-72599

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Water	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS104		W	18-72599	887159	d	BTEX and MTBE in water (Monoaromatics)	L073B-PL	d
WS104		W	18-72599	887159	d	TPHCWG (Waters)	L070-PL	d
WS104		W	18-72599	887159	d	Volatile organic compounds in water	L073B-PL	d



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Analytical Report Number : 18-73227

Project / Site name:	Cosmeston Phase 2	Samples received on:	18/01/2018
Your job number:	UA008386-02	Samples instructed on:	18/01/2018
Your order number:	14002979	Analysis completed by:	25/01/2018
Report Issue Number:	1	Report issued on:	25/01/2018
Samples Analysed:	1 water sample		

Signed: _____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-73227

Project / Site name: Cosmeston Phase 2

Your Order No: 14002979

Lab Sample Number				891045				
Sample Reference				WS111				
Sample Number				None Supplied				
Depth (m)				1.10				
Date Sampled				16/01/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

General Inorganics

Chloride	mg/l	0.15	ISO 17025	21				
Ammoniacal Nitrogen as N	µg/l	15	ISO 17025	4600				

Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				



Analytical Report Number: 18-73227

Project / Site name: Cosmeston Phase 2

Your Order No: 14002979

Lab Sample Number				891045				
Sample Reference				WS111				
Sample Number				None Supplied				
Depth (m)				1.10				
Date Sampled				16/01/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0				
Chloroethane	µg/l	1	ISO 17025	< 1.0				
Bromomethane	µg/l	1	ISO 17025	< 1.0				
Vinyl Chloride	µg/l	1	NONE	< 1.0				
Trichlorofluoromethane	µg/l	1	NONE	< 1.0				
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloromethane	µg/l	1	ISO 17025	< 1.0				
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0				
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0				
Benzene	µg/l	1	ISO 17025	< 1.0				
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0				
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Trichloroethene	µg/l	1	ISO 17025	< 1.0				
Dibromomethane	µg/l	1	ISO 17025	< 1.0				
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0				
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0				
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0				
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0				
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0				
Chlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-Xylene	µg/l	1	ISO 17025	< 1.0				
Styrene	µg/l	1	ISO 17025	< 1.0				
Tribromomethane	µg/l	1	ISO 17025	< 1.0				
o-Xylene	µg/l	1	ISO 17025	< 1.0				
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0				
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0				
Bromobenzene	µg/l	1	ISO 17025	< 1.0				
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0				
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0				
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0				
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0				
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Butylbenzene	µg/l	1	ISO 17025	< 1.0				
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0				
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0				
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0				



Analytical Report Number: 18-73227

Project / Site name: Cosmeston Phase 2

Your Order No: 14002979

Lab Sample Number				891045				
Sample Reference				WS111				
Sample Number				None Supplied				
Depth (m)				1.10				
Date Sampled				16/01/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs								
Analytical Parameter	Units	Limit of detection	Accreditation Status	Result				
Aniline	µg/l	0.05	NONE	< 0.05				
Phenol	µg/l	0.05	NONE	< 0.05				
2-Chlorophenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05				
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05				
2-Methylphenol	µg/l	0.05	NONE	< 0.05				
Hexachloroethane	µg/l	0.05	NONE	< 0.05				
Nitrobenzene	µg/l	0.05	NONE	< 0.05				
4-Methylphenol	µg/l	0.05	NONE	< 0.05				
Isophorone	µg/l	0.05	NONE	< 0.05				
2-Nitrophenol	µg/l	0.05	NONE	< 0.05				
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05				
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05				
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05				
4-Chloroaniline	µg/l	0.05	NONE	< 0.05				
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05				
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05				
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05				
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05				
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05				
Dimethylphthalate	µg/l	0.05	NONE	< 0.05				
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05				
Dibenzofuran	µg/l	0.05	NONE	< 0.05				
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Diethyl phthalate	µg/l	0.05	NONE	< 0.05				
4-Nitroaniline	µg/l	0.05	NONE	< 0.05				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Azobenzene	µg/l	0.05	NONE	< 0.05				
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05				
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Carbazole	µg/l	0.05	NONE	< 0.05				
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05				
Anthraquinone	µg/l	0.05	NONE	< 0.05				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 18-73227

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Chloride in water	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS111		W	18-73227	891045	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
WS111		W	18-73227	891045	b	Volatile organic compounds in water	L073B-PL	b



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Analytical Report Number : 17-70771

