



Roxhill Developments Limited

M1 Junction 15 West – Extended Development Site

Supplementary Geotechnical & Geoenvironmental Investigation

313582-02 (00)

NOVEMBER 2017





RSK GENERAL NOTES

Project No.: 313582-02 (00)

Title: Supplementary ground investigation interpretive report: M1 Junction 15 West – Extended Development Site

Client: Roxhill Developments Ltd (Roxhill), Lumonics House, Valley Drive, Swift Valley, Rugby, Warwickshire, CV21 1TQ

Date: 13th November 2017

Office: RSK Coventry, Abbey Park, Humber Road, Coventry, CV3 4AQ

Status: FINAL

Author	<u>Melissa Southworth</u>	Reviewed and approved by	<u>Darren Bench</u>
Signature		Signature	
Date:	<u>13th November 2017</u>	Date:	<u>13th November 2017</u>
Author	<u>Project Manager</u>		
Signature			
Date:	<u>13th November 2017</u>		

RSK Environment Limited (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

CONTENTS

1	INTRODUCTION.....	6
1.1	Terms of reference.....	6
1.2	Proposed development.....	6
1.3	Objective.....	7
1.4	Scope of the investigation.....	7
1.5	Background information.....	8
1.6	Limitations.....	8
2	SITE DETAILS.....	9
2.1	Site location.....	9
2.2	Local topography, geography and geomorphology.....	9
2.3	Site description.....	10
3	SUMMARY OF AVAILABLE INFORMATION.....	12
3.1	Published geology and expected ground conditions.....	12
4	GROUND INVESTIGATION.....	14
5	GROUND CONDITIONS IDENTIFIED.....	17
5.1	Ground conditions.....	17
5.1.1	Agricultural topsoil.....	18
5.1.2	Subsoil.....	18
5.1.3	Oadby Member.....	19
5.1.4	Glaciofluvial deposits.....	22
5.1.5	Whitby Mudstone Formation.....	23
5.1.6	Results of soakaway testing.....	26
5.2	Groundwater.....	26
5.3	Ground gas regime.....	31
5.4	Visual/olfactory evidence of soil and groundwater contamination.....	33
5.5	Ground model.....	33
6	QUANTITATIVE RISK ASSESSMENT.....	35
6.1	Linkages for assessment.....	35
6.2	Methodology and results.....	36
6.2.1	Direct contact with impacted soil by future end users.....	36
6.2.2	Inhalation exposure of future residents to asbestos fibres.....	37
6.2.3	Uptake of contaminants by vegetation potentially inhibiting plant growth.....	37
6.2.4	Impact of organic contaminants on potable water supply pipes.....	37
6.2.5	Migration of dissolved phase contaminants to wider secondary aquifer body.....	38
6.2.6	Ground gas.....	39
6.3	Summary of quantitative risk assessment.....	40
7	ASSESSMENT OF POTENTIAL LAND CONTAMINATION.....	41
7.1	Potential sources of contamination.....	41
7.2	Preliminary contaminated land risk assessment.....	42
7.2.1	Risk to human health during construction.....	42
7.2.2	Risk to human health post construction.....	42

7.2.3	Risk to local ecology and landscape planting	42
7.2.4	Risk to surface water	42
7.2.5	Risk to groundwater	43
7.2.6	Risk due to ground gas	43
7.2.7	Risk to buried structures and services	44
7.3	Requirement for further assessment	44
8	GEOTECHNICAL SITE ASSESSMENT	45
8.1	Preliminary geohazard and geotechnical assessment	45
8.1.1	Mining and natural cavities	45
8.1.2	Man made voids or obstructions	45
8.1.3	Earthworks	45
8.1.4	Existing cut slopes	46
8.1.5	Existing embankment slopes	46
8.1.6	Proposed cut slope design.....	47
8.1.7	Proposed embankment design	47
8.1.8	Cut to fill transition zones	48
8.1.9	Earthworks – Materials Reuse	48
8.1.10	Earthworks Classification.....	50
8.1.11	Foundations and Floor Slabs	51
8.1.12	Highway & Service Yard construction.....	52
8.1.13	Groundwater levels & Drainage	53
8.1.14	Excavations Stability	54
8.1.15	Foundation works risk assessment.....	55
8.1.16	Chemical attack on buried concrete	55
9	REUSE OF MATERIALS	56
9.1	Reuse of suitable materials.....	56
9.2	Wastes for landfill disposal	56
9.3	Landfill tax	56
10	CONCLUSIONS.....	58
10.1	Conclusions.....	58
11	RECOMMENDATIONS.....	59
11.1	General recommendations.....	59
	BIBLIOGRAPHY	60

TABLES

Table 1:	summary of available information.....	12
Table 2:	Issues targeted within the ground investigation	15
Table 3:	General succession of strata encountered.....	17
Table 4:	Summary of in-situ and laboratory test results for the cohesive Oadby Member	19
Table 5:	Summary of in-situ and laboratory test results for the cohesive Glaciofluvial Deposits.....	22
Table 6:	Summary of in-situ and laboratory test results for Whitby Mudstone Formation	24
Table 7:	Soakaway test results.....	26
Table 8:	Groundwater results during investigation	26
Table 9:	Groundwater monitoring data (22/09/2017 to 24/10/2017)	27

Table 10: Summary of ground gas monitoring results (22/09/2017 to 24/10/2017	31
Table 11: Linkages for generic quantitative risk assessment.....	35
Table 12: Summary of exceedances of contaminants, which could potentially inhibit plant growth of vegetation.	37
Table 13: Summary of groundwater exceedances.....	38
Table 15: Earthworks Classification	50

FIGURES

Figure 1	Site location plan
Figure 2	Proposed development plan
Figure 3	Exploratory hole location plan for current investigation
Figure 4	Exploratory Location plan comprising current and historical boreholes
Figure 5	Exploratory location plan against proposed development plan.

APPENDICES

Appendix A	Service constraints
Appendix B	Summary of legislation and policy relating to contaminated land
Appendix C	Site photographs
Appendix D	Risk assessment methodology
Appendix E	Exploratory hole records
Appendix F	Ground gas monitoring data
Appendix G	Groundwater monitoring records
Appendix H	Laboratory certificates for chemical soil analysis
Appendix I	Laboratory certificates for groundwater analysis
Appendix J	Human health generic assessment criteria
Appendix K	Generic assessment criteria for phytotoxic effects
Appendix L	Generic assessment criteria for controlled waters
Appendix M	Generic assessment criteria for potable water supply pipes
Appendix N	Comparison of soil analysis to human health criteria
Appendix O	Comparison of water laboratory data to controlled waters GAC
Appendix P	Certificates of geotechnical analysis
Appendix Q	Updated geotechnical risk register
Appendix R	Updated contaminated land register
Appendix S	HASWASTE

1 INTRODUCTION

RSK Environment Limited (RSK) has been commissioned by Roxhill Developments Limited (the Client) to carry out a Supplementary Geotechnical and Geoenvironmental Assessment of the extended site development of the proposed M1 Junction 15 West, Northampton Strategic Rail Freight Interchange development.

The interpretive Supplementary Geotechnical & Geoenvironmental Investigation report for the extended development is presented herein, and follows on from a Preliminary Sources Study Report (313418-01(00)), which has previously been prepared for the site by RSK.

This report is subject to the RSK service constraints given in Appendix A.

1.1 Terms of reference

This report comprises a Supplementary Geotechnical & Geoenvironmental investigation report in accordance with the requirements of:

- BS5930:1999+A2:2010 'Code of practice for site investigations':
- Environment Agency CLR 11 2004a 'Model Procedures for the Management of Land Contamination' (Contaminated Land Risk Assessment):
- Highways Agency HD22/08, 'Managing Geotechnical Risk' (Ground Investigation): and
- BS EN 1997-2:2007. Eurocode 7 — Geotechnical design — Part 2: Ground investigation and testing.

1.2 Proposed development

It is understood that the extended site development is being considered for a commercial end use. The development includes seven distribution warehouses with associated loading bays, hard standing, access highways and a new rail freight terminal and associated sidings along the western edge of the site. Additionally, the development is anticipated to include a number of drainage ponds located at either end of the distribution warehouses and large landscape screening bunds along with highways network improvements where the site links to the A508 and Junction 15 of the M1. In order to deliver the development a large cut and fill exercise will be undertaken at the site.

1.3 Objective

The purpose of the investigation works undertaken were to confirm the underlying ground conditions present beneath the extension of the original site to supplement data already obtained from the main body of the site, as detailed in RSK reports 312598 (dated November 2014). The extended site has since been subject to a Preliminary Sources Study Report 313418-01 (00), dated December 2016. In addition, the information collated will be used to assist in the master planning design and to support the Environmental Impact Assessment being developed for the proposed scheme.

The main objectives of the investigation are to:

- Confirm the stratigraphy of the soil across the site;
- Confirm the groundwater and soil gas regime;
- Confirm the contamination status of the extended areas of the site using a programme of in-situ screening and laboratory analysis; and
- To provide sufficient geotechnical information characterising the strata encountered beneath the extended areas of the site, to assist in the master planning design.

1.4 Scope of the investigation

The project has been carried out to an agreed brief as set out in RSKs proposal (ref. 313582-00 (01) Specification, dated 15th June 2017).

The ground investigation fieldwork carried out at the site was undertaken in accordance with a specification developed by RSK in view of the Client's proposed development proposals.

The scope of works for the assessment included:

- an intrusive investigation, with associated laboratory analysis and programme of subsequent monitoring events;
- development of a refined conceptual site model followed by generic quantitative risk assessment (GQRA) to assess complete pollutant linkages that may require the implementation of mitigation measures to facilitate development;
- interpretation of ground conditions and ground model for the site;
- classification of the strata encountered and identification of soil properties;
- an interpretative report to assess both geotechnical and geoenvironmental risks and identify implications that will affect the detailed design of the project; and
- an assessment of the potential waste classification implications of soil arisings.

1.5 Background information

The following scheme design master plan drawing has been provided to RSK by the client:

- Site Plan, Project No. 4054 Drawing No: R001 Rev: P9 prepared by pHp Architects, dated May 2016 (received from pHp June 2016).

The majority of the site, excluding the extension area, has been previously investigated by RSK and reported under the following covers:

- 'M1 Junction 15 West Preliminary Sources Study Report' Ref.: 312598-01(00), dated 17th October 2014,
- 'M1 Junction 15 West Factual Ground Investigation Report' Ref.: 312598-02(00), dated 10th November 2014,
- 'M1 Junction 15 West Preliminary Ground Investigation Interpretive Report' Ref.: 312598-03(00), dated 10th November 2014,
- 'M1 Junction 15 West, Northampton, Revised Junction Design, Preliminary Sources Study Report' Ref.: 313588-01(00), dated 12th April 2017, and
- 'M1 Junction 15 West – Extended Development Site, Supplementary Factual Ground Investigation Report' Ref.: 313582-01(00), dated 14th November 2017.

As previously mentioned, the proposed scheme has since been expanded to include additional areas to both the west and south of the site, together with a rearrangement of the proposed development. Information obtained as part of the above reports has been reviewed and used to inform the opinions and recommendations included within this supplementary Geotechnical and Geoenvironmental report.

1.6 Limitations

The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows may vary from those reported due to seasonal, or other, effects.

Whilst asbestos containing materials were not identified during the fieldworks or supporting laboratory analysis, asbestos is often present in discrete areas. Thus, although not encountered during the site investigation, may be found during more extensive ground works or within areas not investigated, such as within the shooting range and the abandoned barns which are within the footprint of the development.

2 SITE DETAILS

2.1 Site location

The site covers approximately 172 hectares, the centre of which is defined by the following National Grid co-ordinates: 474910, 254660. The site is bound by the M1 motorway, which runs roughly north-west to south-east along the north-eastern boundary of the site. Junction 15 is located on the south-eastern extent of the site with the A508 running south-west from the aforementioned junction, along the south-eastern boundary of the site. A brook with fields beyond denotes the southern extent of the development area, with an existing area of fields to the south retained as part of the overall scheme. Collingtree Lane marks the northern boundary of the site, while the existing railway line marks the western boundary of the site.

The village of Blisworth is situated approximately 1km to the west of the site. The village of Milton Malsor is located approximately 0.5km north-west of the site and the village of Collingtree is located some 100m east, beyond the M1 Motorway.

2.2 Local topography, geography and geomorphology

The site sits within a formerly glaciated area and as such, the land is gently undulating with a general rise from the southern extent to the north-eastern corner of the site.

The site generally slopes down from west to east, with the peak of the hill on which the site sits being located near to the centre of the western boundary of the site. The top of the hill forms a ridge, which extends along the majority of the western boundary of the site. At its highest, the site elevation is approximately 102m AOD, located near to the centre of the western boundary, down to its lowest elevation approximately 80m AOD along the sites eastern boundary, within a shallow valley associated with the unnamed brook flowing north-east, along the sites south eastern boundary.

The M1 motorway is located in a shallow cutting along the eastern site boundary.

The railway is located within a cutting.

The geological sequence of the majority of the site is understood to comprise Oadby Member Glacial Till (Superficial), anticipated to be primarily cohesive, which overlies Glaciofluvial Deposits (Superficial), anticipated to be primarily granular in nature. Both superficial deposits are anticipated to overlie the Whitby Mudstone Formation (Solid deposit), which are likely to comprise weathered laminated fossiliferous mudstones, laminated with thin siltstone or silty mudstone beds and rare fine grained calcareous sandstone beds.

2.3 Site description

A site walkover was originally undertaken on the 19th December 2013, and was updated for the purpose of the revised report of the 22nd July 2016, with the additional areas viewed from public rights of way and farm field tracks.

The site is predominantly utilised for arable farming and comprises fields with hedgerow field boundaries including a variety of immature to mature sized trees of various species. Two areas of mixed woodland are also located within the boundaries of the site. The woodlands are located near to the centre of the site, adjacent to the main access track through the site. The general elevation of the surrounding land undulates up and down, with the site elevations generally sloping down from north-west to south and south-east, rising slightly beyond the unnamed brook in the south of the site.

The main access to the site is via a rough compacted gravel track leading north from the south-western quarter of the site, off the A508 towards the sites centre. In the centre of the site, just off the track, is a spoil heap of rubble consisting of brick, tarmac and stone (presumed to be used from improving farm tracks) which remained present during the undertaking of the intrusive works. An additional track leading east from the main access route terminates at a bridge over the M1 used as a public right of way footpath. There are several public rights of way crossing the site in various locations, one of which heads west to cross the railway line via a footbridge, which is located approximately centrally along the western boundary of the site.

There are two buildings located on site. To the south-west of the centre of the site is a gun club with an associated shooting range and clay pigeon shooting. Derelict farm buildings including two derelict outhouses are also located in the east of the site. The derelict farm buildings are either of stone construction, which is in poor condition, or corrugated sheet metal cladding.

An overhead 1.1kv power supply enters the north-west of the site, travelling south-east and south towards the derelict farm buildings on low level wooden poles. The derelict farm buildings are generally empty but appear to be utilised as a store for stone as well as containing two former fuel tanks, and at the time of the original site walkover, were partially filled with water.

Additionally, the site contains two telecom masts; one is located in the south-eastern corner of the site, accessed via a concrete track running from the A508. While the second mast is located in the north-east of the site, close to the boundary and footbridge to Collingtree, beyond the M1.

In the south of the site is a brook, which appears to flow from west to east along the sites southern boundary, crossing the A508 then north-east towards Northampton. Beyond the unnamed brook in the south of the site are additional fields, which extend to an access track that marks the southern extent of the site.

Additionally, from ecological plans supplied to RSK in 2014, it is noted that the site previously had two badger sets located in the east of the site. One was located on the

north-east corner in coniferous woodland, and the second was within a boundary hedge. The ecological plans supplied to RSK also indicated that there is a pond within the grounds of the gun club woodland, which was suggested to potentially have great crested newts within it, as well as common lizard habitats and bat roosts. At the time of the walkover, RSK was prohibited entering the property associated with the gun club on health and safety grounds, and as such, these features were not observed during the walkover.

Supplied plans also indicated existing underground gas and water district mains in the east corner of the site, though no markers were identified within the boundaries of the site, at the time of the walkover.

3 SUMMARY OF AVAILABLE INFORMATION

3.1 Published geology and expected ground conditions

The British geological Survey (BGS) plans and maps obtained have been reviewed to determine the anticipated geology beneath the site.

It is envisaged that the local geology beneath the site will be in line with the summary below detailed within Table 1.

Table 1: summary of available information.

Geology	Comment
Surfacing and Buried Structures: <small>(source: Envirocheck History Maps, Site Observation)</small>	Hard standing was identified along tracks to existing farm buildings in the east of the site as well as to a telecoms mast in the east of the site. Hard standing was also associated with the derelict farm buildings in the east of the site.
Made Ground / Topsoil: <small>(source: BGS Maps, Available Borehole Logs, Envirocheck Geology & History Maps, memoirs)</small>	The entire Site is anticipated to be underlain by a cultivated plough layer resulting in a sub soil or growing medium (Agricultural Topsoil) rather than topsoil associated with gardens. Previous investigations have identified Agricultural Topsoil to be present to depths of between 0.10m and 0.50m, with a Subsoil present below that was identified to be between 0.10m and 0.90m thick. The Agricultural Topsoil comprised brown sandy slightly gravelly clay or slightly gravelly clayey sand, while the Subsoil comprised orange brown slightly sandy slightly gravelly clay, or clayey sand
Drift Deposits: <small>(source: BGS Maps, Available Borehole Logs, Envirocheck Geology & History Maps, memoirs)</small>	The majority of the site appears to be underlain by a mantle of Oadby Member (Diamicton Till / Glacial Till) which comprised firm to stiff brown or dark grey slightly sandy slight gravelly silty CLAY and was found to be on average between 4.00m to 5.00m thick but ranged between 0.55m and 10.90m thick. In the north corner of the site Glaciofluvial Deposits have been identified, below the Oadby Member, to depths of greater than 20.45m bgl. The Deposits were generally found to be between 0.50m and greater than 8.75m in thickness, and comprised orange brown occasionally slightly clayey gravelly sand or sand and gravel with the sand being predominant and mostly medium sized.
Bedrock <small>(source: BGS Maps, Available Borehole Logs, Envirocheck Geology & History Maps, memoirs)</small>	<p>The entirety of the Site is indicated to be underlain by Whitby Mudstone Formation located below the overlying superficial deposits and have been identified at thicknesses of greater than 8.85m, although desk top information would suggest that the Whitby Mudstone Formation could extend up to 120m in thickness. These deposits appeared to generally comprise dark grey occasionally slightly sandy, occasionally very silty clay and rare silt, with bands of mudstone and siltstone.</p> <p>The Stamford Member is identified to extend just across the southern boundary of the site. The BGS indicates the Stamford Member to be pale greenish grey to yellowish and white, generally massive, fine-grained, generally friable, quartzose, unfossiliferous sandstone or siltstone, interpreted as mainly swamp and lacustrine, seen particularly in the upper part of the</p>

Geology	Comment
	succession and in thicker successions as a sandy silty mudstone with plant debris, rootlets and thin lignite lenses, especially near the top, locally including interpreted lacustrine carbonaceous mudstones in hollows at the base and at the top.
Mining <small>(source: Coal Authority web viewer, BGS Maps, Available Borehole Logs, Envirocheck records, Geology & History Maps)</small>	None Identified.
Faults <small>(source: BGS Maps, Available Borehole Logs, Envirocheck Geology Maps, memoirs)</small>	None Identified.
Opencast Quarrying <small>(source: Coal Authority web viewer, BGS Maps, Envirocheck History Maps)</small>	<p>Some sand and gravel quarries noted within 400m of the site, although none expected on site.</p> <p>A site at Milton Malsor located immediately beyond the northern boundary of the site has allocated permissions for the extraction of up to 1.2M tonnes of glacial sands and gravels. It is however not being exploited at this time.</p>
Mineral protection <small>(source: Local Authority Plan)</small>	<p>The northern half of the site falls within a Mineral Safeguarding and Consultation Areas (MSA & MCA), associated with the sand and gravels of the Glaciofluvial Deposits.</p> <p>Related to this is the submission for 'Preventing land use conflict – buffer for allocated sites' which for the Milton Malsor allocated site extends across the extreme northern boundary of the site.</p>
Soil Chemistry <small>(source: Envirocheck / BGS)</small>	<p>Available soil chemistry data suggests that the natural soils anticipated to be present across the site are unlikely to contain any significantly elevated concentrations of contaminants that would be considered to represent a risk to Human Health for a commercial development.</p> <p>This was confirmed by the preliminary ground investigation undertaken in November 2014.</p>

4 GROUND INVESTIGATION

The investigation undertaken comprised the following:

- Setting out and service Clearance (RSK SafeGround);
- Excavation of 3no trial pits using an operated tracked excavator to depths of between 2.20 to 3.10m bgl;
- Carry out three soakaway tests in the three trial pits in general accordance with BRE 365.
- Sinking of 20no window sampler boreholes to depths between 3.60 and 5.45m bgl;
- Sinking of 14no cable percussive boreholes to depths between 12.25 and 25.45m bgl;
- Installation of 31no combined groundwater/gas monitoring wells to varying depths including provision of flush lockable covers;
- Four visits to monitor groundwater levels/ground gas concentrations;
- One groundwater sampling visit.
- Surveying in of as built exploratory hole positions using GPS surveying equipment;
- Associated sampling and in-situ testing;
- Soil and rock sample geotechnical laboratory testing; and
- Soil sample chemical laboratory testing.
- Groundwater sample chemical and contamination laboratory testing.

Full records and details covering the methodology of the investigation, the location rationale for exploratory holes, exploratory hole logs, completed laboratory testing results and exploratory hole location drawings are presented separately within the Factual Ground Investigation Report (313582 – 01 (00)).

The ground investigation was developed to supplement the findings of the desk study research and the initial Ground Investigation undertaken which is presented separately and detailed within section 1.5. The specification for the works was developed with the aim of confirming the underlying ground conditions present beneath the extension of the original site to supplement data already obtained from the main body of the site. Part of the aim was also to obtain and tests samples to confirm the geotechnical and chemical properties to allow master planning design assessments to be refined. Specific issues targeted by the ground investigation are identified in Table 2 below:

Table 2: Issues targeted within the ground investigation

	Area	Issue	Exploratory Holes	Testing	Comments
Geo-environmental	Targeted in the supplementary areas of the site, which have not undergone previous chemical testing	General chemical characteristics of the Topsoil, near surface sub soils and groundwater as the site is Greenfield	WSA1, WSA2, WSA4 - WSA6, WSA8, WSA14, WSA18, BHA3 -BHA10 and TPA1 -TPA3.	Chemical analysis	To confirm contamination risk potential. To confirm in ground aggressivity for concrete mix designs
Geotechnical	Targeted in the supplementary areas of the site, which have not undergone previous chemical testing	General geotechnical characteristics	All cable percussive boreholes, except BHA9 and BHA11. WSA12 to WSA16.	Soils testing	To confirm distribution, classification, uniformity in plan and depth
	Cuttings and earthworks properties	Strata depths, properties and groundwater levels	BHA1, BHA6, BHA8 and BHA10	SPT, PI, QUTxl, Hand Shear Vane, Consols, earthworks testing	To confirm strata strength characteristics and uniformity. To confirm distribution, classification and reusability in earthworks filling operations
	Embankment Foundations	Strata depths and properties and groundwater levels	BHA2 – BHA5, BHA7, BHA12 to BHA14, WSA1 -5.	Strength and consolidation properties.	To confirm strata strength characteristics and uniformity
	Buildings Plateau Foundations	Strata depths and properties and groundwater levels	BHA1, BHA10, BHA4, BHA11, BHA6, BHA8, WSA6-16 & WSA20	PI, QUTxl, Consols	To confirm strata strengths and settlement characteristics and uniformity of strata
	Hard standing and highways and earthworks	Strata depths and properties and groundwater levels	BHA1, BHA10, BHA4, BHA11, BHA6, BHA8, WSA6-16 & WSA20	Classification, Compaction testing and recompacted CBR.	To confirm shallow ground conditions.
	Flood Attenuation Ponds	Soil Infiltration	TPA1 – TPA3, WSA6, 7 & 11 and WSA17-20	Soakaways, classification tests, and sieving.	To define permeability's and effectiveness of soakaways or need for lining of ponds and establish shallow groundwater table.

It should be noted that the derelict barns and the area surrounding the active shooting club, were not investigated during the original or the current investigation. The derelict barns are known to contain tanks, which should be investigated once access is made available or during the enabling works.

5 GROUND CONDITIONS IDENTIFIED

The results of the Supplementary Ground Investigation and subsequent laboratory analysis undertaken are detailed below. The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented separately in the Factual Ground Investigation Report (313582-01 (00)).

5.1 Ground conditions

The exploratory holes revealed that the site is underlain by a variable thickness of agricultural topsoil and subsoil over drift deposits including, the Oadby Member (Glacial Till) over Glaciofluvial deposits. The upper Oadby member Glacial Till deposits contained random pockets of granular strata. The deeper Glaciofluvial deposits contained localised pockets of cohesive materials. Locally these strata were also noted to be clayey SILTs. The Glaciofluvial deposits appeared to be absent to the south west.

Underlying these drift deposits the strata of the Whitby Mudstone Formation was encountered in most instances. This was confirmed to be weathered to clay tending to weathered mudstone with depth. This appears to confirm the stratigraphical succession described within the initial conceptual model and the previous ground investigation undertaken within the northern and eastern boundaries of the site.

It should be noted that the Stamford Member was not identified within the boundaries of the site, although mapped within the area.

For the purpose of discussion, the ground conditions are summarised in Table 3 and the strata discussed in subsequent subsections.

Table 3: General succession of strata encountered

Strata	Exploratory holes encountered	Depth to Top of stratum m bgl	Depth to Bottom of stratum m bgl
Agricultural Topsoil (Plough Layer)	All exploratory positions except BHA1.	GL	0.15 to 0.50
Subsoil	BHA1	GL	1.10
Oadby Member	All exploratory positions except BHA4.	0.15 to 1.10	1.35 to 11.50 *base not proven within TPA1, TPA2, TPA3, WSA1 to WSA4, WSA9, WSA10, WSA13, WSA15, WSA17 and WSA18.

Strata	Exploratory holes encountered	Depth to Top of stratum m bgl	Depth to Bottom of stratum m bgl
Glaciofluvial Deposits (locally absent)	BHA1, BHA2, BHA4 to BHA6, BHA9 to BHA12, WSA1, WSA11, WSA14, WSA16, WS A19 & WSA20	1.35 to 15.00	2.80 to >25.45 *base not proven within WSA16, WSA20, BHA1 and BHA10
Whitby Mudstone Formation	BHA2 to BHA9, BHA11 to BHA14, WSA1, WSA5 to WSA8, WSA11, WSA12, WSA14, WSA19,	2.20 to 11.80	Proven to the full depth of the investigation (25.45m bgl)
Note: Thickness' are proven thickness in exploratory holes and not full thickness of strata. Strata are likely to be thicker.			

5.1.1 Agricultural topsoil

The topsoil (ploughed surface materials) across the site was typically uniform, comprising dark brown or orange brown sandy, gravelly occasionally silty CLAY. The gravel content was variable, but comprised variations of angular to sub-rounded fine to coarse flint, quartzite and chalk with frequent roots and rootlets. The Agricultural Topsoil ranged in thickness between 0.15 to 0.50m thick but was generally 0.20 to 0.40m thick across most of the site.

The recorded laboratory test results are detailed within the Factual Ground Investigation Report presented separately.

Three soil samples of these deposits were sent for contamination screening testing.

No obvious visual or olfactory evidence of contamination was identified within any of these deposits encountered during the ground investigation.

5.1.2 Subsoil

The subsoil (ploughed surface materials) were only noted from surface within BHA1 to a base depth of 1.10m bgl, comprising a firm orange brown slightly sandy slightly gravelly silty CLAY. Gravel content comprises angular to sub-rounded fine to coarse flint, quartzite and chalk.

No obvious visual or olfactory evidence of contamination was identified within any of these deposits encountered during the ground investigation.

Due to the limited nature of this stratum, no chemical or geotechnical samples were tested.

5.1.3 Oadby Member

The Oadby Member was typically encountered beneath the topsoil/subsoil across the entirety of the site.

The strata encountered typically comprised soft to firm orangish brown slightly gravelly sandy CLAY; with a gravel content consisting of angular to sub-rounded fine to coarse flint, quartzite, chalk fragments. With depth, this stratum becomes firm to stiff dark brown or bluish grey, occasionally mottled orange, slightly silty CLAY. Locally these deposits included lenses and pockets of very clayey silts and gravelly sands.

Significant thicknesses of the granular sand pockets were identified close to surface directly beneath the topsoil and subsoil in some locations in the northern part of the site varying in thickness between 0.80m and 3.40m.

Available exploratory holes indicate that these strata can vary in thickness between 1.30m and 11.20m bgl. However, the base of the stratum was typically not proven within the shallower trial pits and window sampler boreholes (TPA1, TPA2, TPA3, WSA2 to WSA4, WSA9, WSA10, WSA13, WSA15, WSA17 and WSA18).

These deposits were recorded to be generally stable during excavation as trial pits did not collapse when left open to undertake soakaway testing and boreholes remained stable where these deposits were cohesive. Some instability was encountered within boreholes here granular sand lenses were encountered.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 4 below and are included within the Appendix P.

The recorded in-situ test results and laboratory test results are detailed within the Factual Ground Investigation Report presented separately.

Table 4: Summary of in-situ and laboratory test results for the cohesive Oadby Member

Soil parameters	Range	No Tests
Moisture content (%)	11 - 31	30
Liquid limit (%)	27 - 68	18
Plasticity limit (%)	16 - 25	
Plasticity index (%)	9 - 43	
Plasticity term	Low to High	-
Shrinkage Potential	Low to High	NHBC
Clay (%)	13 - 67	17
Silt (%)	13 - 54	
Sand (%)	1 - 53	
Gravel (%)	0 - 17	
Earthworks Class	2	HA MCDHW Series 600
Maximum Dry Density – 4.5kg Rammer (Mg/m ³)	1.80	1

Soil parameters	Range	No Tests
Optimum Moisture Content - 4.5kg Rammer (%)	16	
Natural Moisture Contents of samples tested (%)	19	
Re-compacted CBR – 4.5kg Rammer (%)	3.2 – 5.5 (15 – 20% mc)	2
Moisture Condition Value (MCV)	9.2 – 11.1 (20 – 29% mc)	5
SPT 'N' values (depth plots presented separately)	3 - >50	126
Undrained shear strength inferred from SPT 'N' values (kN/m ²)	14 - >225	
Stiffness term	Very Soft to Very Stiff	
Undrained shear strength measured by onsite hand vane testing (kN/m ²)	48 to 79	24
Stiffness term	Firm to stiff	
Undrained shear strength measured by laboratory shear vane testing (kN/m ²)	118	1
Undrained shear strength measured by triaxial testing kPa) – varies with depth	35 - 144	8
Bulk Density (Mg/m ³)	1.93 – 2.16	
Natural Moisture Content at test	11 - 28	
Coefficient of Consolidation C _v (m ² /Yr) <i>Taken from testing at or close to overburden pressures</i>	0.9 – 14* some samples swelled	10
Coefficient of compressibility M _v (m ² /MN) <i>Taken from testing at or close to overburden pressures</i>	0.041 – 0.31 some samples swelled	
Settlement Term	Very Low to medium Compressibility	

Given the topography, individual borehole plan positions and inherent heterogeneity of the strata in terms of its thickness and material structure there is considerable variation with depth and level. However, as expected in most instances the data indicates a progressive increase in SPT and corresponding strength of the strata with depth with most materials initially being firm closer to surface becoming stiff with depth. However, it should be noted that on occasion softer cohesive materials were identified at the upper interface. Similarly soft zones were also encountered at greater depths. It is considered that these typically correspond with ground water strikes/ seepages and close to saturated water bearing granular lenses and pockets, which has caused local softening.

Only one compaction test was undertaken on the Oadby Member, and this indicates an optimum moisture content of 16% however, the sample tested had a natural moisture content exceeding this suggesting that these materials are wet of optimum for reuse.

However this test should be combined with past testing in the original investigation to give a more considered and balanced review of compact ability.

MCV tests are often used to control the suitability of materials for compaction during earthworks and directly relate to moisture content. In most instances an MCV range of between 8 and 13 are set as acceptability criteria to control the earthworks. This range tends to ensure that only suitable moisture content materials are incorporated within the works, which can therefore be compacted. Moisture content calibration testing carried out on a limited number of samples does however suggest that moisture contents would typically need to fall between 22 and 32% to allow compaction to be achieved.

MCV single point testing carried out on a 5 typical samples at natural moisture content, suggests that the 5 samples tested at as dug moisture contents fall within a suitable envelope for MCV and moisture content and should therefore be compactable.

Natural moisture contents are shown to vary significantly ranging between 11 and 31%, however, the vast majority of moisture contents recorded for these deposits within the various laboratory tests typically fall within the desired range between 20 and 30%. Ultimately, this suggests that these materials could be suitable for reuse with no treatment. However, suitability for reuse within earthworks is often governed by the prevailing weather conditions during the works and the methods of working. It should be appreciated that these Glacial Deposits are formerly over consolidated soils and when exposed by removal of overburden are likely to be subject to stress relief and swell taking in moisture and reducing in strength. Such findings are documented within the consolidation tests carried out, making them difficult to reuse within structural fill operations. It is anticipated that some form of lime or and cement modification might be required to allow these materials to be reused within structural fill. However, this would need to be carried out with caution due to the potential for sulphate heave reactions resulting from the natural presence of high sulphates within these deposits.

In addition, it should be appreciated that in several exploratory holes Silts or very silty clays were identified and a number of particle size distribution tests indicate extremely high silt contents dominating in some of these deposits. Plasticity testing however seems to suggest that the clays are dominant for the most part. It should however be appreciated that silts and soils with high silt contents can be very difficult to use within engineered and compacted fills as the vibration of rollers tends to liquefy high silt content soils, particularly where high moisture contents or precipitation takes place during the works.

It should be recognised that the testing carried out to date is indicative only, it is considered that there is currently a small statistical number of tests and that further investigation and testing will be required to confirm this for earthworks specification and designs. Due to the variation in material properties, the size of the site and the volume of cut materials it is recommended that at the detailed design and specification stage that an intensive sampling and testing investigation is undertaken to better characterise and confirm the properties of the materials from the proposed cut areas.

Eleven samples of this stratum were scheduled for chemical analysis to determine concrete mix design. The results identified concentrations of water-soluble sulphate of up to 1990 mg/l and a minimum pH of 8.43.

Seven soil samples of these deposits were sent for contamination screening testing.

No obvious visual or olfactory evidence of contamination was identified within any of these deposits encountered during the ground investigation.

5.1.4 Glaciofluvial deposits

The Glaciofluvial Deposits were encountered within select boreholes, typically restricted to the northern and eastern half of the site, beneath the Oadby Member. The thickness of this stratum generally increased towards the north-western corner of the site, proven to a depth of 11.80m bgl within BHA9 and 11.40m bgl within BHA2. However, it should be noted that the Glaciofluvials were proven to the full depth of the investigation within BHA1 (25.45m bgl) and BHA10 (20.45m bgl), and so the full thickness of this deposit was not proven within those boreholes. Glaciofluvial Deposits were typically shallower within the central belt of the site (with basal depths ranging from 1.20 to 9.30m bgl).

The soils encountered typically comprised loose to medium dense, becoming dense with depth, orangish brown slightly gravelly, slightly clayey, occasionally silty SAND. The gravel content was typically uniform, consisting of variations of angular to sub-rounded fine to coarse quartzite, flint, chalk fragments and rare ironstone. Occasionally loose to medium dense light orangish brown slightly clayey SAND & GRAVELS, with a gravel content of flint, quartzite, chalk and ironstone, were identified across the site.

Trial pit locations were restricted to the southern half of the site where Glaciofluvial Deposits were not encountered. This in conjunction with the fact that casing was used during drilling to allow for continual drilling and prevention of borehole collapse, it is not known how stable this stratum is, however, it is anticipated that these deposits would not remain stable in deep vertical excavations. However, considering the granular nature of the soils encountered and the recorded presence of groundwater strikes and seepages, it is considered that collapse of sidewalls is inevitable and that excavations should not remain open over long periods of time without appropriate shoring.

These deposits were typically not encountered within trial pit excavations as trial pits were located within the southern half of the site, where Glaciofluvial Deposits were not encountered.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 5 below and are included within the Appendix P.

The recorded in-situ test results and laboratory test results are detailed within the Factual Ground Investigation Report presented separately.

Table 5: Summary of in-situ and laboratory test results for the cohesive Glaciofluvial Deposits

Soil parameters	Range	No Tests
Moisture content (%)	5.1 – 31 <i>Note higher moisture contents were encountered where deposits had higher clay contents.</i>	10
Clay (%)	3 - 16	6
Silt (%)	3 - 27	
Sand (%)	36 - 72	
Gravel (%)	7 - 58	
Earthworks Class	Class 1 to Class 2	HA MCDHW Series 600
SPT 'N' values (depth plots presented separately)	2 - >50	59
Density term	Loose to Dense	

Given the topography, individual borehole plan positions and inherent variation of the strata in terms of its thickness and material structure there is considerable variation with depth and level. However, as expected in most instances the data indicates a progressive increase in SPT and corresponding strength of the strata with depth with most materials initially being initially loose to medium dense increasing in density with depth to dense. It should be appreciated that drilling disturbance, particularly at and below the water table, may have resulted in some lower test results.

Natural moisture contents are shown to vary significantly ranging between 5.1 and 31%, with higher moisture contents encountered in soils with higher fines contents.

It should however be recognised that the testing carried out to date is indicative only, it is considered that there is currently a small statistical number of tests and that further investigation and testing will be required to confirm these findings for earthworks specification and designs. Due to the variation in material properties, the size of the site and the volume of cut materials it is recommended that at the detailed design and specification stage that an intensive sampling and testing investigation is undertaken to confirm the properties of the materials from the proposed cut areas.

No obvious visual or olfactory evidence of contamination was identified within any of these deposits encountered during the ground investigation.

5.1.5 Whitby Mudstone Formation

The Whitby Mudstone Formation stratum was encountered directly beneath the Oadby Member in the southern and western extents of the site and immediately beneath the Glaciofluvial deposits in the eastern and northern extents of the site. Typically, these

deposits were described as stiff dark grey and blue grey silty clay tending to a weathered mudstone structure at depth.

The Whitby Mudstone Formation was not encountered within BHA1, BHA10, WSA1 to WSA4, WSA9, WSA10, WSA13, WSA15, WSA16 to WSA18. As such, it is anticipated that the Whitby Mudstone Formation can be locally deeper.

5.1.5.1 Weathered Whitby Mudstone Formation

These deposits have been identified to be present beneath the Oadby member and Glaciofluvial Deposits and are indicated to be present from a minimum top depth of 2.20m bgl in the south to a maximum top depth of 11.80m bgl in the north.

The deposits encountered typically comprised firm to stiff, becoming very stiff with depth, dark brown or bluish grey slightly silty structured CLAY, with mudstone lithorelicts, possible selenite crystals and shell fragments noted with depth.

5.1.5.2 Solid Whitby Mudstone Formation

Solid Whitby Mudstone Formation was encountered directly beneath the weathered mudstones within BHA2, BHA4, BHA9 and BHA14. The depths to the top of stratum ranged from 11.80 to 18.40m bgl and the bedrock was proven to the full depth of the investigation. SPT N value testing typically refused upon penetration of these mudstones and they were not penetrated to full depth.

The Whitby Mudstone Formation encountered was typically a weak to medium strong dark bluish grey, laminated MUDSTONE, recovered as gravel sized fragments in a clayey matrix.

A summary of the in-situ and laboratory test results in the weathered Whitby Mudstone Formation is presented in Table 6 below and are included within the Appendix P.

The recorded in-situ test results and laboratory test results are detailed within the Factual Ground Investigation Report presented separately.

Table 6: Summary of in-situ and laboratory test results for Whitby Mudstone Formation

Soil parameters	Range	No tests
Moisture content (%)	18 - 27	9
Liquid limit (%)	46 - 62	3
Plasticity limit (%)	20 - 27	
Plasticity index (%)	26 - 35	
Plasticity term	Intermediate to High	
Volume change potential	Medium	NHBC

Soil parameters	Range	No tests
SPT 'N' values (depth plots presented separately)	13 to >50 but typically in the order of 30 to >50	117
Undrained shear strength inferred from SPT 'N' values (kN/m ²)	63 to 250	
Stiffness term	Firm to Very stiff	
Undrained shear strength measured by triaxial testing (kN/m ²)	39 - 120	7
Bulk Density (Mg/m ³)	1.93 – 2.16	
Natural Moisture Content at test	21.2 - 30.2	
Undrained shear strength measured by laboratory shear vane testing (kN/m ²)	131 – 143	2
Coefficient of Consolidation C _v (m ² /Yr) <i>Taken from testing at or close to overburden pressures</i>	0.65 – 7.9	9
Coefficient of compressibility M _v (m ² /MN) <i>Taken from testing at or close to overburden pressures</i>	0.032 – 0.26	
Settlement Term	Very Low to Medium Compressibility	-
Coefficient of Permeability (k _v at 20°C)	7.3x10 ⁻¹¹	1
Moisture Content (%)	23	
Bulk Density (Mg/m ³)	2.10	
Dry Density (Mg/m ³)	1.71	

As expected in most instances, this indicates a progressive increase in SPT and corresponding strength of the strata with depth as the strata graduates from residual weathered soils to weak rock. Initially the weathered strata are noted to be firm to stiff where closer to the surface and base of overlying units and highly weathered.

Natural moisture contents are shown to vary from 18 to 30% with the materials being generally stiff to very stiff in nature. It would appear unlikely that these deposits will be encountered in earthworks re-profiling excavations, however, they may be encountered if deep foundations or service excavations are undertaken. It should be acknowledged that these deposits are over consolidated and when exposed by removal of overburden, are likely to be subject to stress relief and swell taking in moisture and reducing in strength. Such findings are documented within the consolidation tests carried out, making them difficult to reuse within structural fill operations. It is anticipated that some form of lime or and cement modification might be required to allow these materials to be reused within structural fill. However, this would need to be carried out with caution due to the potential for sulphate heave reactions resulting from the natural presence of high sulphates within these deposits.

No obvious visual or olfactory evidence of contamination was identified within any of these deposits encountered during the ground investigation.

5.1.6 Results of soakaway testing

Three soakaway tests were attempted close to locations where it is thought that storm water attenuation ponds or drainage swales might be located to check to see if any infiltration might occur and to confirm if the ground conditions might be suitable for the adoption of soakaway sustainable urban drainage systems.

The results of soakaway testing are summarised in Table 7.

Table 7: Soakaway test results

Trial pit	Geological unit	Test result (m/s)
TPA1	Oadby Member (cohesive)	Insufficient drop in water level. Unable to calculate infiltration rate.
TPA2	Oadby Member (cohesive)	Insufficient drop in water level. Unable to calculate infiltration rate.
TPA3	Oadby Member (cohesive)	4.98×10^{-6}
Notes: Strata predominantly cohesive in nature and therefore not conducive to soakaway.		

5.2 Groundwater

Groundwater was encountered during the investigation as detailed in Table 8.

Table 8: Groundwater results during investigation

BH/TP	Stratum	Strike (m bgl)	Level (mAOD)	Rise (m bgl)	Level (mAOD)
BHA1	OM	4.00	92.51	3.50	93.01
BHA2	GFD	9.50	76.04	9.00	76.54
BHA4	GFD	5.00	90.09	4.00	100.9
BHA5	GFD	4.00	92.78	3.50	93.28
BHA6	OM	6.50	88.25	6.40	88.35
BHA9	GFD	7.80	77.69	7.40	78.09
BHA10	GFD	14.00	79.38	12.00	81.38
BHA11	GFD	4.00	82.77	3.90	82.87
BHA12	GFD	7.90	88.24	7.60	88.54
BHA14	OM	4.40	87.45	3.00	88.85
WSA1	GFD	2.40	86.34	-	-

BH/TP	Stratum	Strike (m bgl)	Level (mAOD)	Rise (m bgl)	Level (mAOD)
WSA2	OM	1.60	90.40	-	-
WSA4	OM	2.20	92.65	-	-
WSA6	OM	1.80	86.64	-	-
WSA11	GFD	4.10	87.02	-	-
WSA12	WMF	3.60	84.62	-	-
WSA13	GFD	3.00	83.31	-	-
WSA14	GFD	2.40	82.04	-	-
WSA16	GFD	2.10	85.82	-	-
WSA19	OM	1.40	79.44	-	-
Notes: OM – Oadby Member, GFD – Glaciofluvial Deposits, WMF – Whitby Mudstone Formation					

Where not listed, exploratory holes did not encounter groundwater strikes during formation. It should be noted that the speed of drilling and casing of holes can often mask minor seepages and water strikes. Indeed the addition of water within cable percussion boreholes to allow drilling to progress through granular deposits may obscure water strikes, however major water strikes are normally evident.

It should be noted that groundwater levels might fluctuate for a number of reasons including in the short term the prevailing weather conditions immediately before and during investigation and monitoring works and longer term seasonal variations should be expected.

The results of the subsequent groundwater monitoring and well surveying exercise are summarised in Table 9. The data recorded during the subsequent ground water monitoring is presented within Figures F and G.

Table 9: Groundwater monitoring data (22/09/2017 to 24/10/2017)

Monitoring well	Response Zone (m bgl)	Strata	Ground Level elevation (m AOD)	Monitored Groundwater Depth Range (mb GL)	Monitored Groundwater Elevation (m AOD)	Notes
BHA1	16.00 to 20.00	OM	96.51	17.75 to 17.78	78.76 to 78.73	Confined perched aquifer – Granular pocket.
BHA2	8.00 to 13.00	GFD / WMF	85.64	8.54 to 10.39	77.10 to 75.25	Confined perched aquifer – Granular pocket.
BHA3	11.00 to 16.00	WMF	89.34	9.01 to 10.05	80.33 to 79.29	Seepages and pore water release build up in low permeability strata not true water table

Monitoring well	Response Zone (m bgl)	Strata	Ground Level elevation (m AOD)	Monitored Groundwater Depth Range (mb GL)	Monitored Groundwater Elevation (m AOD)	Notes
BHA4	2.00 to 7.00	GFD	95.09	2.09 to 2.30	93.00 to 92.79	Confined perched aquifer.
BHA5	4.00 to 8.00	GFD / WMF	96.78	4.00 to 5.08	92.78 to 91.70	Thin confined perched aquifer - seepage build up in well in underlying impermeable strata.
BHA6	8.00 to 12.00	OM / WMF	94.75	7.97 to 8.25	86.78 to 86.50	Seepages and pore water release build up in low permeability strata not true water table
BHA7	15.00 to 20.00	WMF	99.96	17.45 to 17.82	82.51 to 82.14	
BHA8	8.00 to 12.00	WMF	92.26	10.15 to 11.20	82.11 to 81.06	
BHA9	6.00 to 12.00	GFD / WMF	85.49	6.76 to 6.79	78.73 to 78.70	Confined perched aquifer.
BHA10	12.00 to 16.00	GFD	93.38	14.48 to 14.53	78.90 to 78.85	Confined perched aquifer.
BHA11	3.00 to 4.00	GFD / WMF	86.77	3.95 to 3.97	82.82 to 82.80	Confined perched aquifer.
BHA12*	8.00 to 9.00	GFD / WMF	96.14	6.90 to 7.08	89.24 to 89.06	Thin confined perched aquifer and water is at level of layer.
WSA1	1.00 to 3.00	OM / GFD	88.74	1.75 to 1.98	86.99 to 86.76	Thin confined perched aquifer
WSA2*	2.50 to 4.50	OM	92.00	1.90 to 1.96	90.10 to 90.04	Seepages and pore water release build up in low permeability strata not true water table
WSA3*	2.00 to 5.00	OM	97.80	Dry	-	Low permeability strata.
WSA4*	2.00 to 5.00	OM	94.85	1.95 to 2.08	92.90 to 92.77	Seepages and pore water release build up in low permeability strata not true water table
WSA5	2.00 to 5.00	OM / WMF	94.10	3.59 to 4.33	90.51 to 89.77	
WSA6	1.00 to 3.00	OM	88.44	Dry	-	
WSA7	1.00 to 3.00	OM	84.39	1.75 to 2.20	82.64 to 82.19	
WSA8	2.00 to 5.00	OM / WMF	87.05	Dry	-	
WSA9	2.00 to 5.00	OM	87.63	0.61 to 3.49	87.02 to 84.14	
WSA10	2.00 to 5.00	OM	98.28	Dry to 4.96	- To 93.32	
WSA11	2.00 to 5.00	OM / WMF	91.12	3.75 to 3.80	87.3 to 87.32	Thin confined perched aquifer - seepage build up in well in underlying impermeable strata.
WSA12	3.00 to 4.00	WMF	88.22	2.80 to 2.81	85.42 to 85.41	Seepages and pore water release build up in low permeability strata not true water table

Monitoring well	Response Zone (m bgl)	Strata	Ground Level elevation (m AOD)	Monitored Groundwater Depth Range (mb GL)	Monitored Groundwater Elevation (m AOD)	Notes
WSA13	2.00 to 3.00	GFD	86.31	2.53 to 2.55	83.78 to 83.76	Thin confined perched aquifer
WSA14	2.00 to 5.00	GFD / WMF	84.44	2.20 to 2.26	82.24 to 82.18	Confined perched aquifer – Granular pocket., well extends into impermeable strata allowing build up.
WSA15	1.00 to 3.00	OM	84.97	Dry	-	Seepages and pore water release build up in low permeability strata (Silt & Clay) not true water table
WSA16	1.00 to 3.00	OM / GFD	87.92	Dry	-	Thin confined perched aquifer
WSA17	1.00 to 3.00	OM	83.64	2.10 to 2.44	81.54 to 81.20	Seepages and pore water release build up in low permeability strata not true water table.
WSA18^	2.00 to 5.00	OM	81.50	0.00 to 2.16	81.50 to 79.34	Thin confined perched aquifer
WSA19	1.00 to 3.00	OM / GFD / WMF	80.84	0.55 to 1.70	80.29 to 79.14	Seepages and pore water release build up in low permeability strata not true water table.
WSA20	1.00 to 3.00	OM / WMF	89.73	2.45 to 2.87	87.28 to 86.86	Thin confined perched aquifer
CP1	8.00 to 15.00	GFD	90.77	Dry	-	Confined perched aquifer.
CP2	14.00 to 20.00	GFD	95.89	16.92 to 16.95	78.97 to 78.94	Confined perched aquifer.
CP5	4.00 to 8.00	OM / GFD / WMF	84.07	5.40 to 5.50	78.67 to 78.57	Thin confined perched aquifer
CP8	2.00 to 5.00	OM	81.70	1.80 to 2.14	79.90 to 79.56	Confined perched aquifer – Granular pocket., well extends into impermeable strata allowing build up.
CP13	8.00 to 13.00	OM / WMF	83.99	2.93 to 3.18	81.06 to 80.81	Thin confined perched aquifer
CP16	2.00 to 5.00	GFD	81.34	1.60 to 1.80	79.74 to 79.54	Confined perched aquifer – Granular pocket., well extends into impermeable strata allowing build up.
WS2	1.00 to 3.00	GFD / OM	82.99	Dry	-	Thin confined perched aquifer
WS4	2.00 to 5.00	GFD	85.10	Dry to 4.95	- To 80.15	Confined perched
WS8	2.00 to 4.00	OM / GFD	94.28	1.77 to 1.92	92.51 to 92.36	

Monitoring well	Response Zone (m bgl)	Strata	Ground Level elevation (m AOD)	Monitored Groundwater Depth Range (mb GL)	Monitored Groundwater Elevation (m AOD)	Notes
WS11	2.00 to 4.00	OM / GFD / WMF	87.13	3.00 to 3.03	84.13 to 84.10	aquifer – Granular pocket., well extends into impermeable strata allowing build up.
^ Borehole installation was flooded at the time of monitoring. * Only 3 of the 4 monitoring visits undertaken. Field has been ploughed by land owner prior a visit, as such, the installed boreholes could not be located and are considered to have been removed during the ploughing process.						