Replaces Analytical Report Number : 17-70771, issue no. 1

Project / Site name:	Cosmeston Phase 2	Samples received on:	12/12/2017
Your job number:	UA008386-02	Samples instructed on:	14/12/2017
Your order number:		Analysis completed by:	27/12/2017
Report Issue Number:	2	Report issued on:	09/03/2018
Samples Analysed:	11 soil samples		

Signed: _____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				875945	875946	875947	875948	875949
Sample Reference				WS101	WS102	WS103	WS104	WS105
Sample Number				5	2	4	2	4
Depth (m)				0.10-0.20	0.05-0.15	0.35-0.45	0.00-0.20	0.40-0.60
Date Sampled				11/12/2017	08/12/2017	08/12/2017	08/12/2017	08/12/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	33	28	26	27	24
Total mass of sample received	kg	0.001	NONE	1.7	1.6	1.6	1.4	1.6

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.0	7.6	7.7	7.3	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.040	0.020	0.022	0.030	0.021
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	3.3	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	13	15	15	15
Boron (water soluble)	mg/kg	0.2	MCERTS	2.5	2.2	2.9	2.8	2.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.4	0.7	0.7	0.6	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	37	41	41	39	35
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	40	41	39	35
Lead (aqua regia extractable)	mg/kg	1	MCERTS	61	35	33	60	29
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.8	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	37	41	42	33	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	100	110	100	76



Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number	875945			875946			875947			875948			875949		
Sample Reference	WS101			WS102			WS103			WS104			WS105		
Sample Number	5			2			4			2			4		
Depth (m)	0.10-0.20			0.05-0.15			0.35-0.45			0.00-0.20			0.40-0.60		
Date Sampled	11/12/2017			08/12/2017			08/12/2017			08/12/2017			08/12/2017		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												

Monoaromatics

Compound	Units	Limit of detection	Accreditation Status	875945	875946	875947	875948	875949
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	< 8.0	-	< 8.0	< 8.0	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	39	-	< 8.0	32	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	39	-	< 10	32	-

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	< 0.001	-	< 0.001	< 0.001	-
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	< 0.001	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	1.8	-	< 1.0	1.7	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0	-	< 2.0	< 2.0	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	< 10	-	< 10	< 10	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	12	-	< 10	19	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	14	-	< 10	21	-

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				875950	875951	875952	875953	875954
Sample Reference				WS106	WS107	WS108	WS109	WS110
Sample Number				2	2	2	4	2
Depth (m)				0.00-0.20	0.00-0.10	0.10-0.30	0.30-0.50	0.10
Date Sampled				08/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	28	< 0.1	30	< 0.1
Moisture Content	%	N/A	NONE	28	5.7	23	16	24
Total mass of sample received	kg	0.001	NONE	1.7	1.3	1.1	1.1	1.1

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	8.5	7.2	8.1	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.015	0.019	0.018	0.057	0.042
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.29	0.44	< 0.05	0.32	0.26
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.48	0.96	< 0.05	0.43	0.78
Pyrene	mg/kg	0.05	MCERTS	0.38	0.80	< 0.05	0.37	0.58
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.21	0.51	< 0.05	0.26	0.44
Chrysene	mg/kg	0.05	MCERTS	0.30	0.73	< 0.05	0.32	0.55
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.32	0.90	< 0.05	0.39	0.62
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.18	0.45	< 0.05	0.18	0.33
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.29	0.55	< 0.05	0.25	0.39
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.17	0.47	< 0.05	0.28	0.29
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.22	0.61	< 0.05	0.32	0.31

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	2.84	6.42	< 0.80	3.12	4.55
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	3.3	9.4	12	8.4
Boron (water soluble)	mg/kg	0.2	MCERTS	3.4	0.6	1.3	0.7	1.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.7	0.3	0.4	0.8	0.4
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	38	11	17	21	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	45	9.7	19	22	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	48	18	35	220	44
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	41	6.1	16	21	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	87	29	69	94	88



Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				875950	875951	875952	875953	875954
Sample Reference				WS106	WS107	WS108	WS109	WS110
Sample Number				2	2	2	4	2
Depth (m)				0.00-0.20	0.00-0.10	0.10-0.30	0.30-0.50	0.10
Date Sampled				08/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Compound	Units	Limit of detection	Accreditation Status	875950	875951	875952	875953	875954
Benzene	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Toluene	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
p & m-xylene	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
o-xylene	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	2.9	< 2.0	-	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	8.5	< 8.0	-	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	47	< 8.0	-	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	59	< 10	-	-