The findings appear to confirm the site has localised perched water tables within discrete pockets of sands and gravels within the Oadby Member (Glacial Till) at varying levels. In addition, localised seepages from the cohesive Oadby Member have also accumulated within the base of standpipes instrumented within these cohesive deposits. The variable nature of the granular and cohesive strata present throughout the Oadby Member deposits results in pockets of water bearing granular strata, which are not thought to be linked or consistent across the site.

Deeper instruments placed within or across the granular Glaciofluvial Deposits at depth seem to suggest a continuous water table is present within these strata at depths typically ranging from 75mAOD to 85mAOD. However, it should be noted that perched waters are recorded within the Glaciofluvial sands when positioned between cohesive deposits of the Oadby Member and the Whitby Mudstone Formation and therefore appear to be a confined perched aquifer.

Similarly, within instruments placed within the Whitby Mudstone Formation at depth a continuous water table also appears to be present within these strata at depths typically ranging from 79mAOD to 89mAOD. Although this is less likely to be a true water table and may only be related to permeable fissure flows through more permeable thin bands of siltstone or limestone, which are likely to be present.

It is important to understand groundwater flow across the site. This has been achieved by identifying the site elevation level from surface and the deducting the groundwater levels recorded during returned monitoring events. Subsequently, monitoring of groundwater levels suggests that the general groundwater flow is towards the east and northeast.

It's should be appreciated that some of the instrumentation installed cover large response zones including some more permeable strata trapped between less permeable strata. If the more permeable strata yield water these standpipes fill up to the draining layer trapped in the less permeable mudstone surrounding them below and therefore maintain what appears to be a long-term water table, which may not reflect reality and possibly only represent perched water confined by cohesive strata above and below.

Seven water samples were obtained from monitoring instrumentation installed using bailer sampling techniques and were sent for contamination screening testing. No obvious visual or olfactory contamination was identified when taking these samples.

5.3 Ground gas regime

The results of the ground gas monitoring and testing carried out are given in Appendix F. The maximum results are recorded in Table 10.

Table 10: Summary of ground gas monitoring results (22/09/2017 to 24/10/2017)

Borehole	Response zone/strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%) (max)	Carbon dioxide (%) (max)	Oxygen (%) (minimum)	Flow rate (l/hr) (max)	Water level (m bgl)
BHA1	16.00 to 20.00	None identified	4	0.0	0.1	20.8	0.0	17.75 to 17.79
BHA2	8.00 to 13.00	None identified	4	0.0	3.6	14.2	0.1	8.54 to 10.39
BHA3	11.00 to 16.00	None identified	4	0.0	0.4	19.1	0.1	8.55 to 10.05
BHA4	2.00 to 7.00	None identified	4	0.0	2.3	18.1	0.1	2.08 to 2.30
BHA5	4.00 to 8.00	None identified	4	0.0	3.2	0.9	1.2	4.00 to 5.08
BHA6	8.00 to 12.00	None identified	4	0.0	2.0	7.1	0.1	7.97 to 8.25
BHA7	15.00 to 20.00	None identified	4	0.0	2.2	8.3	0.1	16.75 to 17.82
BHA8	8.00 to 12.00	None identified	4	0.0	1.4	15.1	0.1	10.15 to 11.20
BHA9	6.00 to 12.00	None identified	4	0.0	1.7	18.8	0.0	6.76 to 6.79
BHA10	12.00 to 16.00	None identified	4	0.0	0.1	18.4	0.0	14.48 to 14.53
BHA11	3.00 to 4.00	None identified	4	0.0	2.1	17.5	0.2	3.95 to 3.97
BHA12*	8.00 to 9.00	None identified	3	0.0	0.2	17.9	0.0	6.90 to 7.08
WSA1	1.00 to 3.00	None identified	4	0.0	2.5	11.1	-0.1	1.75 to 2.78
WSA2*	2.50 to 4.50	None identified	3	0.0	2.8	16.8	0.0	1.80 to 1.96
WSA3*	2.00 to 5.00	None identified	3	0.0	3.2	17.0	0.0	Dry
WSA4	2.00 to 5.00	None identified	3	0.0	3.0	13.4	0.3	1.95 to 2.08

Borehole	Response zone/strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%) (max)	Carbon dioxide (%) (max)	Oxygen (%) (minimum)	Flow rate (l/hr) (max)	Water level (m bgl)
WSA5	2.00 to 5.00	None identified	4	0.0	3.1	18.4	0.3	3.59 to 4.33
WSA6	1.00 to 3.00	None identified	4	0.0	1.1	18.9	0.3	Dry
WSA7	1.00 to 3.00	None identified	4	0.0	2.1	11.0	0.1	1.75 to 2.2
WSA8	2.00 to 5.00	None identified	4	0.0	1.9	18.6	0.1	Dry
WSA9	2.00 to 5.00	None identified	4	0.0	2.7	15.6	0.3	0.61 to 3.49
WSA10	2.00 to 5.00	None identified	4	0.0	4.6	15.5	0.0	Dry to 4.96
WSA11	2.00 to 5.00	None identified	4	0.0	2.0	15.4	0.0	3.75 to 3.80
WSA12	3.00 to 4.00	None identified	4	0.0	2.9	9.6	0.2	2.80 to 2.81
WSA13	2.00 to 3.00	None identified	4	0.0	3.3	12.9	0.1	2.53 to 2.81
WSA14	2.00 to 5.00	None identified	4	0.0	1.9	17.6	0.2	2.20 to 2.26
WSA15	1.00 to 3.00	None identified	4	0.0	4.0	11.0	0.1	Dry to 1.32
WSA16	1.00 to 3.00	None identified	4	0.0	2.2	17.8	0.1	Dry
WSA17	1.00 to 3.00	None identified	4	0.1	0.9	10.9	0.0	2.10 to 2.44
WSA18	2.00 to 5.00	None identified	4	0.0	1.9	17.5	0.2	1.70 to 2.54
WSA19	1.00 to 3.00	None identified	4	0.0	4.0	8.0	0.1	0.55 to 1.32
WSA20	1.00 to 3.00	None identified	4	0.0	1.0	18.7	0.1	2.45 to 2.87
CP1	8.00 to 15.00	None identified	4	0.0	1.5	17.21	-0.7	Dry
CP2	14.00 to 20.00	None identified	4	0.0	1.1	19.8	0.0	16.92 to 16.95
CP5	4.00 to 8.00	None identified	4	0.0	1.9	16.4	0.2	5.40 to 5.50
CP8	2.00 to 5.00	None identified	4	0.0	0.5	20.6	0.1	1.80 to 2.14

Borehole	Response zone/strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%) (max)	Carbon dioxide (%) (max)	Oxygen (%) (minimum)	Flow rate (l/hr) (max)	Water level (m bgl)
CP13	8.00 to 13.00	None identified	4	0.0	0.2	20.7	0.1	2.93 to 3.18
CP16	2.00 to 5.00	None identified	4	0.0	0.6	20.4	0.0	1.64 to 1.80
WS2	1.00 to 3.00	None identified	4	0.0	2.3	17.8	0.2	Dry
WS4	2.00 to 5.00	None identified	4	0.0	1.4	18.7	0.1	Dry
WS8	2.00 to 4.00	None identified	4	0.0	0.7	20.1	0.1	1.77 to 1.92
WS11	2.00 to 4.00	None identified	4	0.0	2.8	18.1	0.0	3.00 to 3.08
* Only 3 of the 4 monitoring visits undertaken. Field has been ploughed by land owner prior to the final (4 th) visit, as such, the installed boreholes could not be located and are considered to have been removed during the ploughing process.								

No obvious sources of gas were identified during the investigation and the results detailed above are believed to represent the natural soil gas conditions. Gas monitoring visits were undertaken during periods of rising, constant and falling pressures of between 1007 and 1018mbar.

5.4 Visual/olfactory evidence of soil and groundwater contamination

No visual or olfactory evidence of soil or groundwater contamination was encountered or identified during the investigations.

5.5 Ground model

In short, the ground conditions beneath the site appear to comprise variable thicknesses of cohesive Oadby Member (Glacial Till) and this appears to be present across the majority of the site immediately below the surface. Significant depths of Glaciofluvial Deposits were identified beneath the Oadby member (Glacial Till) within BHA1 (25.45m bgl) and BHA10 (20.45m bgl), in the northern part of the site and the base of this stratum was not proven in these holes.

In the western most extreme part of the site, the Glacial deposits are inter mixed, and it appears that the cohesive Oadby Member (Glacial Till) is interleaved with the granular pockets. It is also important to note that a firm orange brown slightly gravely slightly sandy clayey SILT was identified within the eastern corner of the site within WSA15.

This is the only location where a clearly silt dominant soil was identified and it is likely to be the result of a complex glacial history, however high silt contents were identified in a number of holes.

The rise in topography at the site seems to coincide with the rise in levels of the top of the deep underlying solid Whitby Mudstone Formation. Available information from the exploratory logs identify that the Whitby Mudstone Formation was encountered at shallower depths in the southern and central regions of the site. Depths to the top of the Whitby Mudstone Formation in the south and central regions are in the order of 2.2 to 4.80m bgl. Whilst in the northern half of the site, particularly the north-west corner, the Whitby Mudstone Formation was encountered from 11m bgl, or not at all. The Whitby Mudstone Formation comprises predominantly stiff clay tending to mudstone with depth.

The findings appear to confirm the site has localised perched water tables trapped within discrete pockets of sands and gravels within the cohesive Oadby Member (Glacial Till) at varying levels. A more continuous water table appears to be present at depth within the granular Glaciofluvial deposits being perched above the less permeable Whitby Mudstone below. It is important to note that water strikes have also been recorded in the Whitby Mudstone below too.

It should be noted that the ground conditions beneath the derelict farm buildings and within the area associated with the shooting club have not been proven due to access constraints. Ground Investigations to date have been primarily focused upon the development area only. However, no investigation has been undertaken within the shooting range TPA3 was undertaken within the potential range of dropping pellets from clay pigeon shooting.

6 QUANTITATIVE RISK ASSESSMENT

In line with CLR11 (EA, 2004a), there are two stages of quantitative risk assessment, generic and detailed. The GQRA comprises the comparison of soil, groundwater, soil gas and ground gas results with generic assessment criteria (GAC) that are appropriate to the linkage being assessed. This comparison can be undertaken directly against the laboratory results or following statistical analysis depending upon the sampling procedure that was adopted.

6.1 Linkages for assessment

Section 5.5 outlines the refined ground model from which the identified linkages that require assessment after the findings of the site investigation had been considered. These linkages together with the method of assessment are presented in Table 11.

Table 11: Linkages for generic quantitative risk assessment

Potentially relevant pollutant linkage	Assessment method
1. Direct contact with impacted soil by future end users	Direct comparison of laboratory results of soil samples compared to human health GAC in Appendix J for a proposed commercial and industrial end use .
2. Inhalation exposure of future end users to contaminants in the vapour phase	Human health GAC outlined in Appendix J for soil and groundwater based on indoor inhalation exposure to vapour-phase volatile organic compounds (VOC).
3. Inhalation exposure of future end users to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
3. Uptake of contaminants by vegetation potentially impacting plant growth	Comparison of soil data to GAC in Appendix K.
4. Contaminants permeating potable water supply pipes	Comparison of soil data to GAC in Appendix M for plastic water supply pipes using UKWIR (2010) guidance.
5. Leaching of soil contaminants and dissolved phase migration to Secondary A aquifer and unnamed watercourses	Since no leachate data is available, the potential for leaching has been considered qualitatively using soil and groundwater results. Comparison of groundwater data to GAC in Table 1 of Appendix L.
6. Concentrations of methane and carbon dioxide in ground gas entering and accumulating in: depressions and excavations	Gas screening values (GSV) have been calculated using maximum methane and carbon dioxide concentrations with maximum flow rates recorded at the site. The GSV have been compared with the revised Wilson and Card classification presented within CIRIA report C665 (Wilson et

Potentially relevant pollutant linkage	Assessment method
<p>that could affect workers enclosed spaces or small rooms in new buildings, which could affect future residents.</p> <p>In the case of methane, this could create a potentially explosive atmosphere, while death by asphyxiation could result from carbon dioxide.</p>	<p>al., 2007) owing to the development comprising buildings with a ground floor slab.</p>

6.2 Methodology and results

The methodology and results of the GQRA are presented for each relevant pollutant linkage in turn.

6.2.1 Direct contact with impacted soil by future end users

End users of the site are defined as those who are exposed to sources of contamination on a regular and predictable basis. In the case of developments for a commercial end use, the critical receptor is defined within SR3 as a 16 to 65 year old female.

The chemical test results have been compared directly to the appropriate GAC for each contaminant, based upon a conservative Soil Organic Matter (SOM) of 1%. The direct comparison table, which presents the chemical laboratory data set compared against the appropriate GAC, is included within Appendix J.

All samples are below the GAC and the results of the assessment indicate the site and strata encountered are suitable for the proposed end use. However it was noted that a single sample indicated a concentration of lead (1000mg/kg) detected in TP3A, which though below the GAC may indicate the presence of further lead contamination within the approximate area of the shooting range. Further investigation to determine the potential spread of shallow lead contamination within this area is recommended at enabling works stage following granting of the DCO.

Based on the above assessment, no potentially significant risks associated with the soil contamination have been identified and it is considered that the site may be regarded as suitable for the proposed end use. It should however be noted that no investigation was undertaken within the area of the derelict barns which lies within the footprint of the development area. In addition, only limited investigation has been undertaken around the area of the shooting range.

6.2.2 Inhalation exposure of future residents to asbestos fibres

No made ground was encountered during the site investigation and visual inspection of samples while on site did not identify any materials suspected of potentially containing asbestos. The only suspected asbestos containing material identified at the site was sections of roofing on the derelict farm buildings to the east of the centre of the site.

6.2.3 Uptake of contaminants by vegetation potentially inhibiting plant growth

The results have been compared with the GAC presented in Appendix K for this linkage.

Within two separate samples, elevated concentrations of metals were identified, as summarised within Table 12, below.

Table 12: Summary of exceedances of contaminants, which could potentially inhibit plant growth of vegetation.

Metal	GAC (mg/kg)	No. samples screened	No. exceedances of EQS	Location of highest concentration (value)
Zinc	300	10	1	WSA1 (481ug/l)
Lead	300	10	1	TPA3 (1000ug/l)

The results indicate that a single exceedance of zinc and one sample and a single exceedance of lead, however, the vast majority of samples tested appear to suggest that there is no risk with chemical concentrations falling below the relevant GAC.

It is possible that the slightly elevated concentration of lead in TPA3 is likely to have resulted from lead shot used at the adjacent shooting club for clay pigeon shooting in the past. Further assessment of the spread of lead within this area is recommended at enabling works stage following granting of the DCO.

Given that the site is agricultural, there is no known past or present sources of significant contamination and that all plants and crops on site are in good health it is considered that relevant pollutant sources and linkages are unlikely to exist associated with phytotoxic effects.

6.2.4 Impact of organic contaminants on potable water supply pipes

For initial assessment purposes, the results of the investigation have been compared with the GAC presented in Appendix M for this linkage, which are reproduced from *UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (UKWIR, 2010).

The results indicate that a relevant linkage is unlikely to exist associated with organic contaminants and therefore polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes are expected to be suitable for use on the development.

It should be noted that at the time of this investigation the future routes of water supply pipes had not been established, hence the investigation and sampling strategy may not be fully compliant with UKWIR recommendations. Consequently, a targeted investigation and specific sampling/analytical strategy may be required at a later date once the route(s) of the supply pipe(s) are known. In addition, it is recommended that the relevant water supply company be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

6.2.5 Migration of dissolved phase contaminants to wider secondary aquifer body

Soil samples were not analysed for leachable contaminants as no sources were defined to be present at the site, with all strata encountered being natural in origin. Chemical concentrations within the soils tested are generally typical of those recorded in natural strata and topsoil with no exceedances of Human Health GACs for a commercial end use.

The results of the comparison of the groundwater results to the freshwater GACs are provided within Appendix O. A small number of the samples appeared to have slightly elevated concentrations of metals present within the groundwater samples, as summarised within Table 13, below.

Table 13: Summary of groundwater exceedances

Metal	EQS (ug/l)	No. samples screened	No. exceedances of EQS	Location of highest concentration (value)
Boron	2000	7	1	BHA3 (3310 ug/l)
Nickel*	20.81	7	2	BHA3 (50ug/l)
Selenium	10	7	1	WSA18 (40ug/l)
* site specific EQS _{bioavailable} derived using M-BAT tool in conjunction with DOC, calcium and pH data from wider site.				

Slightly elevated concentrations of boron and nickel were only noted within BHA3, which is located adjacent to the existing railway line, which is in shallow cutting. It is plausible that the elevated concentrations within the groundwater at this location may be associated with the railway line. Boron based compounds are typically used as a non-toxic woodworm and dry root treatment and are likely to have been used on the railway for the treatment of railway sleepers and as such are likely to be the cause of the elevated Boron concentrations in the groundwater.

Ironstone cobbles have been indicated to be present on selected exploratory hole logs within the glacial drift deposits which extend across the site. Ironstone contains elevated concentrations of various heavy metals including nickel and as such the slightly elevated nickel concentrations detected in BHA3 and BHA9 are highly likely to have been caused by naturally occurring elements.

An identified elevation of selenium was noted within groundwater obtained from WSA18, which is positioned within the eastern most field of the site, adjacent south of the M1. Soil testing undertaken during both the previous and current investigation has not indicated concentrations of selenium in soil above the limit of detection (<1mg/kg) and as such no valid source of the selenium identified in WSA18 has been identified. It is considered likely that the elevated selenium encountered in groundwater at WSA18 is the result of naturally occurring selenium from selenite crystals known to be present within the Whitby Mudstones.

Other than for the Boron, which has likely been caused by the adjacent railway line, the slightly elevated metals encountered in groundwater are considered to be as a result of naturally occurring metals present within the geology beneath the site and such no further consideration of these results is considered necessary.

6.2.6 Ground gas

The results have been assessed in accordance with the guidance provided in *CIRIA Report C665: Assessing risks posed by hazardous ground gases to buildings* (Wilson et al., 2007). In the assessment of risks and selection of appropriate mitigation measures, the report identifies two types of development, termed Situation A (modified Wilson and Card method), appropriate to all development excluding traditional low-rise construction, and Situation B (National House-Building Council, NHBC) only appropriate to traditional low-rise construction with ventilated sub-floor voids.

Both methods are based on calculations of the limiting borehole gas volume flow for methane and carbon dioxide, renamed as the gas screening value (GSV). The GSV (litres of gas per hour) is calculated by multiplying borehole flow rate (litres per hour) and gas concentration (percent by volume).

In both situations, it is important to note that the GSV thresholds are guideline values and not absolute. The GSV thresholds may be exceeded in certain circumstances, if the site conceptual model indicates it is safe to do so. Similarly, consideration of additional factors such as very high concentrations of methane, should lead to consideration of the need to adopt a higher risk classification than the GSV threshold indicates.

Situation A relates to all development types except low-rise housing and, by combining the qualitative assessment of risk with the gas monitoring results, provides a semi-quantitative estimate of risk for a site. The method uses both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flows for methane and carbon dioxide. Having calculated the worst case GSVs for methane and carbon dioxide, the Characteristic Situation is then determined from Table 8.5 of CIRIA C665.

The site is to be redeveloped with high bay distribution warehousing and offices and therefore falls under Situation A.

The gas monitoring data has identified a maximum methane concentration of 0.1% and a maximum concentration of carbon dioxide of 4.6%. A maximum gas flow rate of 1.2l/hr has been recorded. The calculated GSV for methane is 0.0017l/hr and the GSV for

carbon dioxide is 0.00782l/hr. Based on the GSVs the site has been characterised as **CS1 Very Low Risk**.

For a characteristic Situation 1 (CS1 Very Low Risk) site, no special precautions are required for gas protection.

It is considered that the gas monitoring programme carried out to-date is likely to have established the 'worst-case' scenario and has characterised the ground gas regime sufficient to enable the confident assessment of risk and subsequent design of an appropriate gas protection scheme(s) for the proposed development.

6.3 Summary of quantitative risk assessment

The site is currently in use as arable farm land with little or no Made Ground or potential sources of contamination known to be present.

Supplementary intrusive ground investigations carried out across the site have confirmed that the site is directly underlain by natural soils.

No contaminated strata were identified during the field works.

However, it should be noted that the ground conditions beneath the derelict farm buildings, and within the area associated with the shooting club have not been proven due to access constraints. Ground Investigations to date have been primarily focused upon the development area only.

The comparison of laboratory testing results of the soils collected from the ground investigation indicate that pollutant linkages are unlikely to exist or present a risk to human health, phytotoxic effects, water supply pipes or risks to the underlying secondary aquifer and nearby water courses.

However, a concentration of lead (1000mg/kg) was detected in TP3A which though below the GAC may indicate the presence of further lead contamination within the area of the shooting range. Further investigation to determine the potential spread of shallow lead contamination within this area is recommended at enabling works stage following granting of the DCO.

Ground gas monitoring has indicated that the design of gas protection should be adopted in line with characteristic situation 1 for which no special precautions are required.

7 ASSESSMENT OF POTENTIAL LAND CONTAMINATION

7.1 Potential sources of contamination

Likely ground contamination resulting from the current and former land uses has been determined from the desk study research and the relevant Department of the Environment Industry Profiles.

The Assessment of Potential Land Contamination based upon site walkover and available data collated is included within the Preliminary Sources Study Report for the site ref: 313418 – 01 (00) presented separately. This has been updated to reflect the findings in these recent investigations and an updated version is included in Appendix R.

This report updates the initial assessment by taking account of:

- the Quantitative Risk Assessment of the chemical analysis of soil and groundwater samples taken from the recent supplementary ground investigations and assessment of gas monitoring results also undertaken as part of the recent supplementary ground investigations.

In summary, the ground investigation has not identified any areas of Made Ground or potential contamination confirming as expected that the vast majority of the site is undisturbed Greenfield land underlain by clean natural geological strata and as such, negligible risk has been determined to exist to end users or controlled waters.

Potential sources of contamination have been identified in the form of the shooting club and the area occupied by derelict farm buildings, which have had no investigation undertaken due to accessibility. A single lead concentration identified in TPA3, though not a risk itself or above the GAC suggests a potential for lead contamination to be present within the vicinity of the shooting range and further investigation of the shooting range at enabling works stage following granting of the DCO is recommended.

Gas monitoring of instrumentation installed within exploratory holes indicated a low risk in line with a Characteristic Situation 1 for which no special gas protection measures required, as discussed within Section 6.2.6.

The information detailed above has been used to update the Contaminated Land Risk Assessment (Conceptual Site Model) Matrix included in Appendix R.

The main identified risks are discussed below in more detail however reference should be made to the risk matrix to understand all of the risks assessed

7.2 Preliminary contaminated land risk assessment

7.2.1 Risk to human health during construction

The human health assessment presented in Section 6.2.1 has not indicated there to be any risks to commercial end users. In addition, as the soils encountered were natural it is considered that no significant risks exist or would impact upon construction workers when development occurs. Potential risks may exist within the area of TP3A where lead concentrations were identified associated with an adjacent shooting range although this did not exceed the GAC and in the area of the former farm and barns. Therefore this should be investigated at enabling works stage following granting of the DCO.

The scheme will be built using clean site won materials or / and suitable imported material the risk to human health during construction is considered to be negligible.

7.2.2 Risk to human health post construction

The human health assessment presented in Section 6.2.1 has not indicated there to be any risks to commercial end users.

Given the nature of the proposed scheme is for a large scale commercial development human exposure to soils and groundwater will be extremely low. Any potentially contaminated soils are likely to be covered by fill and hard standing minimising any potential contact pathways.

Residual risks to human health could remain within the area of derelict farm buildings and the shooting club, which should be investigated at enabling works stage following granting of the DCO.

7.2.3 Risk to local ecology and landscape planting

The phytotoxicity assessment presented in Section 6.2.3 indicated that potential risks existed from elevated lead and zinc within two locations at the site.

In regards to the zinc this is unlikely to be an issue, in regards to the identified lead this was found to be within an area potentially affected by the shooting range and may indicate a need for lead resistant plants within this area although the crops grown in this area currently do not seem to be detrimentally affected.

7.2.4 Risk to surface water

Exceedances of some metals were identified within groundwater extracted from localised boreholes, but this was not widespread. Given that no significant made ground has been observed, the general lack of on-site sources, and that the scheme will be built using clean site won materials or / and suitable imported material the risk to surface water from contamination is considered to be Negligible.

The greatest risks to surface waters are from potential uncontrolled release of silt, created during construction activities and subsequent effects on aquatic flora and fauna. This will be controlled by a suitable site-specific construction environmental management plan using best practice to avoid such occurrences.

The shooting range and barns are unlikely to represent a risk to controlled water receptors due to the low permeability deposits that are present.

7.2.5 Risk to groundwater

Exceedances of some metals were identified locally in the groundwater a couple of boreholes but these were considered to generally be as a result of naturally occurring metals within the underlying geology.

Due to no significant made ground being observed, the generally minor nature of the exceedances, the general lack of on-site sources, and the nearest sensitive aquifer being hydraulically up-gradient of the exceedances, and taking account of the fact that the scheme will be built using clean site won materials or / and suitable clean imported material the risk to groundwater from contamination is considered to be Negligible.

7.2.6 Risk due to ground gas

The Envirocheck data suggests that there are no landfills present within the vicinity of the site. The anticipated geology is not indicative of the widespread presence of strata likely to naturally degrade and produce harmful soil gases, indeed the natural near surface geology would also not permit the movement of gases. Therefore, it is concluded that no significant source of ground gas is likely to be present at the site.

Monitoring of ground gas on the site has yielded no concentrations of methane gas, very low concentrations of carbon dioxide and no to very low flow conditions (most likely to have occurred from barometric pressure and groundwater level changes) and as such indicates that the landfill identified 114m south east of the site is unlikely to pose a risk to the site.

As the proposed scheme design for the site is an Industrial Development, the exposure to ground gases posing a risk to human health post-construction is considered to be negligible if basic gas protection measures in line with a Characteristic Situation 1 as recommended within CIRIA C665 are adopted within the design and construction of the buildings.

In regards to ground gases posing a risk to workers during the construction there is considered to be a low risk to personnel from asphyxiation where they have to enter below ground excavations or in ground inspection chambers. Provided suitable atmosphere testing is carried out and confined spaces protocols are observed and these risks to construction and maintenance workers are considered to be low. These risks are managed through health and safety procedures including CDM regulations therefore the resultant risks are expected to be Negligible.

7.2.7 Risk to buried structures and services

The evidence available at the time of this report suggests that no Made Ground or contamination is likely to be present. However, information to date suggests that naturally occurring elevated sulphates in the form of sulphate crystals (gypsum) are likely to be present within cohesive soils present beneath the site both in the Oadby Member (Glacial Till) and the underlying Whitby Mudstone from which it is partially derived. Testing has been undertaken and provided in ground concrete mixes are designed in accordance with the findings of the testing and BRE SD1:2005 the risk of damage to concrete exposed to naturally aggressive substances is considered to be Negligible.

This has been confirmed by recent investigations with testing suggesting that DS-4 AC-4 class concrete will be required to be adopted.

7.3 Requirement for further assessment

At enabling works stage it is recommended that a watching brief and shallow soil investigation is undertaken by a geo-environmental engineer to examine and test the ground in the area of the gun club and derelict barns when demolished with particular attention paid to the areas where possible fuel tanks are located and areas of shooting (lead shot) might have accumulated.

8 GEOTECHNICAL SITE ASSESSMENT

8.1 Preliminary geohazard and geotechnical assessment

Using all of the available information and taking into account the ground model for the site, the Preliminary Geotechnical Risk Register presented within the Preliminary Sources Study Report (313582 – 01(00)) has been revised and updated and is presented in Appendix Q and this highlights several potential risks associated with the site. The main identified risks are discussed below in more detail however reference should be made to the risk matrix to understand all of the risks assessed.

8.1.1 Mining and natural cavities

The site is not within an area affected by coal mining or brine extraction. The geology is not conducive to the formation of large natural cavities. This has been confirmed by the ground investigation, which has confirmed the ground model.

8.1.2 Man made voids or obstructions

There is the possibility that a small void is present within the derelict farm buildings, east of the centre of the site. Examination of this area should be undertaken when access is available to confirm the extent to which the tanks are below ground. These are however not considered to represent a significant risk to the development.

No voids have been identified during the ground investigation.

8.1.3 Earthworks

Significant cut to fill earthworks are required to be undertaken to achieve the proposed redevelopment of the site and to form the main development plateau for the distribution warehouses. It is understood that at this time the development plateau finished floor level is set to range from 85m to 91m AOD

In order to reduce the risk of excessive cost for offsite disposal and on site importation it is assumed that;

- site won materials will be utilised
- a cut to fill volume balance will be achieved.

The supplementary ground investigation has determined that clean natural soils are present within the areas of cut and that these materials should be suitable for reuse provided they are carefully selected and managed in accordance with a suitable earthworks specification.

In particular, careful control of moisture content is required as the majority of the sites won soils are likely to be cohesive clays. The prevailing weather conditions will have a substantial effect on suitability; however, the methodology of works will also have a significant impact upon suitability. These over consolidated cohesive soils will also be subject to stress relief upon unloading and as a result tend to take in moisture and soften. Therefore, double handling and stockpiling should be avoided if at all possible.

In order for these cohesive soils to be acceptable for successful reuse within structural fill earthworks the moisture content will be critical. Therefore it is anticipated that subject to testing lime modification or stabilisation techniques maybe required to allow marginal materials to be reused successfully within structural fill, however all materials are likely to be acceptable for use within landscape features.

Further ground investigation aimed specifically at the reuse of cut material is recommended to confirm strata classification and suitability at detailed design stage.

It should be appreciated that these materials do have high naturally occurring sulphates distributed within them. Such sulphates can react with lime used in stabilisation and cause heave. Therefore, any use of lime stabilisation must be considered very carefully and the mix designed to mitigate this risk. Further investigation and stabilisation laboratory trials should be undertaken if this is proposed to further assess this risk at detailed design stage.

8.1.4 Existing cut slopes

A railway in cutting is located adjacent to the western edge of the site. As far as can be seen this is currently considered to be stable, as no signs of instability were identified during the walkover when viewed from field boundaries and public footbridges. However, it should be noted that limited access was available when viewing the cutting from the public right of way footbridge.

It is understood that the earth screening bund is to be positioned at the western extent of the site along the railway. As this landscape screening bund is relatively significant in size it is anticipated that it will add loads to the ground along the railway cutting, albeit some distance from the cutting. Therefore, at detail design stage careful assessment of cutting stability and the design will be required to ensure that the cutting retains its stability and that the rail infrastructure is not affected. .

This supplementary ground investigation confirms the expected ground model is consistent with the envisaged outline design assumptions. Ground modelling, settlement and slope stability assessments will be required to confirm the designs at detailed design stages.

8.1.5 Existing embankment slopes

There are no existing embankment slopes on the site.

The M1 Junction 15 is on a low embankment close to the eastern boundary of the development site; however, this is maintained by the Highways Agency and does not appear to be showing any signs of instability where it is adjacent to the site.

8.1.6 Proposed cut slope design

Significant cut slopes are required in the north of the site in order to form the main development plateau for the distribution warehouses. In some areas, embankments may be created above the cut slopes to further screen the distribution warehouses.

Deep cuttings are anticipated to encounter mainly the cohesive Oadby Member deposits although lesser volumes of granular Glaciofluvial deposits may also be encountered in the west.

Cutting slope stability will need to be carefully assessed and a suitably robust engineering design provided which includes drainage of the strata anticipated to be encountered, particularly as localised water bearing granular pockets maybe encountered. Slope assessments should also take account of the fact that upon unloading these over consolidated clays tend to take in water, reduce in strength and even swell over time with strengths tending to residual strength levels. This will of course affect the stability of cut slopes, therefore slack slope angles would be recommended to retain stability, although that should be confirmed at detailed design stage by suitable slope stability modelling. The addition of any embankment loading upon the cut slopes will also need to be taken account of within any assessments. Therefore, it is recommended that conservative slack slope angles are used within master planning designs.

It is recommended that at detail design stage further investigation and detailed slope stability analysis should be undertaken to value engineer and refine the cut slope design angles.

8.1.7 Proposed embankment design

Large embankments are proposed for the site, although these are believed to be non-structural landscape embankments around the periphery of the site along the east, north and western boundaries.

It is anticipated that significant cost will be incurred in the formation of the embankments due to the volumes of materials required to be placed. It is assumed that clean site won materials will be suitable for reuse within the embankment construction as part of a cut fill balance design to avoid excessive costs for importation of materials to form the embankment.

The design of the embankment will need to take account of the classification of the materials being utilised for its construction. Options for increasing side slopes and reducing footprint and volume may be explored and these may include reinforced embankments (geogrids) or soil stabilisation (lime and cement) or even retaining walls if

required on the inner faces (inward to the development) to retain the landscape visual aspect outwardly.

Investigations have confirmed that no unstable geology considered susceptible to significant settlement or instability is likely to be present along the footprint of the Embankment. Therefore, there is considered that there is a negligible risk that failure and settlement of any proposed embankment because of the foundation soils beneath.

The risk of failure of embankments is increased where fine-grained soils are used to construct them particularly if insufficient compaction and drainage is designed and the works proceed too quickly. Therefore, it is recommended that staged construction is undertaken and that granular basal and interim granular or drainage media (textiles) layers are installed and linked to the wider drainage network to avoid the build-up of pore water pressures in fine soils beneath and within the embankment as works progress. This will aid and speed up consolidation and increase stability. Alternatively or additionally, the use of soil stabilisation or reinforced earth might be considered partially in transition zones and around abutments or for the entire embankment.

Embankment slopes must be designed appropriate to the stability of the soils being used to construct the embankment and take account of the strength of the underlying foundation soils and any predicted loads (resulting from maintenance vehicles) along the crest.

Drainage will need to be carefully designed to cope with surface water runoff and to avoid runneling and softening of the slope faces and softening in the foundation soils, in particular at the toe of the slopes.

It is recommended that a detailed Earthworks Specification and set of Works Design drawings are prepared at detailed design stage and embankment stability checks are undertaken.

8.1.8 Cut to fill transition zones

It is anticipated that there will be a cut to fill transition line running broadly north to south across the centre of the site of the proposed development.

This change from cut to filled areas can cause differential settlement to building foundations and floor slabs. It is understood that the current scheme layout places several of the proposed buildings across the cut to fill transition. As such, design of foundations and floor slabs will require careful consideration within this area..

8.1.9 Earthworks – Materials Reuse

At this time, it is expect that the development plateau will be achieved by typically undertaking 2 to 6m of cut across the eastern half of the site, whilst 8 to 10m of cut are proposed within the northern half of the site. In addition, approximately 10 to 15m of fill will be required to form the landscape screening bunds along the western and northern boundary of the site with fill placed to achieve the development plateaus in the south too

It is presumed that majority of the fill will be site-won arisings from the major cutting works to be undertaken across the site to achieve the finished floor levels, which range from 85m to 91m AOD.

It is expected that the majority of the cut materials will be cohesive Oadby Member (Glacial Till) with some mixed granular Oadby Member and perhaps a little fraction of granular Glaciofluvial Deposits.

The cohesive Oadby Member (Glacial Till) would be a Class 2 cohesive material. Whilst the granular Glaciofluvial deposits would be Class 1 general granular fill.

Available testing of samples obtained during the ground investigation tends to suggest that these materials could be suitable for reuse with no treatment. However, suitability for reuse within earthworks is often governed by the prevailing weather conditions during the works and the methods of working. It should be appreciated that these cohesive Glacial Deposits are formerly over consolidated soils and when exposed by removal of overburden are likely to be subject to stress relief and swell taking in moisture and reducing in strength as several of the consolidation tests carried out demonstrate. It is anticipated that some form of lime or and cement modification might be required to allow these materials to be reused within structural fill, however this would need to be carried out with caution due to the potential for sulphate heave reactions resulting from the natural presence of high sulphates within these deposits.

In addition, it should be appreciated that in several exploratory holes, silts or very silty clays were identified and a number of particle size distribution tests indicate extremely high silt contents in some of these deposits. Plasticity testing however seems to suggest they are dominated by and act as clays. It should however be appreciated that soils with high silt contents can be very difficult to use within engineered and compacted fills as the vibration of rollers tends to liquefy high silt content soils, particularly where high moisture contents or precipitation takes place during the works.

Testing carried out to date is indicative only; it is considered that further investigation and testing will be required to confirm this for earthworks specification at detailed design stage. Due to the variation in material properties, the size of the site and the volume of cut materials it is recommended that at the detailed design and specification stage that an intensive sampling and testing investigation is undertaken to confirm the properties of the materials from the proposed cut areas.

According to the CL: AIRE guidance “The Definition of Waste: Development Industry Code of Practice” (version 2, March 2011), any material that may be otherwise considered by the Environment Agency as waste (such as made ground), if dealt with in accordance with the Code of Practice under a Materials Management Plan (MMP) will not be considered as waste if used for the purposes of land development. Any Clean and Naturally occurring material may be reused on the site of origin without the need to be included within an MMP, which appear to be the case at this site, and therefore it is not anticipated that a Materials Management Plan will need to be developed to allow the cut to fill earthworks to be undertaken.

It is recommended that at detail design stage further investigation should be undertaken to more comprehensively classify and test the compacted properties of the cut strata such that a suitable earthworks specification may be formulated.

8.1.10 Earthworks Classification

An initial classification, based on the Highways Agency Specification for Highway's Works (SHW 2004), of the materials likely to be encountered on the site is presented in Table 15, below:

Table 14: Earthworks Classification

Material	SHW Classification	Recommended use below	Notes on use
Agricultural Topsoil and Subsoil	5	Landscaped areas and cover to embankment and cutting side slopes	Careful control on storage and avoidance of using saturated materials, particularly on slopes.
Cohesive Oadby Member (Glacial Till)	2A & B	General Fill	Should be possible to reuse in structural fill. Moisture content will need to be carefully controlled.
Granular Glaciofluvial Deposits	1A & 1B	General Fill	Present in the north and west of the site at depth, in areas of deepest proposed cutting.

In summary it is expected that the majority of the site won deposits will be suitable for reuse with the majority of the near surface weathered cohesive materials being within the suitable moisture content range to allow the materials to be compacted to 95% maximum dry density or greater and less than 5% air voids, although some materials were noted to be slightly wetter than optimal. Therefore, wetter materials may require drying or modification/ stabilisation to make them acceptable for reuse within structural fill. Much will depend upon the prevailing weather conditions at the time the earthworks are undertaken and the care with which the selection of materials and works are undertaken.

If significant volumes of material are deemed unsuitable for reuse by means of moisture contents alone it is recommended that soil modification or stabilisation is considered to render these materials suitable for use within engineering fill. Stabilisation works will need to be mindful of the risks of sulphates being present within the soils, which could react with lime to cause heave. Investigation and test results undertaken at this preliminary stage at the site do indicate that significant sulphates concentrations are present. If stabilisation techniques are considered further it is suggested that it will be necessary to undertake further more comprehensive investigation and testing to confirm the suitability of these techniques, a suitable economic design mix and achievable properties of the modified or stabilised materials.

It is recommended that at detailed design stage a suitably robust Earthworks Specification is developed and that all materials are placed and compacted in accordance with this specification.

8.1.11 Foundations and Floor Slabs

Cut areas

It is understood that the proposed seven warehouses are typically spread evenly across the site. Final finished floor levels across the northern half of the site are in the order of 85.50mAOD, whilst finish floor levels within the southern half of the development are typically 91.00mAOD.

It is anticipated that to achieve the aforementioned finished floor levels, there will be a cut to fill transition line running broadly across the centre of the site of the proposed development. Within the northern half of the site 10m of cut is anticipated to be required to achieve a finished floor level of 85.50mAOD (BHA10), whilst 6m of cut is anticipated to achieve a finished floor level of 91.00mAOD (BHA1). Within the central regions of the site 2 to 4m of cut is required to achieve finished floor levels, with 4-6m of cut required within the southern half of the development.

Formation soils are therefore anticipated to expose firm to stiff Oadby Member (Glacial Till) or perhaps in places medium dense to dense Glaciofluvial sands. Therefore, it is anticipated that traditional shallow spread foundations and ground bearing floor slabs may be possible, founded directly upon competent solid strata. However, some considerations of the potential risk of heave in the unloaded strata across the large building footprints maybe necessary if the structures have tight tolerances as swelling of unloaded soils was noted during consolidation testing and stress relief softening could occur.

Filled areas

It is understood that the proposed seven warehouses are typically spread evenly across the site. Final finished floor levels across the northern half of the site are in the order of 85.50mAOD, whilst finish floor levels within the southern half of the development are typically 91.00mAOD.

Along the western and northern boundaries of the site are proposed screen bunds, which will require fill in the order of 10 to 15m. Foundations within filled areas will need to be designed according to the prevailing conditions and in accordance with the standards of engineering fill provided.

Where fill is relatively shallow and the depth to competent bearing strata in the natural undisturbed soils below is relatively shallow then foundations could be formed as over deepened pad or trench fill foundations extended through the full depths of fill and softer natural strata into the competent underlying natural strata. Where deeper fill is placed, piled foundations may need to be considered.

Holistic Design

In order to achieve an economic design solution which allows the use traditional shallow spread foundations and ground bearing floor slabs but which takes account of the loading and differential settlement tolerances required and variable ground conditions, it is suggested that a holistic approach is required. It is therefore considered that some form of ground improvement treatment might be necessary. Given the volumes and nature of the earthworks reprofiling it is suggested that the most likely economic solution would be to adopt a performance based soil stabilisation earthworks technique. This could be applied to ensure the placed fill was engineered to deliver a suitably stiff and homogenous fill to allow both floor slabs and foundations to be formed within it. It could also be carried out across the full footprint of the building and loading bay yards and even extended to the highways in cut areas too as this would improve the exposed cohesive soils and reduce the risks of potential heave and softening from weather degradation and unloading sealing these strata. However, this would need to be carried out with caution due to the potential for sulphate heave reactions resulting from the natural presence of high sulphates within these deposits.

It should also be recognised that the testing carried out to date is indicative only; it is considered that further investigation and testing is anticipated to be required to confirm soil properties for earthworks specification at detailed design stage. Due to the variation in material properties, the size of the site and the volume of cut materials it is recommended that at the detailed design and specification stage that an intensive sampling and testing investigation is undertaken to confirm the properties of the materials from the proposed cut areas.

The cut and fill earthworks, ground improvement treatment and drainage specifications and designs will need to be checked to ensure that foundation bearing, settlement; differential settlement and slope stability criteria required for the development are met.

8.1.12 Highway & Service Yard construction

As the site requires significant cut to fill earthworks to achieve the required development levels, it is anticipated that engineering earthworks design specification will be provided to cover these elements.

This is considered likely to include a performance specification for the formation levels beneath highways in both cut and filled embankment areas.

Based upon available re-compacted CBR testing and available Plasticity Index testing it is recommended that a preliminary design CBR of <2% should be adopted for design purposes for re-compacted cohesive soils. This could of course be increased if modification or stabilisation techniques were used or materials that are more granular were placed and compacted at final formation levels.

8.1.13 Groundwater levels & Drainage

Groundwater levels have been determined by identifying the site elevation level from surface and the deducting the groundwater levels recorded during returned monitoring events.

Unproductive strata generally underlies the site, however, there appear to be localised perched water tables trapped within the granular pockets within the predominantly cohesive Oadby Member (Glacial Till). It is anticipated that these pockets containing perched waters are not continuous across the site and groundwater is likely to be confined to these localised pockets.

Subsequently, monitoring of groundwater levels recorded at depth within the significant but confined Glaciofluvial deposits suggests that the general groundwater flow is towards the North and North west. It should be noted that flows are likely to be slow due to the confining low permeability clays of the Oadby Member above and Whitby Mudstone below.

Excavations and cuttings into these deposits to achieve the desired development platform levels are anticipated to encounter groundwater. Therefore, local instability may occur during groundwork's and drainage and de-watering may be required, particularly within final cut slopes where granular pockets and lenses are intersected within the Oadby Member (Glacial Till) deposits. Designs should accommodate suitable drainage systems to cut off and intersect such strata and to filter groundwater away from the development. Temporary works drainage will also need to be carefully considered and will need to be designed to avoid causing localised fines migration and subsequent inundation collapse settlement as these soils are mixed granular and cohesive soils containing high silt contents.

Additionally, it is also anticipated that the majority of the shallow strata present across the site will not be conducive to infiltration drainage techniques. Areas of sand may be exposed, at depth, within the northern half of the site within areas of proposed cut (BHA1 and BHA10) and as such, may be more suitable for such techniques. However, testing to date proved unsuccessful within the shallow strata in the southern half of the site, where the proposed surface water attenuation ponds are planned, indeed shallow perched groundwater is close to or in one case above the invert level of the attenuation pond and therefore the pond geometry may need to be reconsidered to facilitate sufficient storage and construction.

Deeper instruments placed within the granular Glaciofluvial Deposits at depth appear to suggest a continuous water table typically ranging from 75mAOD to 83mAOD.

Within deeper instruments placed within the Whitby Mudstone Formation at depth seem to suggest a continuous water table is present, typically ranging from 79mAOD to 89mAOD however this might not be a true water table as the Whitby Mudstone is predominantly cohesive low permeability clay and mudstone and may only represent collections of pore water release within effectively impermeable strata or collections of

seepages from fissuring and any thin siltstone or limestone bands again with the water similarly held within the instrument in generally impermeable strata.

Monitoring undertaken during the investigation (limited to late summer) typically suggests that groundwater levels across the site are generally below the finish floor levels of the proposed warehouses. However, it should be noted that groundwater levels recorded during the returned monitoring events ranged from 92.79 to 93.00mAOD within BHA4. This area of the site is noted to be within the footprint of Unit 4, which has a finished floor level of 91.00mAOD, indicating the water levels are 1.50m to 2.00m above the proposed development plateau.

Additionally, returned groundwater levels within WSA10, WSA12, WS8 and WS11 were all noted to be greater than the proposed finished floor levels for their corresponding warehouse units. However, unlike the data acquired from BHA4, the recorded groundwater levels are considered to be false readings and not indicative of actual groundwater levels. The groundwater levels recorded within WSA10 and WSA12 are nominal and as such, are considered to represent stagnant water trapped within the base of the install. Whilst the water levels within WS8 and WS11 are anticipated to be pockets/ units of granular fractions, containing perched waters, which are not considered to be continuous across the site. The water levels are considered to be exacerbated, due to the presence of cohesive fractions above and below these said granular units, restricting drainage.

Long term monitoring and a hydrogeological assessment would be beneficial in confirming this hypothesis particularly as groundwater levels are susceptible to variation with prevailing weather conditions and seasonal variation and due to the complex shallow geology.

8.1.14 Excavations Stability

Conventional plant should be suitable for general excavations at the Site.

Excavations with vertical sides in granular strata are likely to be unstable and will therefore require battering back or appropriate trench support to be provided. Excavations with vertical sides into cohesive deposits are likely to retain some limited stability in the short term. however if man entry is required then slopes should be battered to a suitable safe and stable angle or appropriate trench supports will need to be provided.

Groundwater may be expected to be present where granular horizons are intersected and are likely to induce instability, boiling and running sand conditions when penetrated. Dewatering will need careful consideration, design and implementation to avoid causing loss of fines and later inundation collapse settlement in local ground.

Man entry into any excavations should not be undertaken without provision of suitable shoring and support and dewatering or suitable regrading and battering of side slopes to safe angles. Confined spaces protocols for the Health and Safety of personnel should

always be used where man entry into excavations is to be undertaken, as low oxygen conditions may be present.

8.1.15 Foundation works risk assessment

It is anticipated that a foundation works risk assessment report will not be required for the development because concentrations of chemicals of potential concern (COPC) within natural soils and groundwater were not identified.

8.1.16 Chemical attack on buried concrete

The soils beneath the site are known to include naturally occurring sulphates and as such in ground concrete will need to be designed to accommodate the risks represented by contact with such sulphates.

As such, careful consideration should be given to the design chemical and sulphate class of concrete used within the development particularly when in contact with the ground.

In addition, consideration will need to be given to the potential for sulphate induced heave especially where the materials noted above are used within a cut and fill program where soils would be significantly disturbed allowing a greater oxidation potential.

This assessment of the potential for chemical attack on buried concrete is based on current BRE guidance. The desk study and site walkover indicate that, for the purposes of this assessment of the aggressive chemical environment, the site should be considered as a Greenfield that has not been subject to previous industrial development.

A suite of chemical analyses appropriate to this site classification was carried out on soil samples from the near surface strata determined to be likely to be in contact with in ground concrete either insitu or as part of the proposed earthworks reprofiling.

For the Oadby Member, following guidelines within BRE; SD1, a characteristic water-soluble sulphate content of 1990mg/l has been taken, a total potential sulphate of 2.07%. As this value is below the limiting value of 3.0g/l consideration magnesium analysis is not required. Design Sulphate Class of DS-4, may be adopted for the site.

Based on the findings of the groundwater monitoring it has been assumed that groundwater conditions are mobile. From consideration of the characteristic pH value of 7.54, an aggressive chemical environment for concrete classification of AC-4 may be assumed for design purposes.

It is recommended that further testing is undertaken at detailed design stage to confirm this over a broader selection of sample depths.

9 REUSE OF MATERIALS

9.1 Reuse of suitable materials

It is understood that no soil wastes are anticipated to be generated from the site with a complete cut to fill balance being achieved in modelling.

As the site has not been previously developed all excavation works are expected to generate only clean and naturally occurring soils.

Under the Waste Framework Directive, naturally occurring soils are not considered waste if re-used on the site of origin. Therefore it should not be necessary to either obtain a licence or prepare a Materials Management Plan in accordance with the CL; AIRE Code of Practice.

9.2 Wastes for landfill disposal

Whilst it is not anticipated that any soils will be removed to landfill an initial assessment of waste classification has been undertaken using the soil contamination data. This is presented within Appendix S. The results suggest that the soils tested would generally not be classified as Hazardous except for within the locality of TP3A where a slightly elevated lead concentration was encountered, likely to have been associated with the adjacent shooting range. Given that arisings are anticipated to be natural strata it is possible that the non-hazardous soils could be classified as inert waste, however full Waste Acceptance Criteria analysis would be required to confirm this.

9.3 Landfill tax

Waste producers disposing of material to landfill are required to pay landfill tax by HM Revenue and Customs.

The tax is chargeable by weight (tonnage) and two rates apply, either standard or lower rate. The lower rate only applies to those less polluting wastes as set out in the Landfill Tax (Qualifying Material) Order 2011, which include naturally occurring rock and soil, concrete, some minerals, some furnace slags and ash, and some low-activity organic compounds. Evidence confirming that the waste qualifies for the lower rate will be required, and standard rate tax will apply for the whole waste load for any loads of mixed waste.

Currently (since 1 April 2017), standard rate landfill tax is £86.10 per tonne.

The lower rate of landfill tax applicable to less polluting wastes (i.e. 'inert' wastes) remains at £2.70 per tonne. Material disposed of at a soil treatment centre will not be subject to landfill tax.