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001	< 0.001	-	-
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	< 0.001	-	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	< 2.0	-	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	< 10	< 10	-	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	76	17	-	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	76	17	-	-

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	27	13
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	35	18

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	2.4	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	23	27
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	32	33



Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				875955				
Sample Reference				WS111				
Sample Number				2				
Depth (m)				0.10-0.20				
Date Sampled				07/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	31				
Total mass of sample received	kg	0.001	NONE	0.97				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.9				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.041				
Total Organic Carbon (TOC)	%	0.1	MCERTS	6.6				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	0.36				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.87				
Pyrene	mg/kg	0.05	MCERTS	0.67				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.54				
Chrysene	mg/kg	0.05	MCERTS	0.67				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.93				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.51				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.61				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.49				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.52				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	6.17				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13				
Boron (water soluble)	mg/kg	0.2	MCERTS	1.6				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	65				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.2				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100				



Analytical Report Number: 17-70771
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				875955				
Sample Reference				WS111				
Sample Number				2				
Depth (m)				0.10-0.20				
Date Sampled				07/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-				
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-				
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-				
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-				
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-				
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-				
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-				

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-				
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-				
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-				
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-				
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-				
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-				
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-				

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	2.9				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	22				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	30				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.3				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	21				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	27				



Analytical Report Number : 17-70771

Project / Site name: Cosmeston Phase 2

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
875945	WS101	5	0.10-0.20	Brown clay and loam with vegetation.
875946	WS102	2	0.05-0.15	Brown clay and loam with gravel and vegetation.
875947	WS103	4	0.35-0.45	Brown clay and loam with vegetation.
875948	WS104	2	0.00-0.20	Brown clay and loam with vegetation.
875949	WS105	4	0.40-0.60	Light brown clay and sand with gravel and vegetation.
875950	WS106	2	0.00-0.20	Brown clay and loam with gravel and vegetation.
875951	WS107	2	0.00-0.10	Brown loam and clay with stones and vegetation.
875952	WS108	2	0.10-0.30	Brown loam and clay with gravel and vegetation.
875953	WS109	4	0.30-0.50	Brown clay and sand with stones and vegetation.
875954	WS110	2	0.10	Brown loam and clay with gravel and vegetation.
875955	WS111	2	0.10-0.20	Brown loam and clay with vegetation.



Analytical Report Number : 17-70771

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS107	2	S	17-70771	875951	c	Total cyanide in soil	L080-PL	c
WS108	2	S	17-70771	875952	c	Total cyanide in soil	L080-PL	c
WS109	4	S	17-70771	875953	c	Total cyanide in soil	L080-PL	c
WS110	2	S	17-70771	875954	c	Total cyanide in soil	L080-PL	c
WS111	2	S	17-70771	875955	c	Total cyanide in soil	L080-PL	c



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Analytical Report Number : 17-70975

Project / Site name:	Cosmeston Phase 2	Samples received on:	18/12/2017
Your job number:	UA008386-02	Samples instructed on:	18/12/2017
Your order number:		Analysis completed by:	28/12/2017
Report Issue Number:	1	Report issued on:	28/12/2017
Samples Analysed:	10 soil samples		

Signed: _____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-70975
Project / Site name: Cosmeston Phase 2

Lab Sample Number				877402	877403	877404	877405	877406
Sample Reference				TP101	TP102	TP103	TP104	TP105
Sample Number				2	4	2	2	2
Depth (m)				0.05-0.15	0.30-0.40	0.05-0.15	0.05-0.15	0.05-0.15
Date Sampled				13/12/2017	13/12/2017	13/12/2017	13/12/2017	13/12/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	35	22	24	39	25
Total mass of sample received	kg	0.001	NONE	2.0	1.7	1.8	1.6	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.9	8.8	7.7	8.0
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.024	0.021	0.056	0.021	0.027
Total Organic Carbon (TOC)	%	0.1	MCERTS	4.2	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.23	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.25	0.29	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.21	0.23	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	18	11	14	17
Boron (water soluble)	mg/kg	0.2	MCERTS	3.8	1.2	3.2	4.4	2.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	0.8	0.5	0.7	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	59	48	62	52	63
Copper (aqua regia extractable)	mg/kg	1	MCERTS	55	53	62	52	65
Lead (aqua regia extractable)	mg/kg	1	MCERTS	41	23	25	44	46
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	79	29	30	41
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	91	430	100	110	140