10 CONCLUSIONS

10.1 Conclusions

The site is primarily considered to be Greenfield in nature and there is little evidence to suggest there are any significant potential sources of contamination likely to be present that would detrimentally impact upon the proposed scheme design within areas of the site that were investigated.

All soil samples analysed revealed chemical concentrations below the GAC and the results of the assessment indicate the site and strata encountered are suitable for the proposed end use.

Although the risk of contamination is considered negligible, it is recommended that at enabling works stage, a watching brief is put in place and further localised investigations of shallow soils are undertaken during the demolition and removal of hard standings relating to the derelict farm buildings where tanks are located and in the area of the shooting club to check for potential localised lead pollution risks.

Minor exceedances of the GAC's for some metals were identified within groundwater in localised boreholes which appear to be the result of a naturally occurring metals in natural strata. A risk to groundwater has not been identified.

Ground gas monitoring has indicated that the design of gas protection should be adopted in line with characteristic situation 1 for which no special protection measures are required.

No specific geo-hazards or risks were identified that would affect the proposed scheme design or construction.

All geotechnical risks are normal to a project of this type and would be anticipated to be resolved using normal civil engineering techniques.

A cut and fill earthworks balance is anticipated to be achievable as all materials should be suitable for use as general fill for the construction of the scheme. The 1:3 side slopes currently proposed for all cuttings and embankments are anticipated to be suitable, however, slope stability assessments will be required at detailed design stage as the design evolves to ensure that all slopes are stable.

Groundwater levels do not appear to present any unacceptable risks to the proposed scheme.

11 RECOMMENDATIONS

11.1 General recommendations

Some of the key recommendations are summarised below. Many of the technical or advice recommendations have not been included below. The whole of the report should be read to identify all recommendations and advice.

- It is recommended that the findings of the Contaminated Land Risk Assessment are confirmed and agreed with the regulatory authorities.
- It is recommended that at detailed design stage (Post DCO) a site wide Earthworks Specification is prepared which should include testing frequency requirements and performance criteria for the various elements of the scheme design and may well require on site compaction trials to be undertaken to inform the specification.
- At detailed design stage, it is recommended that cutting slope stability assessments are carried out to refine the design and this should determine the need for any additional slope drainage.
- At detailed design stage, it is recommended that embankment design geometries should be checked for slope stability and settlement. However, it should be understood that the stability of an embankment would be a function of its geometry, the materials with which it is built, the degree of compaction applied, speed of construction and the foundation strata and underlying groundwater table on to which it is formed. This information will be required to feed into the earthworks specification.
- Drainage will need to be designed with care due to the poor drainage infiltration of the underlying shallow soils.
- In ground concrete should be designed to resist elevated sulphates with a minimum mix design of **DS-4 AC-4** to allow for the potential for naturally occurring sulphates within the underlying strata.
- At enabling works stage, it is also recommended that a watching brief and localised shallow soil investigation is undertaken following demolition and removal of hard standings relating to the gun club and derelict farm buildings where tanks were identified although the risk of contamination is considered low.

BIBLIOGRAPHY

AGS Interim Guidance (2013), 'Site investigation and asbestos risk assessment for the protection of site investigation and geotechnical laboratory personnel', February.

Baker, K., Hayward, H., Potter, L., Bradley, D. and McLeod, C. (2009), *CIRIA Report C682. The VOCs Handbook. Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination* (London: CIRIA).

Barton, N. J. (1992), *The Lost Rivers of London: A Study of Their Effects Upon London and Londoners, and the Effects of London and Londoners on Them* (London: Historical Publications).

Boyle, R. A. and Witherington, P. J. (2007), 'Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present', National House-Building Council and RSK Group.

British Standards Institution (BSI) (1990), 'BS 1377:1990. Methods of test for soils for civil engineering purposes'.

British Standards Institution (2015), 'BS 5930:2015. Code of practice for ground investigations'.

British Standard Institution (BSI) (2015), 'BS 8485:2015. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

British Standards Institution (2013), 'BS 10175:2013. Investigation of potentially contaminated sites: Code of practice'.

British Standards Institution (2013), BS8576:2013. Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs)

Building Research Establishment (BRE) (2001), *BRE Report 414. Protective measures for housing on gas-contaminated land* (London: BRE).

Building Research Establishment (2005), *BRE Special Digest 1: Concrete in aggressive ground* (London: BRE).

Building Research Establishment (2016) *BRE Digest 365. Soakaway design* (London: BRE).

Card, G. B. (1995), *CIRIA Report 149. Protecting development from methane* (London: CIRIA).

Chandler R. J. and Forster A., (2001) CIRIA Report C570, Engineering in Mercia Mudstone.

Chartered Institute for Environmental Health and Land Quality Management (2009), 'The LQM/CIEH Generic Assessment Criteria for Human Health', second edition.

Chartered Institute of Environmental Health (CIEH) and CL:AIRE (2008), *Guidance on Comparing Soil Contamination Data with a Critical Concentration* (London: CIEH).

CIRIA (2014). Good practice on the testing and verification of protection systems for buildings against hazardous ground gases

CL:AIRE (2009), *Soil Generic Assessment Criteria for Human Health Risk Assessment* (London: CL:AIRE).

CL:AIRE (2011), *CL:AIRE Code of Practice. The Definition of Waste: Development Industry Code of Practice, Version 2* (London: CL:AIRE).

Dangerous Substances Directive (76/464.EEC).

Department for Environment, Food and Rural Affairs (2010), *The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010* (London: HMSO).

Department of the Environment (1996), *Code of Practice for Agricultural Use of Sewage Sludge* (London: HMSO).

Environment Agency (2015), 'Technical Guidance WM3. Guidance on the classification of and assessment of waste. 1st Edition.

Environment Agency (2004), *Model Procedures for the Management of Contaminated Land. Contaminated Land Report Number 11 (CLR11)*, September (Bristol: Environment Agency).

Environment Agency (2004b), 'Policy Number 199_04, dated 9 March 2004, Part IIA – Detailed Quantitative Assessment of Chronic Risks to Human Health from Contaminated Soils'.

Environment Agency (2006a), 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination'.

Environment Agency (2006b), 'The Knotweed Code of Practice – managing Japanese Knotweed on development sites'.

Environment Agency (2008), *Science Report SC050021/SR7. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values* (Bristol: Environment Agency).

Environment Agency (2009a), Contaminated Land Exposure Assessment (CLEA) software, version 1.06.

Environment Agency (2009b), *Human health toxicological assessment of contaminants in soil. Science Report – Final SC050021/SR2*, January (Bristol: Environment Agency).

Environment Agency (2009c), 'Science Report SC050021/benzene SGV, toluene SGV, ethylbenzene SGV, xylene SGV, mercury SGV, selenium SGV, nickel SGV, arsenic SGV, cadmium SGV, phenol SGV, dioxins, furans and dioxin like PCBs SGVs', 'Supplementary information for the derivation of SGV for: benzene, toluene, ethylbenzene, xylene, mercury,

selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs', and 'Contaminants in soil: updated collation of toxicological data and intake values for humans: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs', March 2009, May 2009 and September 2009.

Environment Agency (2009d), *Science Report – SC050021/SR3. Updated technical background to the CLEA model* (Bristol: Environment Agency).

Environment Agency (2010a), 'GPLC1 – Guiding Principles of Land Contamination', 'GPLC2 – Frequently Asked Questions, Technical Information, Detailed Advice and References', and 'GPLC3 – Reporting Checklists', all March.

Environment Agency (2010b), 'Horizontal Guidance Note H1 - Environmental risk assessment for permits'.

Environment Agency (2010c), 'Status Report: Management of the London Basin Chalk Aquifer'.

Environment Agency (2011) Chemical Standards Database.

Environment Agency (no date) Freshwater environmental quality standards.

Environment Agency [hi/](#).

Environmental Permitting (England and Wales) Regulations 2010 (London: HMSO).

Hartless, R. (1991), 'BRE Report 212: Construction of new buildings on gas-contaminated land', Building Research Establishment.

Hazardous Waste Regulations 2005 (London: HMSO).

Knipp, C. V., Lloyd, J. W., Lerner, D. N. and Greswell, R. (1993), *CIRIA Special Publication 92. Rising groundwater levels in Birmingham, and their engineering significance* (London: CIRIA).

Lord, J. A., Clayton, C. R. I. and Mortimore, R. N. (2002), *CIRIA Report C574 Engineering in chalk* (London: CIRIA).

National House-Building Council (1999), 'Chapter 5.2: Suspended Ground Floors' in *NHBC Standards*, revised September 1999, effective January 2000.

Norbury, D. (2010), *Soil and Rock Description in Engineering Practice* (Caithness: Whittles).

Office of the Deputy Prime Minister (2004), *Planning Policy Statement 23: Planning and Pollution Control* (London: The Stationery Office).

Part IIA of the Environmental Protection Act (Contaminated Land Regulations (England) 2002 (London: HMSO).

Rudland, D. J., Lancefield, R. M. and Mayell, P. N. (2001), *CIRIA C552. Contaminated Land Risk Assessment: A Guide to Good Practice* (London: CIRIA).

Simpson, G., Blower, T., Craig, R. N. and Wilkinson, W. B. (1989), *CIRIA Special Publication 69. The engineering implications of rising groundwater levels in the deep aquifer beneath London* (London: CIRIA).

Stone, K., Murray, A., Cooke, S., Foran, J., Gooderham, L., (2009) CIRIA C681, Unexploded Ordnance (UXO). A guide or the construction industry.

The Building Regulations (revised December 2004) 'Approved Document C. Department of the Environment and The Welsh Office'.

The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (London: HMSO).

The Surface Waters (Dangerous Substances) (Classification) Regulations 1998 (London: HMSO).

The Water Supply (Water Quality) Regulations 1989, 2000 and 2001 (London: HMSO).

Transport and Road Research Laboratory (1970), 'TRRL Road Note 29 (Appendix 1). Road pavement design'.

Transport and Road Research Laboratory (1984), 'TRRL Report LR1132 (Table C1)'.

UK Water Industry Research (2010) *UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (London: UKWIR).

Water Framework Directive (2000/60/EC).

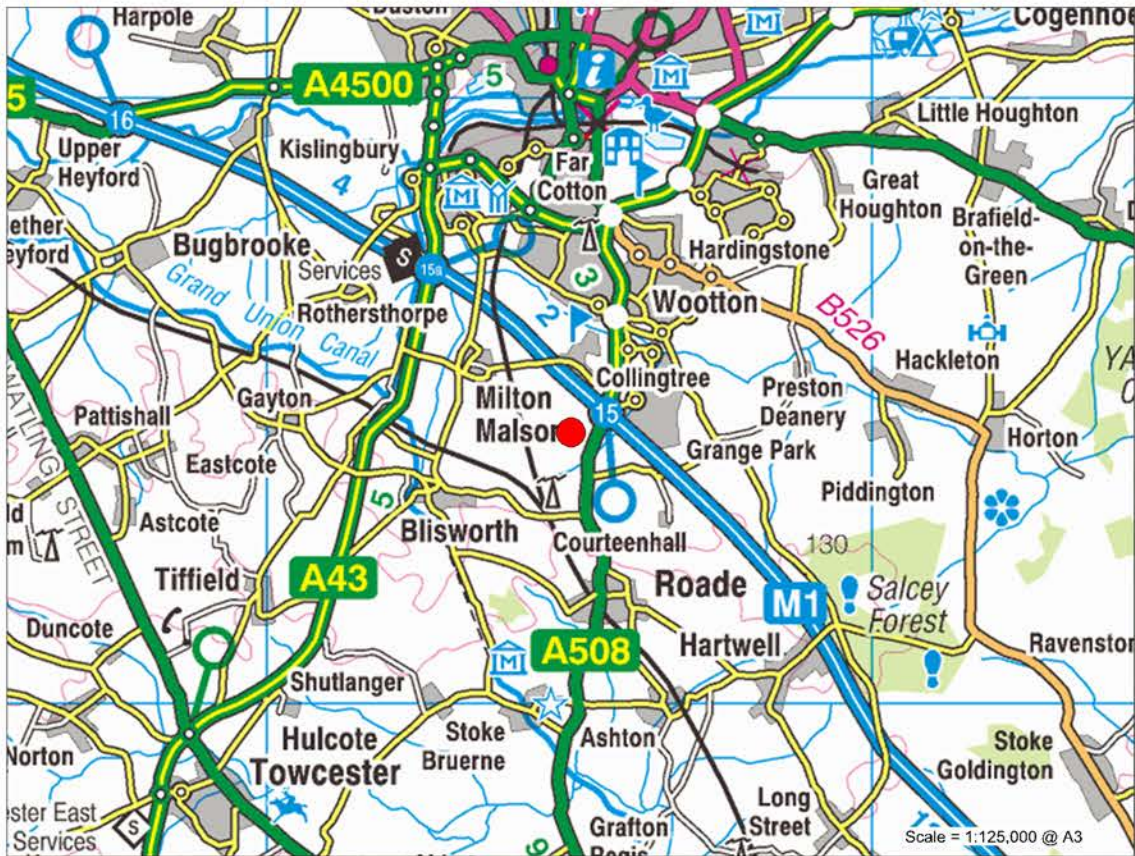
Wilson, S. A. and Card, G. B. (1999), 'Reliability and risk in gas protection design', *Ground Engineering*, February: 33–6.

Wilson, S., Oliver, S., Mallet, H., Hutchings, H. and Card, G. (2007), *CIRIA Report C665: Assessing risks posed by hazardous ground gases to buildings* (London: CIRIA).

World Health Organization (2004), *Guidelines for drinking-water quality*, 3rd edn (Geneva: WHO).

WRc plc (2002), 'Polycyclic Aromatic Hydrocarbons (PAH): Priorities for Environmental Quality Standard Development, R&D Technical Report P45'.

FIGURES



Site Boundary

Rev	Date	Description	Drn	Chk	App
00	26.10.17	313582	SP	RG	DB

M1 Junction 15 West, Northampton

Figure 1

Site Location Plan

Scale = 1:25,000 @ A3

REV 00



- Site boundary (Feb 2017)
- Borehole (BH A)
- Trial Pit (TP) with Soakaway (S)
- Window Sample (WS A)
- Boreholes to be re-activated
 - Cable Percussion borehole (CP)
 - Window Sample (WS)

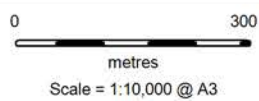


00	26.10.17	313582	SP	RG	DB
Rev	Date	Description	Drn	Chk	App

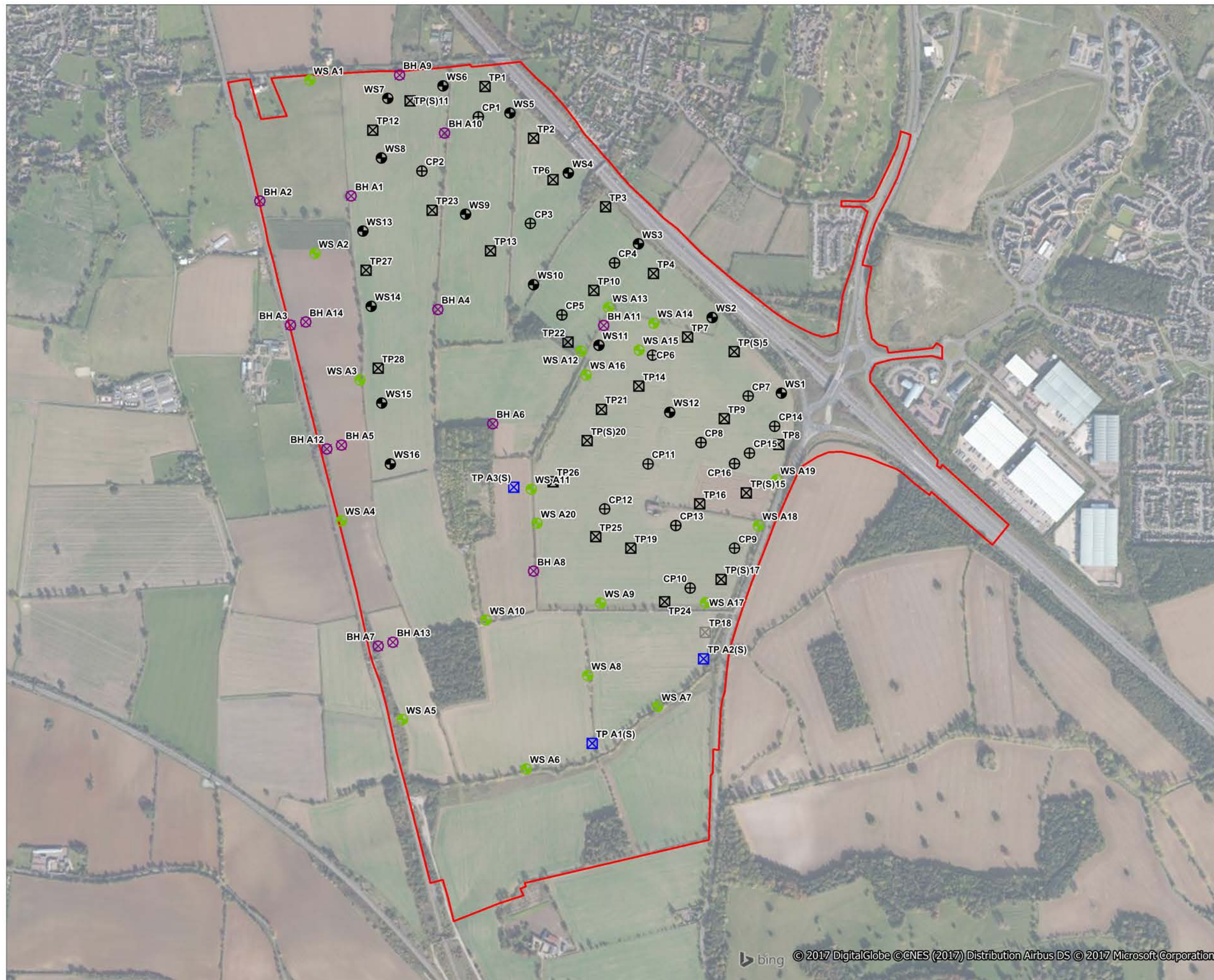
M1 Junction 15 West, Northampton



Figure 3
Exploratory Hole Plan for
Supplementary Works



REV 00



Site boundary (Feb 2017)

Borehole (BH A)

Trial Pit (TP) with Soakaway (S)

Window Sample (WS A)

Boreholes to be re-activated

Cable Percussion borehole (CP)

Window Sample (WS)

Exploratory holes from 2014 Investigation

Trial pit

Window sample

Cable percussion borehole

00	12.04.17	313582	SP	RG	DB
Rev	Date	Description	Drn	Chk	App

M1 Junction 15 West, Northampton

Figure 4

Exploratory Location Plan Comprising Current and Historical Boreholes

0 300 metres

Scale = 1:10,000 @ A3

N

W

E

S

REV 00



Site boundary (Feb 2017)

Borehole (BH A)

Trial Pit (TP) with Soakaway (S)

Window Sample (WS A)

Boreholes to be re-activated

Cable Percussion borehole (CP)

Window Sample (WS)

Exploratory holes from 2014 Investigation

Trial pit

Window sample

Cable percussion borehole

Wellingborough

Northampton

Northamptonshire

Towcester

Silverstone

Pagney

Wellingborough

Northampton

Northamptonshire

Towcester

Silverstone

Pagney

00	12.04.17	313582	SP	RG	DB
Rev	Date	Description	Drn	Chk	App

M1 Junction 15 West, Northampton

RSK

Figure 5

Exploratory Hole Location Plan and Proposed Development Plan

0 300

metres

Scale = 1:10,000 @ A3

N

W

E

S

REV 00

Contains Ordnance Survey data © Crown copyright and database right 2017

Proposed plan provided by client, Drawing: NGW-BWB-HDG-XX-DR-PD-0001_Indicative Water Storage.dwg

© 2017 DigitalGlobe © CNES (2017) Distribution Airbus DS © 2017 Microsoft Corporation

File Name : U:\Geo\313582 - M1 J15\GIS

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Roxhill Developments Ltd (the "client") in accordance with the terms of a contract between RSK and the "client", dated 15th June 2017. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B

SUMMARY OF LEGISLATION AND POLICY RELATING TO CONTAMINATED LAND

Part IIA of the Environmental Protection Act 1990 (EPA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land as 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered to include all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA of the EPA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2010 provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2010 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land

affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF).

The new framework has only limited guidance on contaminated land, as follows:

- *“planning policies and decisions should also ensure that:*
 - *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
 - *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*
 - *adequate site investigation information, prepared by a competent person, is presented”.*

APPENDIX C

SITE PHOTOGRAPHS

APPENDIX C

PHOTOGRAPHIC LOG OF SITE WORKS

Photo no. 1	Date: 30/08/2017	
Exploratory hole number: Window sample borehole A1		
Description: Photographed are the contents of the hand pit within WSA1.		

Photo No. 2	Date: 30/08/2017	
Exploratory hole number: Window sample borehole A1		
Description: WSA1 was advanced to 5.45m bgl upon refusal of the SPT equipment.		

Photo No. 3	Date: 30/08/2017	
Exploratory hole number: Window sample borehole A2		
Description: WSA2 was advanced to 5.45m bgl.		

Photo No. 4	Date: 30/08/2017	
Exploratory hole number: Window sample borehole A3		
Description: WSA3 was advanced to 5.45m bgl.		

Photo no. 5	Date: 31/08/2017	
Exploratory hole number: Window sample borehole A4		
Description: WSA4 was advanced to 5.45m bgl.		

Photo No. 6	Date: 30/08/2017	
Exploratory hole number: Window sample borehole A5		
Description: WSA5 was advanced to 5.45m bgl.		

Photo No. 7	Date: 31/08/2017
Exploratory hole number: Window sample borehole A6	
Description: WSA6 was advanced to 5.45m bgl.	



Photo no. 8	Date: 31/08/2017	
Exploratory hole number: Window sample borehole A7		
Description: WSA7 was advanced to 5.45m bgl.		

Photo No. 9	Date: 31/08/2017	
Exploratory hole number: Window sample borehole A8		
Description: WSA8 was advanced to 5.45m bgl.		

Photo No. 10	Date: 31/08/2017	
Exploratory hole number: Window sample borehole A9		
Description: WSA9 was advanced to 5.45m bgl.		

Photo no. 11	Date: 31/08/2017	 A photograph showing a white data tag with handwritten text: "Project: Juvonai IT, H. Malawi", "Hole: WSA10", "Depth: From 0.00 to 5.45 m bgl", and "Date: 31/8/17". Next to the tag are several white plastic cups and three long, dark, cylindrical core samples lying on dry grass.
Exploratory hole number: Window sample borehole A10		
Description: WSA10 was advanced to 5.45m bgl.		


Photo No. 12	Date: 01/09/2017	
Exploratory hole number: Window sample borehole A11		
Description: WSA11 was advanced to 5.45m bgl.		

Photo No. 13	Date: 04/09/2017	 A photograph showing three soil samples from borehole A12 laid out on a bed of straw. Above the samples is a white data plate with handwritten text: 'PROJECT: JUNCTION IT, HI MAZDA', 'CORE: 30562', 'B.H. ID: WSA12', 'DEPTH: FROM 0.00 to 5.45 mgl', and 'DATE: 4/9/17'. A measuring tape is placed horizontally behind the samples.
Exploratory hole number: Window sample borehole A12		
Description: WSA12 was advanced to 5.45m bgl upon refusal of the SPT equipment.		

Photo no. 14	Date: 04/09/2017	 A photograph showing three soil samples from borehole A13 laid out on a bed of straw. Above the samples is a white data plate with handwritten text: 'PROJECT: JUNCTION IT, HI MAZDA', 'CORE: 30562', 'B.H. ID: WSA13', 'DEPTH: FROM 0.00 to 4.45 mgl', and 'DATE: 4/9/17'. A measuring tape is placed horizontally behind the samples.
Exploratory hole number: Window sample borehole A13		
Description: WSA13 was advanced to 4.45m bgl upon refusal of the SPT equipment.		


Photo No. 15	Date: 04/09/2017	
Exploratory hole number: Window sample borehole A14		
Description: WSA14 was advanced to 5.45m bgl.		

Photo No. 16	Date: 04/09/2017	
Exploratory hole number: Window sample borehole A15		
Description: WSA15 was advanced to 3.40m bgl upon refusal of the SPT equipment.		

Photo no. 17	Date: 04/09/2017	
Exploratory hole number: Window sample borehole A16		
Description: WSA16 was advanced to 3.45m bgl upon refusal of the SPT equipment.		


Photo No. 18	Date: 01/09/2017	
Exploratory hole number: Window sample borehole A17		
Description: WSA17 was advanced to 5.45m bgl.		


Photo No. 19	Date: 01/09/2017	
Exploratory hole number: Window sample borehole A18		
Description: WSA18 was advanced to 5.45m bgl.		

Photo no. 20	Date: 01/09/2017	
Exploratory hole number: Window sample borehole A19		
Description: WSA19 was advanced to 3.60m bgl upon refusal of SPT equipment.		

Photo No. 21	Date: 01/09/2017	
Exploratory hole number: Window sample borehole A20		
Description: WSA20 was advanced to 5.45m bgl.		

Photo No. 22	Date: 12/09/2017	
Exploratory hole number: Trial pit A1		
Description: Trial pit A1 excavated to a maximum depth of 3.10m upon completion of the excavation a soakaway test was undertaken.		

Photo No. 23	Date: 12/09/2017	
Exploratory hole number: Trial pit A1		
Description: Trial pit A1 stock pile.		

Photo no. 24	Date: 12/09/2017	
Exploratory hole number: Trial pit A1		
Description: Trial pit A1 stock pile.		

Photo No. 25	Date: 12/09/2017	
Exploratory hole number: Trial pit A2		
Description: Trial pit A1 excavated to a maximum depth of 3.00m upon completion of the excavation a soakaway test was undertaken.		

Photo No. 26	Date: 12/09/2017	
Exploratory hole number: Trial pit A2		
Description: Trial pit A2 stock pile.		


Photo no. 27	Date: 12/09/2017	
Exploratory hole number: Trial pit A3		
Description: Trial pit A3 excavated to a maximum depth of 2.20m upon completion of the excavation a soakaway test was undertaken.		

Photo No. 28	Date: 12/09/2017	
Exploratory hole number: Trial pit A3		
Description: Trial pit A3 stock pile.		

Photo No. 29	Date: 12/09/2017	
Exploratory hole number: Trial pit A3		
Description: Trial pit A3 stock pile.		

APPENDIX D

RISK ASSESSMENT METHODOLOGY

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution
- likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in ‘significant harm’ as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in ‘Draft Circular on Contaminated Land’, DETR 2000)
- medium: chronic damage to human health (‘significant harm’ as defined in ‘Draft Circular on Contaminated Land’, DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem

- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment
- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.
- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.

APPENDIX E

EXPLORATORY HOLE RECORDS

Contract: M1 Junction 15 Main Site			Client: Roxhill		Trial Pit: TPA1
Contract Ref: 313582	Start: 12.09.17 End: 12.09.17	Ground Level: 86.36	National Grid Co-ordinate: E:474978.2 N:253805.1		Sheet: 1 of 1

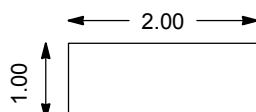

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
						Dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	86.06	(0.30)	
0.40	1	ES PID	0.0ppm			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (OADBY MEMBER)			
0.60	2	D							
0.80	3	B V	$c_u=58/55/61$					(1.00)	
1.10	4	D							
							85.06	1.30	
1.50	6	D				Firm to stiff brown grey slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)			
1.80	7	B V	$c_u=68/72/64$. . . occasional mottled orange brown silt from 2.00m bgl.			
						. . . slightly structured from 2.30m bgl.		(1.80)	
2.50	8	D				. . . dark brown grey from 2.50m bgl.			
2.80	9	B V	$c_u=71/79/76$						
							83.26	3.10	
						Trial pit terminated at 3.10m bgl for soakaway testing.			

Plan (Not to Scale)		General Remarks			
		1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Trial pit remained stable during excavation. 3. Groundwater not encountered. 4. Trial pit backfilled with arisings upon completion of a soakaway test.			
		All dimensions in metres		Scale:	1:25
Method Used: Machine dug	Plant Used: JCB-3CX	Logged By: MSouthworth	Checked By: DAB		

Contract: M1 Junction 15 Main Site			Client: Roxhill		Trial Pit: TPA2
Contract Ref: 313582	Start: 12.09.17 End: 12.09.17	Ground Level: 82.99	National Grid Co-ordinate: E:475271.2 N:254033.5		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.20 0.20	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	82.69	(0.30) 0.30	
0.50 0.50 0.50 0.70	2 2a 3	B B V D	$c_u=50/58/52$			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk fragments. (OADBY MEMBER)		(1.00)	
1.00	4	D					81.69	1.30	
1.50 1.50 1.50	6 6a	B B V	$c_u=67/63/58$			Firm to stiff grey brown occasional mottled orange slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (OADBY MEMBER)		(1.70)	
2.00	7	D							
2.50 2.50 2.50	8 8a	B B V	$c_u=72/72/69$						
2.90	9	D					79.99	3.00	
Trial pit terminated at 3.00m bgl for soakaway testing.									

GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_018 ProjVersion: v8_06 - Core+Logs - 002 | Log TRIAL PIT LOG - A4P | 313582 - M1 JUNCTION 15 MAIN SITE.GPJ - v8_06.
 RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk | 19/10/17 - 16:13 | MS8

Plan (Not to Scale)		General Remarks			
		<div>1. Location scanned with GPR prior to breaking ground. No services encountered.</div> <div>2. Trial pit remained stable during excavation.</div> <div>3. Groundwater not encountered.</div> <div>4. Trial pit backfilled with arisings upon completion of a soakaway test.</div>			
		All dimensions in metres		Scale: 1:25	
Method Used: Machine dug	Plant Used: JCB-3CX	Logged By: MSouthworth	Checked By: DAB		



Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend	
Depth	No	Type	Results							
0.10 0.10	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	91.75	0.30		
0.50	2	D	c _u =52/49/48			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, chalk and flint. (OADBY MEMBER)		(1.70)		
0.90	3	D								
1.00	4	B								
1.00	4a	B								
1.00		V								
1.20	5	D	... cobbles of chalk from 1.50m bgl. ... pockets of sand from 1.60m to 1.80m bgl.							
1.90	6	D	c _u =58/62/60			Firm locally stiff grey slightly gravelly silty structured CLAY with occasional pockets of orange brown silty. Gravel is angular to subrounded fine to coarse chalk. (OADBY MEMBER)	90.05	2.00		
2.00	7	B								
2.00		V								
						Trial pit terminated at 2.20m bgl for soakaway testing.				

RSK Environmental Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk, 19/10/17 - 16:13 MS8 |



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA1
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 88.74	National Grid Co-ordinate: E:474200.9 N:255552.1		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20 0.20	1	ES PID	0.0ppm			Brown silty slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Sand is fine to coarse. Gravel is subrounded to subangular fine to coarse chalk. (AGRICULTURAL TOPSOIL)	88.44	(0.30) 0.30	
	0.40 0.40	2	ES PID	0.0ppm			Soft light orangish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)			
	0.90	3	D						(1.40)	
	1.20-1.65 1.20-2.00 1.20	1 4 5	SPT B D	N=4						
	1.60	6	D					87.04	1.70	
	2.00-2.45 2.00-3.00	2 7	SPT B	N=2			Very loose orange light brown slightly silty slightly clayey SAND. Sand is fine to coarse. (OADBY MEMBER)			
	2.60	8	D				... damp at 2.30m bgl.		(1.20)	
	3.00-3.45 3.00-4.00	3 9	SPT B	N=8			Soft to firm grey slightly silty CLAY. (OADBY MEMBER)	85.84	2.90	
	3.60	10	D							
	4.00-4.45	4	SPT	N=20			... Stiff from 4.00m bgl.		(2.55)	

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.40m bgl. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion. 5. Perched water from 4.00m to 4.20m bgl.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	RSalama
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA1
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 88.74	National Grid Co-ordinate: E:474200.9 N:255552.1	Sheet: 2 of 2

Progress	Samples / Tests				Water Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (65mm dia) 80% rec ▼	4.60	11	D			Soft to firm grey slightly silty CLAY. (OADBY MEMBER) (stratum copied from 2.90m from previous sheet)			
	5.00-5.45	5	SPT	N:50 for 295mm					
							83.29	5.45	
						Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				

WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA2
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 92.00	National Grid Co-ordinate: E:474282.8 N:255096.3		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<p>1.20 - 2.00 (85mm dia) 100% rec</p> <p>2.00 - 3.00 (75mm dia) 100% rec</p> <p>3.00 - 4.00 (65mm dia) 68% rec</p> <p>4.00 - 5.00 (65mm dia) 62% rec</p>							Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets . Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	91.70	(0.30)	
	0.50	1	ES	0.0ppm			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)			
	0.50	2	PID							
	0.60		D							
	0.80	3	D						(0.90)	
	1.00	4	D							
	1.00-2.00	6	B					90.80	1.20	
	1.20-1.65	1	SPT	N=11			Loose to medium dense orangish brown slightly gravelly silty clayey SAND. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)			
	1.50	5	D				... rare ironstone at 1.30m bgl. ... less gravelly from 1.50m bgl.		(0.80)	
	2.00-2.45	2	SPT	N=5			Soft dark brown grey silty CLAY. (OADBY MEMBER)	90.00	2.00	
	2.50	7	D				Soft dark blue grey to brown silty CLAY. (OADBY MEMBER)	89.50	2.50	
	3.00-3.45	3	SPT	N=3			... very sandy from 3.00m to 4.00m bgl.			
	3.00-4.00	9	B							
	3.50	8	D						(2.95)	
	4.00-4.45	4	SPT	N=13			... Firm from 4.00m bgl.			
	4.00-5.00	11	B				... becoming more structured from 4.20m bgl.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater seepage encountered at 1.60m and water encountered at 3.00m bgl. 4. Gas and groundwater monitoring well installed to 4.45m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA2
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 92.00	National Grid Co-ordinate: E:474282.8 N:255096.3	Sheet: 2 of 2

Progress		Samples / Tests			Water Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (65mm dia) 62% rec ▼	4.50	10	D			Soft dark blue grey to brown silty CLAY. (OADBY MEMBER) (stratum copied from 2.50m from previous sheet)			
	5.00-5.45	5	SPT	N=12					
						Window sample hole terminated at 5.45m bgl.	86.55	5.45	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA3
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 97.80	National Grid Co-ordinate: E:474346.3 N:254758.9		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.10 0.10	1	ES PID	0.0ppm			Grass over dark brown dry slightly gravelly silty very sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	97.40	(0.40)	
	0.50-1.00	2	B				Light orange brown slightly gravelly silty clayey SAND. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)			
	0.70	3	D						(0.80)	
	1.10	4	D					96.60	1.20	
	1.20-1.65 1.20	1 5	SPT D	N=12			Firm orange brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)	96.40	1.40	
	2.00-2.45 2.00 2.10-2.90	2 6 7	SPT D B	N=15			Firm becoming stiff grey brown slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse fragments of chalk and small pockets of fine orange sand. (OADBY MEMBER)			
	3.00-3.45 3.00	3 8	SPT D	N=18			... stiff from 3.00m bgl.			
	3.00 - 4.00 (65mm dia) 100% rec								(4.05)	
	4.00-4.45 4.00 4.10-4.80	4 9 10	SPT D B	N=16						
	4.00 - 5.00 (65mm dia) 100% rec									

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS

[illegible]

PRINT LIBRARY V8_06 GLB LibVersion: v8_06_018 PdfVersion: v8_06 - Core4-Logs - 002 | Log WINDOW SAMPLE LOG - A4P | 313582 - M1 JUNCTION 15 MAIN SITE.GPJ - v8_06_06_06
RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk | 13/11/17 - 16:15 MS8 |



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA4
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 94.85	National Grid Co-ordinate: E:474302.5 N:254385.6		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
							Grass over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	94.55	(0.30)	
	0.40	1	ES	0.0ppm			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)			
	0.40	2	PID				... chalk fragments from 0.60m bgl.			
	0.50	3	D				... very sandy from 1.00m bgl.			
	0.60-1.00		B							
	1.10	4	D	N=14						
	1.20-1.65	1	SPT							
	1.20	5	B							
	1.50	6	D							
	2.00-2.45	2	SPT	N=17				92.75	2.10	
							Firm locally stiff brown mottled grey slightly gravelly slightly andy silty CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)			
							... cobbles of chalk at 2.20m bgl.			
							... very sandy between 2.60m and 2.80m bgl.			
							... stiff from 3.00m bgl.			



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA4
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 94.85	National Grid Co-ordinate: E:474302.5 N:254385.6	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.50	10	D							
	5.00-5.45	5	SPT	N=23			Stiff dark grey slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse chalk. (OADBY MEMBER)	89.95	4.90	
							Window sample hole terminated at 5.45m bgl.	89.40	5.45	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA5
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 94.10	National Grid Co-ordinate: E:474470.8 N:253860.1		Sheet: 1 of 2


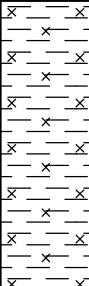
Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.30 0.30	1	ES PID	0.0ppm			Crop over light brown sandy CLAY with frequent roots and rootlets. (AGRICULTURAL TOPSOIL)	93.60	0.50	
	0.50-1.00	2	B				Firm orange brown slightly gravelly dry CLAY. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)			
	0.70	3	D							
	1.10	4	D							
	1.20-1.65	1	SPT	N=8						
	1.30	5	D							
	1.40-1.90	6	B							
	2.00-2.45	2	SPT	N=13			Firm blue grey mottled light orange brown slightly gravelly CLAY. Gravel is angular fine to coarse flint and fragments of chalk. (OADBY MEMBER)	92.20	1.90	
	2.30	7	D				... becoming more structured from 2.70m bgl.			
	2.40-2.90	8	B				... less gravelly from 3.00m bgl with pockets of yellow brown silt.			
	3.00-3.45	3	SPT	N=15			... possible selenite crystals from 3.70m bgl.			
	3.30	9	D							
	3.40-4.00	10	B							
	4.00-4.45	4	SPT	N=18			Stiff dark grey silty CLAY. (WHITBY MUDSTONE FORMATION)	90.00	4.10	
	4.30	11	D							



Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA5
Contract Ref: 313582	Start: 30.08.17 End: 30.08.17	Ground Level: 94.10	National Grid Co-ordinate: E:474470.8 N:253860.1	Sheet: 2 of 2

Progress	Samples / Tests				Water Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (65mm dia) 100% rec ▼	5.00-5.45	5	SPT	N=29		Stiff dark grey silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 4.10m from previous sheet)	88.65	(1.35) 5.45	
						Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
						All dimensions in metres		Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD	Logged By:	MSouthworth
						Checked By:			



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA6
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 88.44	National Grid Co-ordinate: E:474803.2 N:253734.5		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.30-0.80	1	B	0.0ppm			Grass over dark brown slightly gravelly sandy dry CLAY with frequent roots and rootlets. gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	88.14	(0.30)	
	0.40	2	ES PID				Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and rare chalk. (OADBY MEMBER)		0.30	
	0.40									
	0.70	3	D							
	1.00	4	D				... sandy from 1.00m bgl.			
	1.00-2.00	5	B							
	1.20-1.65	1	SPT	N=7					(2.10)	
	1.40	6	D				... pocket of orange brown sand from 1.80m to 1.90m bgl.			
	2.00-2.45	2	SPT	N=12			... pocket of orange brown sand from 2.10m to 2.20m bgl.			
	2.50	8	D				Firm dark brown grey slightly sandy silty CLAY with occasional pockets of light orange brown silt. (OADBY MEMBER)	86.04	2.40	
	3.00-3.45	3	SPT	N=13			... shell fragments from 3.00m bgl.			
	3.00-4.00	9	B				Stiff dark grey silty CLAY with possible selenite crystals. (WHITBY MUDSTONE FORMATION)	85.24	3.20	
	4.00-4.45	4	SPT	N=17			... mudstone lithorelicts from 3.80m bgl.		(2.25)	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	<div>1. Location scanned with GPR prior to breaking ground. No services encountered.</div> <div>2. Hand dug inspection pit to 1.20m bgl.</div> <div>3. Groundwater not encountered.</div> <div>4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.</div>			
						All dimensions in metres Scale: 1:25			
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD	Logged By:	MSouthworth
						Checked By:	MS		AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA6
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 88.44	National Grid Co-ordinate: E:474803.2 N:253734.5		Sheet: 2 of 2

Progress		Samples / Tests			Water Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (65mm dia) 100% rec ▼	5.00-5.45	5	SPT	N=32		Stiff dark grey silty CLAY with possible selenite crystals. (WHITBY MUDSTONE FORMATION) (stratum copied from 3.20m from previous sheet)	82.99	5.45	
						Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
						All dimensions in metres		Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD	Logged By:	MSouthworth
						Checked By:	MS		



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA7
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 84.39	National Grid Co-ordinate: E:475150.8 N:253905.4		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20 0.20	1	ES PID	0.0ppm			Crop over firm light brown slightly gravelly sandy CLAY frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite and flint. (AGRICULTURAL TOPSOIL)	83.99	(0.40) 0.40	
	0.40-0.80 0.50	2 3	B D				Soft light orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-angular fine to coarse chalk fragments and quartzite. (OADBY MEMBER) ... becoming more sandy from 0.80m bgl.		(1.10)	
	1.00	4	D							
	1.20-1.65	1	SPT	N=5				82.89	1.50	
	1.60	5	D				Firm grey slightly sandy silty CLAY with pockets of light orange brown silt. (OADBY MEMBER)			
	2.00-2.45 2.00-3.00	2 6	SPT B	N=11						
	2.60	7	D				... becoming more structured from 2.50m bgl.		(2.30)	
	3.00-3.45	3	SPT	N=17			... becoming stiff from 3.00m bgl.			
	3.60	8	D					80.59	3.80	
	4.00-4.45 4.00-5.00	4 9	SPT B	N=19			Stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION)			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.60	10	D	N=24			Stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 3.80m from previous sheet) ... mudstone lithorelicts from 4.50m bgl.		(1.65)	
	5.00-5.45	5	SPT					78.94	5.45	
Window sample hole terminated at 5.45m bgl.										

PRINT LIBRARY V8_06 GLB LibVersion: v8_06_018 ProjVersion: v8_06 - Core+Logs - 002 | Log WINDOW SAMPLE LOG - A4P | 313582 - M1 JUNCTION 15 MAIN SITE.GPJ - v8_06_06_018
RISK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk | 13/11/17 - 16:16 | MS8 |





WINDOW SAMPLE LOG


Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA8
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 87.05	National Grid Co-ordinate: E:474963.3 N:253984.7		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
							Grass over dark brown slightly gravelly very sandy CLAY with frequent roots and rootlets. Gravel is angular to subangular fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	86.75	(0.30)	
	0.40-0.90	1	B	0.0ppm			Firm orange brown slightly gravelly sandy dry CLAY. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)		0.30	
	0.50	2	ES							
	0.50		PID							
	0.90	3	D						(1.00)	
	1.20-1.65	1	SPT	N=20			Stiff dark grey slightly gravelly slightly sandy silty CLAY with frequent pockets of orange brown silt. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)	85.75	1.30	
	1.20	4	D							
	1.80	5	D						(0.90)	
	2.00-2.45	2	SPT	N=23			Stiff dark grey slightly gravelly silty CLAY. Gravel is angular fine to coarse mudstone lithorelicts. (WHITBY MUDSTONE FORMATION)	84.85	2.20	
	2.00-3.00	6	B							
	2.80	7	D				... structured from 2.70m bgl.			
	3.00-3.45	3	SPT	N=26			... possible selenite crystals from 3.10m bgl.			
	3.60	8	D						(3.25)	
	4.00-4.45	4	SPT	N=20			... stiff from 4.00m bgl			
	4.00-5.00	9	B							

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						<ol style="list-style-type: none">1. Location scanned with GPR prior to breaking ground. No services encountered.2. Hand dug inspection pit to 1.20m bgl.3. Groundwater not encountered.4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.	
						All dimensions in metres	Scale: 1:25
Method Used: Tracked window sampling	Plant Used: Premier 110			Drilled By: DSUK LTD	Logged By: MSouthworth	Checked By: MS	



Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend		
Window Run	Depth	No	Type	Results								
<div>4.00 - 5.00 (65mm dia) 100% rec</div> <div>▼</div>	4.60	10	D	N=31			Stiff dark grey slightly gravelly silty CLAY. Gravel is angular fine to coarse mudstone lithorelicts. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 2.20m from previous sheet)</i> ... an increase in mudstone lithorelicts from 4.50m bgl. ... Very stiff from 5.00m bgl.					
	5.00-5.45	5	SPT									
									Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	
All dimensions in metres						Scale: 1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By: DSUK LTD Logged By: MSouthworth Checked By: DAB 

INGINT_LIBRARY_V8_06_GLB LibVersion: v8_06_018 PivVersion: v8_06 - Core+Logs - 002 | Log WINDOW SAMPLE LOG - AAP | 1313592 - M1 JUNCTION 15 MAIN SITE GP J - V8_06.
RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600; Fax: 02476 501417; Web: www.rsk.co.uk | 13/11/17 - 16:16 | MSB |



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA9
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 87.63	National Grid Co-ordinate: E:474994.9 N:254177.1		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
							Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	87.23	(0.40)	
	0.50	1	ES	0.0ppm			Firm to stiff orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)			
	0.50	2	B							
	0.50	3	PID						(0.80)	
	0.70		D							
	1.00	4	D					86.43	1.20	
	1.20-1.65	1	SPT	N=17			Firm brown grey mottled orange brown slightly gravelly slightly andy silty CLAY. Gravel is subrounded fine to coarse chalk. (OADBY MEMBER)			
	1.50	5	D				... cobbles of chalk at 1.20m bgl.			
	2.00-2.45	2	SPT	N=19			... cobbles of chalk at 1.80m bgl.			
	2.00-3.00	6	B						(2.00)	
	2.50	7	D				... becoming more structured from 3.00m bgl.			
	3.00-3.45	3	SPT	N=21				84.43	3.20	
	3.50	8	D				Firm to stiff dark grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse fragments of chalk. (OADBY MEMBER)			
	4.00-4.45	4	SPT	N=21						
	4.00-5.00	9	B						(2.25)	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	<div>1. Location scanned with GPR prior to breaking ground. No services encountered.</div> <div>2. Hand dug inspection pit to 1.20m bgl.</div> <div>3. Groundwater not encountered.</div> <div>4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.</div>			
Method Used: Tracked window sampling						All dimensions in metres		Scale: 1:25	
Plant Used: Premier 110			Drilled By: DSUK LTD		Logged By: MSouthworth		Checked By: MS		



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA9
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 87.63	National Grid Co-ordinate: E:474994.9 N:254177.1		Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.50	10	D				Firm to stiff dark grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse fragments of chalk. (OADBY MEMBER) (stratum copied from 3.20m from previous sheet)			
	5.00-5.45	5	SPT	N=24				82.18	5.45	
							Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
						All dimensions in metres		Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD	Logged By:	MSouthworth
						Checked By:	MS		AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA10
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 98.28	National Grid Co-ordinate: E:474690.5 N:254127.8		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div>1.20 - 2.00 (85mm dia) 100% rec</div> <div>2.00 - 3.00 (75mm dia) 100% rec</div> <div>3.00 - 4.00 (65mm dia) 100% rec</div> <div>4.00 - 5.00 (65mm dia) 100% rec</div>	0.10 0.10	1	ES PID	0.0ppm			Crop over brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	97.88	(0.40) 0.40	
	0.50	2	D				Firm orange brown slightly gravelly very sandy CLAY. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)	97.48	(0.40) 0.80	
	1.00	3	D				Firm to stiff grey brown mottled light orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse chalk and quartzite. (OADBY MEMBER)		(0.80)	
	1.20-1.65	1	SPT	N=19						
	1.60-2.00	4	B				Firm to stiff dark grey slightly gravelly silty CLAY with occasional pockets of light orange brown silt. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)			
	1.70	5	D				... becoming more structured from 2.00m bgl.			
	2.00-2.45	2	SPT	N=16						
	2.70	6	D							
	3.00-3.45	3	SPT	N=17						
	3.00-4.00	7	B							
	3.70	8	D						(3.85)	
	4.00-4.45	4	SPT	N=24			... stiff from 4.00m bgl.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.	
Method Used: Tracked window sampling						All dimensions in metres	Scale: 1:25
Plant Used: Premier 110			Drilled By: DSUK LTD		Logged By: MSouthworth	Checked By: MS	



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA10
Contract Ref: 313582	Start: 31.08.17 End: 31.08.17	Ground Level: 98.28	National Grid Co-ordinate: E:474690.5 N:254127.8	Sheet: 2 of 2

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.70	9	D				Firm to stiff dark grey slightly gravelly silty CLAY with occasional pockets of light orange brown silt. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER) (stratum copied from 1.60m from previous sheet)			
	5.00-5.45	5	SPT	N=26				92.83	5.45	
							Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA11
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 91.12	National Grid Co-ordinate: E:474803.4 N:254476.7		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div>1.20 - 2.00 (85mm dia) 55% rec</div> <div>2.00 - 3.00 (75mm dia) 100% rec</div> <div>3.00 - 4.00 (65mm dia) 100% rec</div> <div>4.00 - 5.00 (65mm dia) 100% rec</div>	0.20 0.20	1	ES PID	0.0ppm			Crop over soft brown silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite and flint. (AGRICULTURAL TOPSOIL)	90.82	(0.30) 0.30	
	0.40-0.80	2	B				Soft to firm light brown orange silty slightly sandy CLAY with rare subangular to subrounded coarse quartzite gravel. (OADBY MEMBER)	90.32	(0.50) 0.80	
	0.60	3	D				Soft to firm very light brown mottled grey slightly gravelly, slightly sandy silty CLAY. Gravel is angular to sub-angular fine to coarse quartzite and chalk. (OADBY MEMBER)			
	1.00-1.90	4	B							
	1.20-1.65 1.20	1 5	SPT D	N=9						
	2.00-2.45 2.00	2 6	SPT D	N=13						
	3.00-3.45 3.00	3 7	SPT D	N=14			Firm to stiff brown grey mottled orange brown slightly sandy slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse chalk. (OADBY MEMBER)	88.22	2.90	
	4.00-4.45 4.00	4 8	SPT D	N=27			Medium dense light orange brown slightly clayey gravelly SAND. Gravel is angular to subangular fine to coarse flint and quartzite. (GLACIOFLUVIAL DEPOSITS)	87.22	3.90	
							Description on next sheet	87.02	4.10	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	<div>1. Location scanned with GPR prior to breaking ground. No services encountered.</div> <div>2. Hand dug inspection pit to 1.20m bgl.</div> <div>3. Groundwater encountered at 4.10m bgl.</div> <div>4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.</div>			
Method Used: Tracked window sampling						All dimensions in metres		Scale: 1:25	
Plant Used: Premier 110			Drilled By: DSUK LTD		Logged By: RSalama		Checked By: RSB		



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA11
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 91.12	National Grid Co-ordinate: E:474803.4 N:254476.7		Sheet: 2 of 2

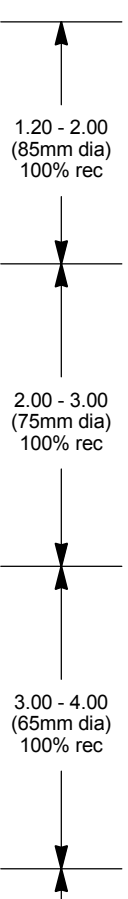




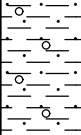
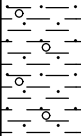
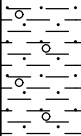