Analytical Report Number: 17-70975
 Project / Site name: Cosmeston Phase 2

Lab Sample Number	877402				877403	877404	877405	877406
Sample Reference	TP101				TP102	TP103	TP104	TP105
Sample Number	2				4	2	2	2
Depth (m)	0.05-0.15				0.30-0.40	0.05-0.15	0.05-0.15	0.05-0.15
Date Sampled	13/12/2017				13/12/2017	13/12/2017	13/12/2017	13/12/2017
Time Taken	None Supplied				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics

Compound	Units	Limit of detection	Accreditation Status	877402	877403	877404	877405	877406
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	-	< 8.0	-	< 8.0
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	-	< 10	-	< 10

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	-	< 0.001	-	< 0.001
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	-	< 0.001	-	< 0.001
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	-	< 1.0	-	< 1.0
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	-	< 2.0	-	< 2.0
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	-	< 10	-	< 10
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	-	< 10	-	< 10
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	-	< 10	-	< 10

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-



Analytical Report Number: 17-70975
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				877407	877408	877409	877410	877411
Sample Reference				TP106	TP107	TP109	TP110	TP111
Sample Number				4	2	4	2	2
Depth (m)				0.30-0.40	0.10-0.20	0.30-0.30	0.10-0.20	0.05-0.15
Date Sampled				13/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	20	29	24	29	26
Total mass of sample received	kg	0.001	NONE	1.0	1.5	1.6	1.7	1.4

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	7.2	7.9	7.5	7.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.018	0.023	0.064	0.024	0.030
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.37	0.29
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.27	0.29
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	8.4	13	12	15	13
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	4.7	0.8	5.6	4.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.8	0.3	1.2	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	77	72	60	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31	82	68	50	34
Lead (aqua regia extractable)	mg/kg	1	MCERTS	12	37	20	54	51
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	39	52	39	33
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	35	210	78	110	120



Analytical Report Number: 17-70975
 Project / Site name: Cosmeston Phase 2

Lab Sample Number	877407			877408			877409			877410			877411		
Sample Reference	TP106			TP107			TP109			TP110			TP111		
Sample Number	4			2			4			2			2		
Depth (m)	0.30-0.40			0.10-0.20			0.30-0.30			0.10-0.20			0.05-0.15		
Date Sampled	13/12/2017			12/12/2017			12/12/2017			12/12/2017			12/12/2017		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												

Monoaromatics

Compound	Units	Limit of detection	Accreditation Status	877407	877408	877409	877410	877411
Benzene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
Toluene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
o-xylene	ug/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	< 1.0

Petroleum Hydrocarbons

Parameter	Units	Limit of detection	Accreditation Status	877407	877408	877409	877410	877411
TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-	-	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-	-	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	-	< 8.0	-	-	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	-	43	-	-	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	-	43	-	-	-

Parameter	Units	Limit of detection	Accreditation Status	877407	877408	877409	877410	877411
TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	-	< 0.001	-	-	-
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	-	< 0.001	-	-	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	-	< 1.0	-	-	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	-	< 2.0	-	-	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	-	< 10	-	-	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	-	< 10	-	-	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	-	< 10	-	-	-

Parameter	Units	Limit of detection	Accreditation Status	877407	877408	877409	877410	877411
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	44
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	50

Parameter	Units	Limit of detection	Accreditation Status	877407	877408	877409	877410	877411
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	29
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	35



Analytical Report Number : 17-70975

Project / Site name: Cosmeston Phase 2

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
877402	TP101	2	0.05-0.15	Brown clay and loam with vegetation and gravel
877403	TP102	4	0.30-0.40	Brown clay.
877404	TP103	2	0.05-0.15	Brown loam and clay with vegetation and gravel
877405	TP104	2	0.05-0.15	Brown clay and loam with vegetation.
877406	TP105	2	0.05-0.15	Brown clay and loam with gravel and vegetation.
877407	TP106	4	0.30-0.40	Brown clay with vegetation.
877408	TP107	2	0.10-0.20	Brown clay and loam with vegetation.
877409	TP109	4	0.30-0.30	Brown clay with gravel and vegetation.
877410	TP110	2	0.10-0.20	Brown clay and loam with gravel and vegetation.
877411	TP111	2	0.05-0.15	Brown clay and loam with gravel and vegetation.



Analytical Report Number : 17-70975

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Iss No 17-70975-1 Cosmeston Phase 2 UA008386-02

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The results included within the report are representative of the samples submitted for analysis.