Progress		Samples / Tests			Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.90	9	D	N=28			Stiff dark silty grey CLAY with mudstone lithorelicts. (WHITBY MUDSTONE FORMATION) (stratum copied from 4.10m from previous sheet)		(1.35)	
	5.00-5.45	5	SPT							
							Window sample hole terminated at 5.45m bgl.	85.67	5.45	

Drilling Progress and Water Observations						General Remarks
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA12
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 88.22	National Grid Co-ordinate: E:474932.8 N:254844.8		Sheet: 1 of 2

Progress		Samples / Tests			Water Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.10 0.10	1	ES PID	0.0ppm		Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	87.92	(0.30) 0.30	
	0.60 0.70	2 3	B D			Firm becoming stiff orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and rare chalk. (OADBY MEMBER)			
	1.00 1.00-2.00	4 5	D B						
	1.20-1.65	1	SPT	N=23		... becoming stiff from 1.20m bgl.		(2.30)	
	2.00-2.45 2.10	2 6	SPT D	N=28		... pocket of orange brown sand from 2.10m to 2.20m bgl.			
	2.90 3.00-3.45 3.00-4.00	7 3 8	D SPT B	N=30		Stiff to very stiff dark blue grey structured CLAY. (WHITBY MUDSTONE FORMATION)	85.62	2.60	
	3.00 - 4.00 (65mm dia) 100% rec					... occasional mudstone lithorelicts from 3.45m bgl. ... very silty between 3.60m to 3.80m bgl.			
	4.00-4.45	4	SPT	N=37		... very silty between 4.10m to 4.20m bgl.		(2.85)	

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater seepage encountered at 3.60m bgl. 4. Gas and groundwater monitoring well installed to 4.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA12
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 88.22	National Grid Co-ordinate: E:474932.8 N:254844.8	Sheet: 2 of 2

Progress	Samples / Tests				Water Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (65mm dia) 100% rec ▼	5.00-5.45	5	SPT	N=50		Stiff to very stiff dark blue grey structured CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 2.60m from previous sheet)	82.77	5.45	
						Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA13
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 86.31	National Grid Co-ordinate: E:475004.2 N:254960.7		Sheet: 1 of 1

Progress		Samples / Tests			Water Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
						Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to medium quartzite. (AGRICULTURAL TOPSOIL)	86.11	0.20	
	0.30	1	ES						
	0.30		PID	0.0ppm					
	0.40	2	D			Firm orange brown slightly silty sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse quartzite, ironstone, chalk and flint. (OADBY MEMBER)			
	0.80	3	D						
	0.80	4	B						
	1.00-2.00	5	B					(1.90)	
	1.10	6	D						
	1.20-1.65	1	SPT(c)	N=16		... very sandy from 1.20m bgl.			
1.20 - 2.00 (85mm dia) 100% rec									
	1.70	7	D						
	2.00-2.45	2	SPT(c)	N=45			84.21	2.10	
	2.00-3.00	9	B			Dense light orange brown slightly gravelly clayey silty SAND. Gravel is angular to subrounded fine to coarse chalk and rare quartzite and flint. (OADBY MEMBER)			
2.00 - 3.00 (75mm dia) 100% rec								(0.90)	
	2.70	9	D			... very gravelly from 2.80m bgl.			
	3.00-3.45	3	SPT(c)	N=28			83.31	3.00	
3.00 - 4.00 (65mm dia) 100% rec						Stiff to very stiff orange brown slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse flint, quartzite and chalk. (OADBY MEMBER)			
	4.00-4.45	4	SPT(c)	N=50				(1.45)	
							81.86	4.45	
						Window sample hole terminated at 4.45m bgl.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 3.00m bgl and after 20 minutes at 3.00m bgl. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
All dimensions in metres						Scale:	1:28
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA14
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 84.44	National Grid Co-ordinate: E:475124.8 N:254920.1		Sheet: 1 of 2


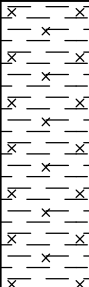
Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20 0.20	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	84.14	0.30	
	0.60	2	B				Firm orange brown slightly gravelly silty very sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and chalk. (OADBY MEMBER)		(1.05)	
	0.90 1.00-2.00	3 4	D B							
	1.20-1.65 1.20	1 5	SPT D	N=14				83.09	1.35	
	1.90 2.00-2.45 2.00-3.00	6 2 7	D SPT B	N=40			Dense light orange brown slightly gravelly silty clayey SAND. Gravel is angular to subrounded fine to coarse flint, quartzite and chalk. (GLACIOFLUVIAL DEPOSITS) ... pocket of clay from 1.60m to 1.70m bgl. ... very clayey from 1.70m to 1.90m bgl.		(2.65)	
	2.90 3.00-3.45 3.00-4.00	8 3 9	D SPT B	N=37						
	4.00-4.45	4	SPT(c)	N=34			Stiff to very stiff dark grey silty CLAY. (WHITBY MUDSTONE FORMATION)	80.44	4.00	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.40m bgl. 4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.			
All dimensions in metres						Scale:	1:25		
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD	Logged By:	MSouthworth
						Checked By:	AGS		



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA14
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 84.44	National Grid Co-ordinate: E:475124.8 N:254920.1	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.90 5.00-5.45	10 5	D SPT(c)	N=39			Stiff to very stiff dark grey silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 4.00m from previous sheet)		(1.45)	
							Window sample hole terminated at 5.45m bgl.	78.99	5.45	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA15
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 84.97	National Grid Co-ordinate: E:475087.3 N:254849.9		Sheet: 1 of 1

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div>1.20 - 2.00 (85mm dia) 100% rec</div> <div>2.00 - 3.00 (75mm dia) 100% rec</div> <div>3.00 - 3.40 (65mm dia) 100% rec</div>	0.40 0.40	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	84.67	0.30	
	0.80	2	D				Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse chalk. (OADBY MEMBER)		(0.90)	
	1.00-2.00	3	B							
	1.10	4	D							
	1.20-1.65	1	SPT	N=13						
	2.00-2.45	2	SPT	N=21						
	2.00-3.00	5	B				... band of medium to coarse sand from 1.90m to 1.95m bgl.		(1.80)	
	2.00	6	D							
	3.00-3.45	3	SPT	N:50 for 295mm			Very stiff grey silty slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse chalk. (OADBY MEMBER)	81.97	3.00	
	3.00	7	D						(0.71)	
	3.40-3.64	4	SPT	N:50 for 151mm						
	3.40	8	D					81.26	3.71	
							Window sample hole terminated at 3.71m bgl due to refusal.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
Method Used: Tracked window sampling						All dimensions in metres	Scale: 1:25
Plant Used: Premier 110			Drilled By: DSUK LTD		Logged By: MSouthworth	Checked By: MS	



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA16
Contract Ref: 313582	Start: 04.09.17 End: 04.09.17	Ground Level: 87.92	National Grid Co-ordinate: E:474947.5 N:254781.8		Sheet: 1 of 1

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div>1.20 - 2.00 (85mm dia) 100% rec</div> <div>2.00 - 3.00 (75mm dia) 100% rec</div> <div>3.00 - 3.95 (65mm dia) 50% rec</div>	0.20	1	ES PID	0.0ppm			Crop over dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	87.62	(0.30)	
	0.20						Firm orange brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (OADBY MEMBER)		0.30	
	0.50	2	B							
	0.60	3	D							
	1.00	4	D							
	1.20-1.65	1	SPT D	N=18					(1.65)	
	1.20	5								
	1.80	6	D							
	2.00-2.45	2	SPT B	N=26			Medium dense light orange brown slightly clayey slightly gravelly silty SAND. Gravel is angular to subrounded fine to coarse chalk and rare flint and quartzite. (GLACIOFLUVIAL DEPOSITS)	85.97	1.95	
	2.00-3.00	8								
	2.80	7	D							
	3.00-3.32	3	SPT B	N:50 for 170mm			... Very dense from 3.00m bgl.		(2.00)	
	3.00-3.90	9								
	3.50-3.73	4	SPT	N:50 for 125mm						
							Window sample hole terminated at 3.95m bgl.	83.97	3.95	

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.10m bgl. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA17
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 83.64	National Grid Co-ordinate: E:475273.4 N:254182.3		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.10 0.10	1	ES PID	0.0ppm			Crop over dark brown slightly clayey sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse fragments of chalk. (AGRICULTURAL TOPSOIL)	83.34	(0.30) 0.30	
	0.40 0.60	2 3	D B				Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)		(0.70)	
	0.90 1.00-2.00	4 5	D B					82.64	1.00	
	1.20-1.65 1.20	1 6	SPT D	N=25			Stiff brown slightly gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse chalk and rare quartzite and flint. (OADBY MEMBER)			
	1.20 - 2.00 (85mm dia) 100% rec	7	D							
	2.00-2.45	2	SPT	N=18						
	2.00 - 3.00 (75mm dia) 100% rec	8	D						(2.90)	
	3.00-3.45 3.00-4.00	3 9	SPT B	N=24						
	3.00 - 4.00 (65mm dia) 100% rec	10	D					79.74	3.90	
	4.00-4.45	4	SPT	N=24			Stiff dark grey slightly gravelly silty CLAY. Gravel is angular fine to coarse chalk. (OADBY MEMBER)			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA17
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 83.64	National Grid Co-ordinate: E:475273.4 N:254182.3	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	4.50	11	D				Stiff dark grey slightly gravelly silty CLAY. Gravel is angular fine to coarse chalk. (OADBY MEMBER) (stratum copied from 3.90m from previous sheet)		(1.55)	
	5.00-5.45	5	SPT	N=25				78.19	5.45	
							Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA18
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 81.50	National Grid Co-ordinate: E:475402.4 N:254380.9		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div>1.20 - 2.00 (85mm dia) 100% rec</div> <div>2.00 - 3.00 (75mm dia) 100% rec</div> <div>3.00 - 4.00 (65mm dia) 100% rec</div> <div>4.00 - 5.00 (65mm dia) 100% rec</div>	0.40	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly slightly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse chalk. (AGRICULTURAL TOPSOIL)	81.20	(0.30)	
	0.40						Firm to stiff orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint, quartzite and occasional chalk gravel. (OADBY MEMBER)		0.30	
	0.60-1.20	2	B				... cobbles of limestone from 0.50m to 1.00m bgl.			
	1.00	3	D							
	1.20-1.65	1	SPT	N=21			... stiff at 1.20m bgl.			
	1.20	4	D							
	1.20	5	D							
	2.00-2.45	2	SPT	N=15			... Firm to stiff from 2.00m bgl and occasionally mottled grey.			
	2.00-3.00	6	B							
	2.20	7	D							
	3.00-3.45	3	SPT	N=17						
	3.00-4.00	8	B							
	3.20	9	D							
	4.00-4.45	4	SPT	N=15			Firm to stiff brown grey slightly sandy silty CLAY with occasional pockets of orange brown silt. (OADBY MEMBER)	78.10	3.40	
	4.00-5.00	10	B							
	4.20	11	D						(2.05)	

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 5.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site		Client: Roxhill		Window Sample: WSA18
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 81.50	National Grid Co-ordinate: E:475402.4 N:254380.9	Sheet: 2 of 2

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Reduced Level	Depth (Thick-ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (65mm dia) 100% rec ▼	5.00-5.45	5	SPT	N=19			Firm to stiff brown grey slightly sandy silty CLAY with occasional pockets of orange brown silt. (OADBY MEMBER) (stratum copied from 3.40m from previous sheet)	76.05	5.45	
							Window sample hole terminated at 5.45m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				

WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA19
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 80.84	National Grid Co-ordinate: E:475449.7 N:254508.0		Sheet: 1 of 1

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.10 0.10 0.30	1 2	ES PID D	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	80.44	(0.40) 0.40	
	0.70 1.00-2.00	3 4	D B				Soft to firm orange brown slightly gravelly very sandy CLAY. Gravel is angular to subrounded fine to coarse chalk and rare flint and quartzite. (OADBY MEMBER)		(1.50)	
	1.20-1.65 1.20	1 5	SPT D	N=7				78.94	1.90	
	2.00-2.45 2.00	2 6	SPT D	N=32			Medium dense to dense light grey mottled orange brown slightly gravelly very clayey SAND. Gravel is angular to subrounded fine to coarse chalk fragments. (GLACIOFLUVIAL DEPOSITS)	78.64	(0.30) 2.20	
	2.00 - 3.00 (75mm dia) 100% rec						Light grey brown slightly clayey very silty SAND. (GLACIOFLUVIAL DEPOSITS)		(0.60)	
	3.00-3.45 3.00-4.00 3.20	3 7 8	SPT B D	N=24			... pocket of clay from 2.70m to 2.80m bgl. Stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION)	78.04	2.80 (0.80)	
	3.00 - 4.00 (65mm dia) 45% rec							77.24	3.60	
	3.60-3.97	4	SPT	N:50 for 230mm			Window sample hole terminated at 3.60m bgl.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater seepage encountered at 1.50m and 2.90m bgl. 4. Gas and groundwater monitoring well installed to 3.00M bgl upon completion.			
Method Used: Tracked window sampling						All dimensions in metres		Scale: 1:25	
Plant Used: Premier 110			Drilled By: DSUK LTD		Logged By: MSouthworth		Checked By: AGS		



WINDOW SAMPLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Window Sample: WSA20
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 89.73	National Grid Co-ordinate: E:474822.6 N:254386.1		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20 0.20	1	ES PID	0.0ppm			Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	89.43	(0.30) 0.30	
	0.60	2	D				Firm orange brown slightly gravelly very sandy CLAY. Gravel is angular to subrounded fine to coarse flint and quartzite. (OADBY MEMBER)		(0.90)	
	0.90	3	D							
	1.00-2.00	4	B							
	1.20-1.65 1.20	1 5	SPT D	N=13			Firm brown grey mottled orange brown slightly gravelly slightly silty slightly sandy CLAY with occasional pockets of orange brown silt. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)	88.53	1.20	
	1.80	6	D						(1.20)	
	2.00-2.45	2	SPT	N=14						
	2.80	7	D							
	3.00-3.45	3	SPT	N=17			Firm to stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION)	87.33	2.40	
	3.80	8	D						(3.05)	
	4.00-4.45 4.00-5.00	4 9	SPT B	N=21			... stiff at 4.00m bgl.			

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Premier 110		Drilled By:	DSUK LTD
						Logged By:	MSouthworth
						Checked By:	AGS



Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
<div> <div>4.00 - 5.00 (65mm dia) 100% rec</div> <div>▼</div> </div>	5.00-5.45	5	SPT	N=27			Firm to stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 2.40m from previous sheet)</i>	84.28	5.45	
							Window sample hole terminated at 5.45m bgl.			

PRINT LIBRARY V8_06 GLB LibVersion: v8_06_018 PdfVersion: v8_06 - Core+Logs - 002 | Log WINDOW SAMPLE LOG - A4P | 313582 - M1 JUNCTION 15 MAIN SITE.GPJ - v8_06_06.
RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600. Fax: 02476 501417. Web: www.rsk.co.uk | 13/11/17 - 16:18 | MS8 |

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA1
Contract Ref: 313582	Start: 06.09.17 End: 07.09.17	Ground Level: 96.51	National Grid Co-ordinate: E:474315.2 N:255246.6		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Firm orange brown slightly sandy slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse flint, quartzite and chalk. (SUBSOIL)		(1.10)	
0.50	2	D							
0.50	3	ES							
1.00	4	D							
1.00	5	ES							
1.20-1.65	1	SPT	N=12			Medium dense orange brown slightly gravelly slightly clayey SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)			
1.20-1.70	6	B							
1.20	7	D							
1.70-2.20	8	B						(1.90)	
1.70	9	D							
2.00-2.45	2	SPT	N=11						
2.00	10	D							
2.20-2.70	11	B							
2.50	12	D							
2.70-3.00	13	B							
							95.41	1.10	
3.00-3.45	3	SPT	N=12			Firm grey brown occasional mottled orange brown slightly sandy silty CLAY. (OADBY MEMBER)		(0.60)	
3.00-3.50	14	B							
3.00	15	D							
3.50	16	D							
3.60-4.00	17	B				orange brown slightly gravelly slightly clayey silty SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)			
4.00-4.45	4	SPT	N=8					(1.40)	
4.00	18	D							
4.00-4.50	19	B							
4.50-5.00	20	B							
4.50	21	D							
							91.51	5.00	
5.00-5.45	5	SPT	N=7			Soft to firm grey brown mottled orange brown slightly sandy silty CLAY. (OADBY MEMBER)			
5.00-5.50	22	B							
5.00	23	D							
5.50	24	D							
5.60-6.00	25	B							
6.00-6.45	6	SPT	N=10					(3.00)	
6.00	26	D							
6.50	27	D							
7.00-7.45	7	SPT	N=30						
7.00	28	D							
7.50	29	D							
							88.51	8.00	
8.00-8.45	8	SPT	N=27			Medium dense orange brown to grey clayey slightly gravelly silty SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER)			
8.00-9.00	30	B							
8.00	31	D							
8.50	32	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
06/09/17	08:00	0.00	None	N/R		15.80	16.00	01:00	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 25.45m bgl. 4. Groundwater encountered at 4.00m bgl and rose to 3.50m bgl after 20 minutes.
06/09/17	12:00	4.00	3.00	151	4.00	16.00	16.30	01:50	
06/09/17	17:00	12.00	12.00	151	Dry				
07/09/17	08:00	12.00	12.00	151	Dry				
07/09/17	15:00	25.45	25.00	151	Dry				
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
Checked By: AGS						Checked By: AGS			



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA1
Contract Ref: 313582	Start: 06.09.17 End: 07.09.17	Ground Level: 96.51	National Grid Co-ordinate: E:474315.2 N:255246.6		Sheet: 2 of 3


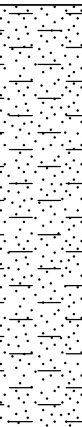
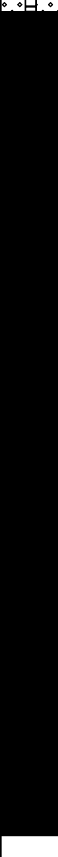

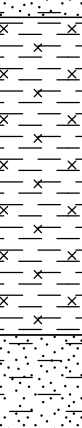
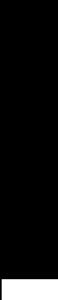



Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00-10.00 9.00 9.50	9 33 34 35	SPT B D D	N=23			Medium dense orange brown to grey clayey slightly gravelly silty SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (OADBY MEMBER) (stratum copied from 8.00m from previous sheet)		(3.00)	
10.00-10.45 10.00-11.00 10.00	10 36 37	SPT B D	N=24						
11.00	38	D					85.51	11.00	
11.50-11.95 11.50	11 39	SPT D	N=33						
12.00-12.50 12.50	40 41	B D				Stiff to very stiff grey brown slightly sandy silty CLAY. (OADBY MEMBER)			
13.00-13.45 13.00	12 42	SPT D	N=35					(4.50)	
14.00 14.00 14.00-14.45 14.50-14.95 14.50	43 44 45 13 46	D U B SPT D	100 blows N=32						
15.50 15.60-15.80 15.80-15.83 15.80	47 48 14 49	D B SPT D	N:50 for 20mm				81.01	15.50	
16.00-16.02 16.30-16.66 16.30 16.50-17.50	15 16 50 51	SPT SPT D B	N:50 for 15mm N:50 for 205mm			Orange brown clayey silty SAND with large ironstone cobbles. (GLACIOFLUVIAL DEPOSITS)			
17.00	52	D							
17.50-17.83 17.50 17.50-18.50	17 53 54	SPT D B	N:50 for 180mm						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 20.00m bgl upon completion. 6. Non recovery of U100 test at 14.00m bgl.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: MS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA1
Contract Ref: 313582	Start: 06.09.17 End: 07.09.17	Ground Level: 96.51	National Grid Co-ordinate: E:474315.2 N:255246.6		Sheet: 3 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend			
	No	Type	Results									
18.00	55	D	N:50 for 185mm			Orange brown clayey silty SAND with large ironstone cobbles. (GLACIOFLUVIAL DEPOSITS) (stratum copied from 15.50m from previous sheet)		(5.40)				
18.50-19.50	56	B										
19.00-19.34	18	SPT										
19.00	57	D										
20.00	58	D	N=38									
20.50-20.95	19	SPT										
20.50-21.00	59	B										
20.50	60	D										
21.00	61	D	N:50 for 75mm			Very stiff dark blue grey silty CLAY. (GLACIOFLUVIAL DEPOSITS)	75.61	20.90				
21.50-22.00	62	B										
22.00-22.13	20	SPT										
22.00	63	D										
22.50-23.00	64	B					73.51	23.00				
23.00	65	D										
23.50-23.95	21	SPT										
23.50-24.00	66	B										
23.50	67	D	N=43			Dense orange brown slightly gravelly slightly clayey silty SAND. Gravel is angular to subrounded fine to coarse flint and quartzite. (GLACIOFLUVIAL DEPOSITS)		(2.45)				
24.50-25.00	68	B										
24.50	69	D										
25.00-25.45	22	SPT										
25.00	70	D	N=44				71.06	25.45				
Borehole terminated at 25.45m bgl.												

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA2
Contract Ref: 313582	Start: 30.08.17 End: 31.08.17	Ground Level: 85.64	National Grid Co-ordinate: E:474073.2 N:255229.9		Sheet: 1 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over brown silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse chalk and quartzite. (AGRICULTURAL TOPSOIL) Firm light brown mottled light grey silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse chalk. (OADBY MEMBER)	85.24	0.40	
0.50	2	D							
1.00	3	D						(1.30)	
1.20-1.65	1	SPT	N=16						
1.20-1.70	4	B							
1.20	5	D					83.94	1.70	
2.00-2.45	2	SPT	N=8			Loose brown orange slightly gravelly slightly clayey SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse ironstone and pockets of clay. (GLACIOFLUVIAL DEPOSITS)			
2.00-2.50	6	B							
2.00	7	D							
2.50	8	D							
3.00-3.45	3	SPT	N=9						
3.00	10	D							
3.00-4.00	9	B							
3.50	11	D							
4.00-4.45	4	SPT	N=13			... medium dense from 4.00m bgl.			
4.00-5.00	12	B							
4.00	13	D							
4.50	14	D							
5.00-5.45	5	SPT	N=28						
5.00-6.00	15	B							
5.00	16	D							
5.50	17	D							
6.00-6.45	6	SPT	N=24			... dense from 5.00m bgl.			
6.00-7.00	18	B							
6.00	19	D							
6.50	20	D						(9.70)	
7.00-7.45	7	SPT	N=25						
7.00-8.00	21	B							
7.00	22	D							
7.50	23	D							
8.00-8.45	8	SPT	N=20						
8.00-9.00	24	B							
8.00	25	D							
8.50	26	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
30/08/17	10:00	0.00	None	N/R		13.10	13.20	01:00	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 13.20m bgl. 4. Groundwater encountered at 9.50m and rose to 9.00m bgl, whilst a water seepage was
30/08/17	14:00	9.50	None	151	9.50				
30/08/17	17:30	12.00	12.00	151	Dry				
31/08/17	08:00	12.00	12.00	151	Dry				
31/08/17	10:00	13.20	12.00	151	Dry				
Method Used: Cable Percussion		Plant Used: Dando 3000		Drilled By: Borehole Solutions Ltd		All dimensions in metres			Scale: 1:50
Logged By: RSalama		Checked By: RSB							



BOREHOLE LOG



Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA2
Contract Ref: 313582	Start: 30.08.17 End: 31.08.17	Ground Level: 85.64	National Grid Co-ordinate: E:474073.2 N:255229.9		Sheet: 2 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00-10.00 9.00 9.50	9 27 28 29	SPT B D D	N=15			Loose brown orange slightly gravelly slightly clayey SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse ironstone and pockets of clay. (GLACIOFLUVIAL DEPOSITS) (stratum copied from 1.70m from previous sheet)			
10.00-10.45 10.00-11.00 10.00	10 30 31	SPT B D	N=10						
11.00-11.50 11.00	32 33	B D					74.24	11.40	
11.50-11.95 11.50	11 34	SPT D	N=35			Stiff grey blue silty CLAY. (WHITBY MUDSTONE FORMATION)		(1.20)	
12.00-12.50	35	B							
12.50 12.50-13.00 12.50	36 37 38	U B D	100 blows			Weak to medium strong greyish blue MUDSTONE. (WHITBY MUDSTONE FORMATION)	73.04	12.60	
13.00-13.13 13.00 13.20-13.20 13.20	12 39 13 40	SPT D SPT D	N:50 for 10mm N:50 for 1mm			. . . band of fine grey clay from 13.00m to 13.10m bgl.	72.44	13.20	
						Borehole terminated at 13.20m bgl.			