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Analytical Report Number : 17-71271

Replaces Analytical Report Number : 17-71271, issue no. 1

Project / Site name:	Cosmeston Phase 2	Samples received on:	18/12/2017
Your job number:	UA008386-02	Samples instructed on:	19/12/2017
Your order number:		Analysis completed by:	09/03/2018
Report Issue Number:	2	Report issued on:	12/03/2018
Samples Analysed:	4 leachate samples - 6 soil samples		

Signed: _____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-71271
 Project / Site name: Cosmeston Phase 2

Lab Sample Number	879502				879503		879504		879505		879506	
Sample Reference	TP108				TP112		TP112		TP113		TP114	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.05-0.15				0.00-0.10		0.30-0.40		0.10-0.20		0.10-0.20	
Date Sampled	15/12/2017				14/12/2017		14/12/2017		14/12/2017		14/12/2017	
Time Taken	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	31	32	26	31	25				
Total mass of sample received	kg	0.001	NONE	1.1	1.2	1.3	1.1	1.2				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.4	7.2	7.4	7.0	7.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.023	0.029	0.034	0.029	0.018

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.16	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.27	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.18	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.20	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.24	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.12	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	1.60	< 0.80	< 0.80	< 0.80

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	16	11	12	14
Boron (water soluble)	mg/kg	0.2	MCERTS	3.6	4.4	1.1	1.2	3.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	0.6	0.4	0.7	0.8
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	41	40	23	33	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	50	46	36	50	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	43	44	18	34	35
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	42	35	31	49	33
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	140	68	160	100



Analytical Report Number: 17-71271
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Lab Sample Number	879502			879503			879504			879505			879506		
Sample Reference	TP108			TP112			TP112			TP113			TP114		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.05-0.15			0.00-0.10			0.30-0.40			0.10-0.20			0.10-0.20		
Date Sampled	15/12/2017			14/12/2017			14/12/2017			14/12/2017			14/12/2017		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status												

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0	-
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0	-	-	2.0	-
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	< 8.0	-	-	< 8.0	-
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	13	-	-	36	-
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	13	-	-	38	-
TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	< 0.001	-	-	< 0.001	-
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001	-	-	< 0.001	-
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	< 1.0	-	-	1.4	-
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0	-	-	3.2	-
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	< 10	-	-	< 10	-
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	< 10	-	-	20	-
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10	-	-	24	-



Analytical Report Number: 17-71271
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				879507				
Sample Reference				TP115				
Sample Number				None Supplied				
Depth (m)				0.30-0.40				
Date Sampled				14/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	17				
Total mass of sample received	kg	0.001	NONE	1.1				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.016				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.7				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	22				



Analytical Report Number: 17-71271
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				879507				
Sample Reference				TP115				
Sample Number				None Supplied				
Depth (m)				0.30-0.40				
Date Sampled				14/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH6 - Aliphatic (C6 - C8)	mg/kg	0.001	MCERTS	< 0.001				
TPH6 - Aliphatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001				
TPH6 - Aliphatic (C10 - C12)	mg/kg	1	MCERTS	< 1.0				
TPH6 - Aliphatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0				
TPH6 - Aliphatic (C16 - C21)	mg/kg	8	MCERTS	< 8.0				
TPH6 - Aliphatic (C21 - C35)	mg/kg	8	MCERTS	< 8.0				
TPH6 - Aliphatic (C6 - C35)	mg/kg	10	NONE	< 10				

TPH6 - Aromatic (C6 - C8)	mg/kg	0.001	NONE	< 0.001				
TPH6 - Aromatic (C8 - C10)	mg/kg	0.001	MCERTS	< 0.001				
TPH6 - Aromatic (C10 - C12)	mg/kg	1	MCERTS	< 1.0				
TPH6 - Aromatic (C12 - C16)	mg/kg	2	MCERTS	< 2.0				
TPH6 - Aromatic (C16 - C21)	mg/kg	10	MCERTS	< 10				
TPH6 - Aromatic (C21 - C35)	mg/kg	10	MCERTS	< 10				
TPH6 - Aromatic (C6 - C35)	mg/kg	10	NONE	< 10				



Analytical Report Number: 17-71271
Project / Site name: Cosmeston Phase 2

Lab Sample Number				879508	879509	879510	879511	
Sample Reference				TP101	TP107	TP112	TP115	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.05-0.15	0.10-0.20	0.00-0.10	0.30-0.40	
Date Sampled				12/12/2017	15/12/2017	14/12/2017	14/12/2017	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Leachate Analysis)								
	Units	Limit of detection	Accreditation Status					

General Inorganics

pH	pH Units	N/A	ISO 17025	8.1	7.7	7.8	7.9	
Total Cyanide	mg/l	0.01	ISO 17025	< 0.010	< 0.010	< 0.010	< 0.010	
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	
Sulphate as SO ₄	mg/l	0.1	ISO 17025	3.9	2.8	5.2	5.2	
Alkalinity	mgCaCO ₃ /l	3	ISO 17025	150	29	75	77	

Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5	< 0.5	

Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5	< 3.5	
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2	< 0.2	
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1.1	ISO 17025	3.3	< 1.1	3.6	3.6	
Boron (dissolved)	µg/l	10	ISO 17025	61	72	50	10	
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	< 0.08	
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.4	1.0	0.5	0.9	
Copper (dissolved)	µg/l	0.7	ISO 17025	22	38	24	11	
Lead (dissolved)	µg/l	1	ISO 17025	14	1.1	8.2	5.4	
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5	3.8	1.6	1.7	
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0	
Zinc (dissolved)	µg/l	0.4	ISO 17025	8.2	10	6.4	5.1	



Analytical Report Number : 17-71271

Project / Site name: Cosmeston Phase 2

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
879502	TP108	None Supplied	0.05-0.15	Brown clay and loam with vegetation.
879503	TP112	None Supplied	0.00-0.10	Brown clay and loam with gravel and vegetation.
879504	TP112	None Supplied	0.30-0.40	Light brown clay and sand.
879505	TP113	None Supplied	0.10-0.20	Brown clay and loam with vegetation.
879506	TP114	None Supplied	0.10-0.20	Brown clay and loam with vegetation and gravel
879507	TP115	None Supplied	0.30-0.40	Brown clay.



Analytical Report Number : 17-71271

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Alkalinity in Leachate	Determination of Alkalinity by discreet analyser (colorimetry).	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE

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The results included within the report are representative of the samples submitted for analysis.



Analytical Report Number : 17-71271

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil"	L039-PL	W	ISO 17025
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in leachate	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH6 (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method	L076-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



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Analytical Report Number : 17-71746

Project / Site name:	Cosmeston Phase 2	Samples received on:	28/12/2017
Your job number:	UA008366-02	Samples instructed on:	28/12/2017
Your order number:		Analysis completed by:	08/01/2018
Report Issue Number:	1	Report issued on:	08/01/2018
Samples Analysed:	1 soil sample		

Signed: _____

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 17-71746
 Project / Site name: Cosmeston Phase 2

Lab Sample Number				882702				
Sample Reference				WSTP116				
Sample Number				2				
Depth (m)				0.00-0.20				
Date Sampled				08/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	46				
Total mass of sample received	kg	0.001	NONE	1.5				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected				
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Free Cyanide	mg/kg	1	MCERTS	< 1				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.37				
Total Organic Carbon (TOC)	%	0.1	MCERTS	8.4				

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0				
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	0.33				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	0.89				
Pyrene	mg/kg	0.05	MCERTS	0.78				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.65				
Chrysene	mg/kg	0.05	MCERTS	1.2				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.5				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.53				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.91				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.75				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.88				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	8.37				
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13				
Boron (water soluble)	mg/kg	0.2	MCERTS	3.6				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	81				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	48				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	27				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120				



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 Project / Site name: Cosmeston Phase 2

Lab Sample Number				882702				
Sample Reference				WSTP116				
Sample Number				2				
Depth (m)				0.00-0.20				
Date Sampled				08/12/2017				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)		Units	Limit of detection	Accreditation Status				

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0				
Toluene	ug/kg	1	MCERTS	< 1.0				
Ethylbenzene	ug/kg	1	MCERTS	< 1.0				
p & m-xylene	ug/kg	1	MCERTS	< 1.0				
o-xylene	ug/kg	1	MCERTS	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0				

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0				
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	3.6				
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	11				
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	110				
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	120				

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001				
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	1.2				
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0				
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10				
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	72				
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	84				



Analytical Report Number : 17-71746

Project / Site name: Cosmeston Phase 2

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
882702	WSTP116	2	0.00-0.20	Black loam with vegetation and gravel



Analytical Report Number : 17-71746

Project / Site name: Cosmeston Phase 2

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WSTP116	2	S	17-71746	882702	c	Free cyanide in soil	L080-PL	c
WSTP116	2	S	17-71746	882702	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
WSTP116	2	S	17-71746	882702	c	Total cyanide in soil	L080-PL	c
WSTP116	2	S	17-71746	882702	c	Total organic carbon (Automated) in soil	L009-PL	c

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