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									recorded at 12.60m bgl. 5. Gas and groundwater monitoring well installed to 13.00m bgl upon completion. 6. SPT at 9.00m and 10.00m bgl are possibly affected by drilling process, which results in possible reduction of SPT N values.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: RSalama			Checked By: AGS

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA3
Contract Ref: 313582	Start: 04.09.17 End: 05.09.17	Ground Level: 89.34	National Grid Co-ordinate: E:474161.5 N:254893.2		Sheet: 1 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thick ness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over soft dark brown slightly gravelly sandy CLAY with frequent roots. Gravel is subangular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	89.04	0.30	
0.50	2	D							
0.50	3	ES							
1.00	10	D							
1.00	4	ES							
1.20-1.65	1	SPT	N=10			Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and chalk. (OADBY MEMBER)			
1.20-1.70	5	B							
1.20	6	D				... mottled brownish grey from 1.30m bgl.		(2.70)	
2.00-2.45	2	SPT	N=9						
2.00-2.50	7	B							
2.00	8	D							
2.50	10	U	75 blows						
2.50	9	D					86.34	3.00	
2.95	11	D							
3.00-3.45	3	SPT	N=11			Firm light brown grey mottled orange brown slightly gravelly silty sandy CLAY. Gravel is angular to subrounded fine to coarse chalk. (OADBY MEMBER)			
3.00-3.50	12	B						(1.10)	
3.00	13	D							
3.50	14	D							
4.00-4.45	4	SPT	N=20				85.24	4.10	
4.00-4.50	15	B				Firm occsaionally stiff light grey slightly gravelly slightly sandy silty CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)			
4.00	16	D							
4.50	17	D							
4.50	18	U	80 blows						
4.95	19	D				... structured from 5.00m bgl.			
5.00-5.45	5	SPT	N=17						
5.00-5.50	20	B							
5.00	21	D							
5.50	22	D						(3.90)	
6.00-6.45	6	SPT	N=16						
6.00	23	D							
6.50	24	D							
6.50	25	U	100 blows						
6.95	26	D							
7.00-7.45	7	SPT	N=18						
7.00	27	D							
7.50	28	D							
8.00-8.45	8	SPT	N=27				81.34	8.00	
8.00-8.80	29	B				Stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION)			
8.00	30	D							
8.50	31	D							
8.50	32	U	100 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
04/09/17	11:00	0.00	None	N/R		16.00	16.05	01:00	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 16.05m bgl. 4. Groundwater not encountered. 5. Gas and groundwater monitoring well		
04/09/17	17:00	10.00	10.00	151	Dry						
05/09/17	08:00	10.00	10.00	151	Dry						
05/09/17	16:05	16.05	16.00	151	Dry						
Method Used: Cable Percussion			Plant Used: Dando 3000			Drilled By: Borehole		Logged By: MSouthworth		Checked By: 	
All dimensions in metres									Scale: 1:50		






















































BOREHOLE LOG



Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA3
Contract Ref: 313582	Start: 04.09.17 End: 05.09.17	Ground Level: 89.34	National Grid Co-ordinate: E:474161.5 N:254893.2		Sheet: 2 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 33	SPT D	N=28			Stiff dark grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 8.00m from previous sheet)</i>			
9.50	34	D							
10.00-10.45 10.00	10 35	SPT D	N=32						
10.50	36	U	100 blows						
11.00-11.50 11.00	37 38	B D							
11.50-11.95 11.50	11 39	SPT D	N=44						
12.50 12.50	40 41	D U	100 blows						
13.00-13.45 13.00	12	SPT	N=41						
14.00-14.50 14.00	42 43	B D							
14.50-14.95 14.50	13 44	SPT D	N=40						
15.00 15.00	45 46	D U	100 blows						
16.00-16.02 16.00	14 47	SPT D	N:50 for 5mm			Weak dark grey laminated MUDSTONE. Recovered as gravel sized fragments of mudstone. (WHITBY MUDSTONE FORMATION) Borehole terminated at 16.06m bgl.	73.34 73.28	16.00 16.06	
16.05-16.06 16.05	15 48	SPT(c) D	N:50 for 1mm						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		
									installed to 16.00m bgl upon completion.	

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA4
Contract Ref: 313582	Start: 04.09.17 End: 05.09.17	Ground Level: 95.09	National Grid Co-ordinate: E:474549.8 N:254949.5		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thick- ness)	Material Graphic Legend
	No	Type	Results						
				 		Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	94.79	0.30	
0.40	1	ES	0.0ppm	 		Firm orange brown slightly gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse quartzite and chalk. (OADBY MEMBER)		(0.90)	
0.40		PID							
0.50-1.00	2	B							
0.50	3	D	0.0ppm	 					
0.80	4	ES							
0.80		PID							
1.00-1.50	5	B	N=11	 		Loose to medium dense orange brown slightly clayey silty SAND AND GRAVEL. Gravel is angular to subrounded fine to coarse chalk, flint and quartzite. (GLACIOFLUVIAL DEPOSITS)			
1.00	6	D							
1.20-1.65	1	SPT							
1.20	7	D	N=11	 					
1.50-2.00	8	B							
1.70	9	D							
2.00-2.45	2	SPT	N=10	 					
2.00-2.50	10	B							
2.00	11	D							
2.50-3.00	12	B	N=16	 		... becoming stiff from 4.00m bgl.		(6.30)	
2.50	13	D							
3.00-3.45	3	SPT							
3.00-3.50	14	B	N=20	 					
3.00	15	D							
3.50-4.00	16	B							
3.50	17	D	N=20	 					
4.00-4.45	4	SPT							
4.00-4.50	18	B							
4.00	19	D	N=22	 					
4.50-5.00	20	B							
4.50	21	D							
5.00-5.45	5	SPT	N=20	 					
5.00-5.50	22	B							
5.00	23	D							
5.50-6.00	24	B	N=20	 					
5.50	25	D							
6.00-6.45	6	SPT							
6.00-6.50	26	B	N=22	 					
6.00	27	D							
6.50-7.00	28	B							
6.50	29	D	N=24	 					
7.00-7.45	7	SPT							
7.00-7.50	30	B							
7.00	31	D	N=24	 					
7.50-8.00	32	B							
7.50	33	D							
8.00-8.45	8	SPT	73 blows 0% recovery	 		Stiff dark grey structured silty CLAY. (WHITBY MUDSTONE FORMATION)			
8.00	34	D							
8.50	35	U							
	36			 					
8.50-8.95	37	B							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
04/09/17	08:00	0.00	None	N/R					1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 25.45m bgl. 4. Groundwater encountered at 5.00m bgl and rose to 4.00m bgl after 20 minutes			
04/09/17	12:00	5.00	4.50	151	5.00							
04/09/17	17:00	14.00	14.00	151	Dry							
05/09/17	08:00	14.00	14.00	151	Dry							
05/09/17	15:00	25.45	25.00	151	Dry							
Method Used: Cable Percussion				Plant Used: Dando 3000			Drilled By: Borehole		Logged By: MSouthworth		Checked By: 	



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA4
Contract Ref: 313582	Start: 04.09.17 End: 05.09.17	Ground Level: 95.09	National Grid Co-ordinate: E:474549.8 N:254949.5		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
8.50	9	D				Stiff dark grey structured silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 7.50m from previous sheet) ... shell fragments from 9.00m bgl.			
9.00-9.45	38	SPT	N=30						
9.00		D							
9.50	39	D							
10.00-10.45	10	SPT	N=37			... mudstone lithorelicts from 11.50m bgl.			
10.00	40	D							
10.50	41	U	67 blows						
10.50	42	D							
10.50-11.00	43	B							
11.00	44	D							
11.50-11.95	11	SPT	N=36						
11.50	45	D							
12.50	46	D							
12.50-13.00	47	B							
13.00-13.45	12	SPT	N=37						
13.00	48	D							
14.00	49	U	69 blows						
14.00	50	D							
14.50-14.95	13	SPT	N=36						
14.50	51	D							
14.50-15.00	52	B							
15.50	53	D							
16.00-16.45	14	SPT	N=40						
16.00	54	D							
16.50-17.00	55	B							
17.00	56	U	81 blows						
17.00	57	D							
17.45	58	D							
17.50-17.95	15	SPT	N=50						
17.50	59	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 7.00m bgl upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: MSB



BOREHOLE LOG



Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA4
Contract Ref: 313582	Start: 04.09.17 End: 05.09.17	Ground Level: 95.09	National Grid Co-ordinate: E:474549.8 N:254949.5		Sheet: 3 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
18.50 18.50-19.00	60 61	D B				Stiff dark grey structured silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 7.50m from previous sheet)			
19.00-19.43 19.00	16 62	SPT D	N:50 for 285mm			. . . very stiff from 19.00m bgl.			
20.00 20.00	63 64	U D	115 blows						
20.45 20.50-20.86 20.50 20.50-21.00	65 17 66 67	D SPT D B	N:50 for 226mm						
21.50	68	D							
22.00-22.30 22.00	18 69	SPT D	N:50 for 185mm						
22.50-23.00	70	B							
23.00 23.00	71 72	U D	125 blows						
23.45 23.50-23.78	73 19	D SPT	N:50 for 160mm						
24.50 24.50-25.00	74 75	D B							
25.00-25.27 25.00	20 76	SPT D	N:50 for 150mm						
						Borehole terminated at 25.45m bgl.	69.64	25.45	

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA5
Contract Ref: 313582	Start: 07.09.17 End: 07.09.17	Ground Level: 96.78	National Grid Co-ordinate: E:474303.8 N:254576.9		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over dark brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	96.28	(0.50)	
0.50	2	D							
0.50	3	ES							
0.50		PID	0.0ppm						
1.00	4	D							
1.00	5	ES							
1.00		PID	0.0ppm						
1.20-1.65	1	SPT	N=8						
1.20-1.70	6	B							
1.20	7	D						(3.00)	
2.00-2.45	2	SPT	N=10						
2.00-2.50	8	B							
2.00	9	D							
2.50	10	D							
2.50-2.90	11	U	55 blows						
3.00-3.45	3	SPT	N=10						
3.00	12	D					93.28	3.50	
3.50	13	D				Firm grey slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)	92.78	(0.50)	
4.00-4.45	4	SPT	N=13						
4.00-5.00	14	B				Loose to medium dense orange brown slightly gravelly silty clayey SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (GLACIOFLUVIAL DEPOSITS)		(0.80)	
4.00	15	D							
4.50	16	D					91.98	4.80	
5.00-5.45	5	SPT	N=14			Firm grey silty structured CLAY with frequent mudstone lithorelicts. (WHITBY MUDSTONE FORMATION)			
5.00	17	D							
5.50-6.00	18	B							
5.50	19	D							
6.00-6.45	6	SPT	N=15						
6.00	20	D							
6.50	21	D							
6.50-6.95	22	U	75 blows						
7.00-7.45	7	SPT	N=19			. . . becomes firm to stiff from 7.00m bgl.			
7.00	23	D							
7.50	24	D							
7.70-8.20	25	B							
8.00-8.45	8	SPT	N=34			. . . stiff from 8.00m bgl.			
8.00	26	D							
8.50	27	D				. . . mudstone lithorelicts from 8.50m bgl.			
8.50-8.95	28	U	100 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
07/09/17	08:00		None	N/R		21.50	21.50	01:00	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 21.50m bgl. 4. Groundwater encountered at 4.00m bgl and rose to 3.50m after 20 minutes.			
07/09/17	11:00	4.00	3.00	151	4.00							
07/09/17	17:30	12.00	12.00	151	Dry							
08/09/17	08:00	12.00	12.00	151	Dry							
08/09/17	17:00	21.50	20.00	151	Dry							
Method Used: Cable Percussion				Plant Used: Dando 3000			Drilled By: Borehole		Logged By: MSouthworth		Checked By: 	



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA5
Contract Ref: 313582	Start: 07.09.17 End: 07.09.17	Ground Level: 96.78	National Grid Co-ordinate: E:474303.8 N:254576.9		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 29	SPT D	N=40			Firm grey silty structured CLAY with frequent mudstone lithorelicts. (WHITBY MUDSTONE FORMATION) (stratum copied from 4.80m from previous sheet) ... very stiff from 9.00m bgl.			
9.50	30	D							
10.00-10.45 10.00	10 31	SPT D	N=41						
10.50	32	D							
10.50-10.95 10.50	33	U	100 blows						
11.00-11.50 11.00	34 35	B D							
11.50-11.95 11.50	11 36	SPT D	N=43						
12.50	37	D							
13.00-13.45 13.00	12 38	SPT D	N=45					(16.72)	
14.00	39	D							
14.50-14.95 14.50-15.00 14.50	13 40 41	SPT B D	N=50						
15.50	42	D							
16.00-16.35 16.00	14 43	SPT D	N:50 for 200mm						
16.50	44	D							
17.00-17.50 17.00	45	B							
17.50-17.84 17.50	15 46	SPT D	N:50 for 190mm			... an increase in mudstone lithorelicts from 17.50m bgl.			

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 8.00m bgl upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: AGS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA5
Contract Ref: 313582	Start: 07.09.17 End: 07.09.17	Ground Level: 96.78	National Grid Co-ordinate: E:474303.8 N:254576.9		Sheet: 3 of 3






















































Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
18.00	47	D				Firm grey silty structured CLAY with frequent mudstone lithorelicts. (WHITBY MUDSTONE FORMATION) (stratum copied from 4.80m from previous sheet)			
18.50	48	D							
19.00-19.30	16	SPT	N:50 for 145mm						
19.00	49	D							
20.00-20.50	50	B				... shell fragments from 19.00m bgl.			
20.00	51	D							
20.50-20.75	17	SPT	N:50 for 115mm						
20.50	52	D							
21.00	53	D				Borehole terminated at 21.52m bgl on assumed bedrock.			
21.50-21.52	18	SPT	N:50 for 10mm						
21.50	54	D							
21.51-21.52	19	SPT(c)	N:50 for 1mm						
							75.26	21.52	



Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA6
Contract Ref: 313582	Start: 29.08.17 End: 29.08.17	Ground Level: 94.75	National Grid Co-ordinate: E:474700.5 N:254648.7		Sheet: 1 of 2

Depth (m)	Samples & Testing			Backfill & Instru- mentation	Water	Description of Strata	Reduced Level	Depth (Thick- ness)	Material Graphic Legend							
	No	Type	Results													
0.20-0.50	1	B	0.0ppm			Crop over soft dark brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite and flint. (AGRICULTURAL TOPSOIL)	94.55	0.20								
0.40	2	ES														
0.40		PID														
0.50	3	D														
0.60-0.90	4	B	0.0ppm				Soft to firm orange brown slightly gravelly very sandy CLAY. Gravel is angular to subrounded fragments of chalk. (OADBY MEMBER)	(1.80)								
0.80	5	ES														
0.80		PID														
1.00	6	D														
1.20-1.65	1	SPT	N=9						92.75	2.00						
1.20-1.70	7	B														
1.20	8	D														
1.70	9	D														
2.00-2.45	2	SPT	N=8					Soft to firm grey brown mottled dark grey slightly gravelly slightly silty slightly sandy CLAY. Gravel is angular to subrounded fine to coarse fragments of chalk. (OADBY MEMBER)		(1.00)						
2.00-2.50	10	B														
2.00	11	D														
2.50-3.00	12	B														
2.50	13	D	27 blows						91.75	3.00						
2.50	14	U														
2.95	15	D														
3.00-3.45	3	SPT									N=12					
3.00-3.50	16	B	N=16					Firm locally stiff dark brown grey slightly gravelly silty CLAY. Gravel is angular to subrounded fine to coarse chalk fragments. (OADBY MEMBER)								
3.00	17	D														
3.50-4.00	18	B														
3.50	19	D														
4.00-4.45	4	SPT	N=16					. . . becoming structured from 4.00m bgl.								
4.00	20	D														
4.50	21	D														
4.50	22	U														
5.00-5.45	5	SPT	N=14													
5.00-5.50	23	B														
5.00	24	D														
5.50	25	D														
6.00-6.45	6	SPT	N=27					. . . becoming stiff from 6.00m bgl.		(6.00)						
6.00-6.50	266	B														
6.00	27	D														
6.50-6.95	28	B														
6.50	29	D														
6.50	30	U	52 blows 0% recovery													
7.00-7.45	31	SPT	N=22													
7.00-7.50	32	B														
7.00	33	D														
7.50		D														
8.00-8.45	8	SPT	N=19										. . . small pockets and orange brown coarse sand from 8.50m bgl.			
8.00-8.50	34	B														
8.00	35	D														
8.50-8.95	36	B														
8.50	37	D	100 blows													
8.50	38	U														

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks						
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)							
29/08/17	10:30	0.00	None	N/R	6.50				1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 12.45m bgl. 4. Groundwater seepage encountered at 6.50m bgl and rose to 6.40m after 20 minutes.						
29/08/17	12:00	5.00	5.00	151											
29/08/17	15:00	9.00	9.00	151											
29/08/17	16:30	12.45	12.00	151											
										All dimensions in metres		Scale: 1:50			
Method Used: Cable Percussion			Plant Used: Dando 3000			Drilled By: Borehole			Logged By: MSouthworth			Checked By: 			



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA6
Contract Ref: 313582		Start: 29.08.17 End: 29.08.17	Ground Level: 94.75	National Grid Co-ordinate: E:474700.5 N:254648.7	Sheet: 2 of 2

Depth (m)	Samples & Testing			Backfill & Instru- mentation	Water	Description of Strata	Reduced Level	Depth (Thick- ness)	Material Graphic Legend		
	No	Type	Results								
9.00-9.45	9		0% recovery			Dense brown grey slightly gravelly very clayey SAND. Gravel is angular to subrounded flint and quartzite. (GLACIOFLUVIAL DEPOSITS) Stiff to very stiff dark grey silty CLAY. (WHITBY MUDSTONE FORMATION)	85.45	9.30			
39	SPT	N=31									
9.00-9.50	40	B									
9.00	41	D									
9.50		D									
10.00-10.45	10	SPT	N=31								
10.00-10.50	42	B									
10.00	43	D									
10.50	44	D									
10.50	45	U	98 blows								
10.95	46	D									
11.00-11.50	47	B									
11.50-11.95	11	SPT	N=36								
11.50	48	D									
12.00-12.45	12	SPT	N=33								
12.00	49	D									
Borehole terminated at 12.45m bgl.							82.30	12.45			

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		
									5. Gas and groundwater monitoring well installed to 12.00m bgl upon completion.	



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA7
Contract Ref: 313582	Start: 30.08.17 End: 31.08.17	Ground Level: 99.96	National Grid Co-ordinate: E:474406.0 N:254054.8		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over brown silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse chalk, flint and quartzite. (AGRICULTURAL TOPSOIL) Light brown grey mottled cream/orange silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse chalk and quartzite. (OADBY MEMBER) ... becoming grey in colour from 2.00m bgl.	99.56	0.40	
0.50	2	D							
1.00	3	D							
1.20-1.65	1	SPT	N=11					(2.40)	
1.20	4	D							
1.50-2.00	5	B							
1.70	6	D							
2.00-2.45	2	SPT	N=13						
2.00	7	D							
2.50	10	U	50 blows						
2.50-3.00	8	B					97.16	2.80	
2.50	9	D				Firm becoming stiff dark grey blue silty CLAY. (WHITBY MUDSTONE FORMATION) ... very stiff from 5.00m bgl.			
2.95	11	D							
3.00-3.45	3	SPT	N=13						
3.00	12	D							
3.50-4.00	13	B							
3.50	14	D							
4.00-4.45	4	SPT	N=14						
4.00	15	D							
4.50-5.00	16	B							
4.50	17	D							
4.50	18	U	62 blows						
5.00-5.45	5	SPT	N=24						
5.00	19	D							
5.50-6.00	20	B							
5.50	21	D							
6.00-6.45	6	SPT	N=23						
6.00	22	D							
6.50-7.00	23	B							
6.50	24	D							
6.50	25	U	71 blows						
6.95	26	D							
7.00-7.45	7	SPT	N=29						
7.00	27	D							
7.50-8.00	28	B							
7.50	29	D							
8.00-8.45	8	SPT	N=28						
8.00	30	D							
8.50-9.00	31	B							
8.50	32	D							
8.50	33	U	78 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks												
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)													
30/08/17	15:00		None	N/R					1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 25.00m bgl. 4. Groundwater not encountered. 5. Gas and groundwater monitoring well												
30/08/17	17:30	7.00	3.00	151	Dry																
31/08/17	08:00	7.00	3.00	151	Dry																
31/08/17	15:00	25.15	3.00	151	Dry																
Method Used:		Cable Percussion		Plant Used:		Dando 3000		Drilled By:		Borehole		Logged By:		RSalama		Checked By:		DAB		AGS	
All dimensions in metres										Scale:		1:50									



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA7
Contract Ref: 313582	Start: 30.08.17 End: 31.08.17	Ground Level: 99.96	National Grid Co-ordinate: E:474406.0 N:254054.8		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 34	SPT D	N=30			Firm becoming stiff dark grey blue silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 2.80m from previous sheet) ... very stiff from 9.00m bgl.			
9.50-10.00 9.50	35 36	B D							
10.00-10.45 10.00	10 37	SPT D	N=32						
10.50 10.50	38 39	D U	82 blows						
10.95	40	D							
11.50-11.95 11.50	11 41	SPT D	N=36						
11.50-12.00	42	B							
12.50 12.50-13.00	43 44	D B							
13.00-13.45 13.00	12 45	SPT(c) D	N=43						
13.50 13.50-14.00	46 47	U B	101 blows						
13.95 14.00-14.45	48 13	D SPT	N=53			... band of extremely weak grey blue silty MUDSTONE from 13.00m to 13.30m bgl.			
14.00 14.50-15.00	49 50	D B							
15.00	51	D							
15.50-15.83 15.50	14 52	SPT D	N:51 for 228mm						
15.50-16.00 16.00	53 54	B D							
16.00 16.45	55 56	U D	110 blows						
16.50-17.00 17.00	57 58	B D							
17.50-17.95 17.50	15 59	SPT D	N=52						
17.50-18.00	60	B							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									installed to 20.00m bgl upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: RSalama			Checked By: AGS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA7
Contract Ref: 313582		Start: 30.08.17 End: 31.08.17	Ground Level: 99.96	National Grid Co-ordinate: E:474406.0 N:254054.8	Sheet: 3 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
18.50 18.50-19.00	61 62	D B				Firm becoming stiff dark grey blue silty CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 2.80m from previous sheet)			
19.00-19.31 19.00	16 63	SPT D	N:50 for 225mm						
19.50 19.50-20.00	64 65	U B	125 blows						
19.95	66	D							
20.50-20.79 20.50 20.50-21.00	17 67 68	SPT D B	N:50 for 205mm						
21.50 21.50-22.00	69 70	D B							
22.00-22.20 22.00	18 71	SPT D	N:50 for 150mm						
22.50 22.50 22.50-23.00 22.95	72 73 74 75	D U B D	130 blows						
23.50-23.69 23.50 23.50-24.00	19 76 77	SPT D B	N:50 for 130mm						
24.50 24.50-25.00	78 79	D B							
25.00-25.15 25.00	20 80	SPT D	N:50 for 110mm			Borehole terminated at 25.15m bgl.	74.81	25.15	



Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA8
Contract Ref: 313582	Start: 29.08.17 End: 30.08.17	Ground Level: 92.26	National Grid Co-ordinate: E:474814.9 N:254259.2		Sheet: 1 of 2

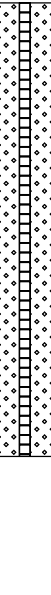




Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over brown slightly sandy silty slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL) Stiff light brown orange silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite and chalk. (OADBY MEMBER) ... brown from 0.70m bgl.	91.86	0.40	
0.50	2	D							
0.50		PID	0.0ppm						
1.00	3	D							
1.00		PID	0.0ppm						
1.20-1.65	1	SPT	N=29			... firm from 2.00m bgl. ... mottled grey from 2.50m bgl.		(2.90)	
1.20-2.00	4	B							
1.20	5	D							
2.00-2.45	2	SPT	N=12						
2.00-3.00	6	B							
2.00	7	D							
2.50	8	D							
2.50	9	U	100 blows						
3.00-3.45	3	SPT	N=23						
3.00-4.00	10	B					88.96	3.30	
3.00	11	D				Firm to stiff dark grey blue structured silty CLAY. (WHITBY MUDSTONE FORMATION) ... stiff from 5.00m bgl. ... shell fragments from 8.00m bgl.			
3.50	12	D							
4.00-4.45	4	SPT	N=21						
4.00-5.00	13	B							
4.00	14	D							
4.50	15	D							
4.50	16	U	100 blows						
4.95	17	D							
5.00-5.45	5	SPT	N=34						
5.00-6.00	18	B							
5.00	19	D							
5.50	20	D							
6.00-6.45	6	SPT	N=30						
6.00-6.50	21	B							
6.00	22	D							
6.50	23	D							
6.50	24	U	95 blows						
6.95	25	D							
7.00-7.45	7	SPT	N=34						
7.00-7.50	26	B							
7.00	27	D							
7.50	28	D						(9.15)	
8.00-8.45	8	SPT	N=49						
8.00-8.50	29	B							
8.00	30	D							
8.50	31	D							
8.50	32	U	100 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks		
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)			
29/08/17	15:30		None	N/R					1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 12.00m bgl. 4. Groundwater not encountered. 5. Gas and groundwater monitoring well		
29/08/17	17:30	4.00	3.00	151	Dry						
30/09/17	08:00	4.00	3.00	151	Dry						
30/09/17	14:30	12.45	3.00	151	Dry						
Method Used: Cable Percussion			Plant Used: Dando 3000			Drilled By: Borehole		Logged By: RSalama		Checked By: 	
All dimensions in metres									Scale: 1:50		



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA8
Contract Ref: 313582	Start: 29.08.17 End: 30.08.17	Ground Level: 92.26	National Grid Co-ordinate: E:474814.9 N:254259.2		Sheet: 2 of 2

Depth (m)	Samples & Testing			Backfill & Instru- mentation	Water	Description of Strata	Reduced Level	Depth (Thick- ness)	Material Graphic Legend	
	No	Type	Results							
8.95	33	D	N=46			Firm to stiff dark grey blue structured silty CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 3.30m from previous sheet)</i>				
9.00-9.45	9	SPT								
9.00-9.50	34	B								
9.00	35	D								
9.50	36	D	100 blows							
10.00-10.45	10	SPT								
10.00-10.50	37	B								
10.00	38	D								
10.50	39	U								
10.50	40	D								
10.95	41	D	N=49							
11.00-11.50	42	B								
11.50-11.95	11	SPT	N=32							
11.50	43	D								
12.00-12.45	12	SPT								
12.00	44	D								
Borehole terminated at 12.45m bgl.							79.81	12.45		

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									installed to 12.00m bgl upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
						Drilled By: Borehole Solutions Ltd			Scale: 1:50
						Logged By: RSalama			Checked By: AGS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA9
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 85.49	National Grid Co-ordinate: E:474439.0 N:255569.7		Sheet: 1 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.25	1	D				Dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	85.19	0.30	
0.30	2	B							
0.50	3	D							
0.90	4	D				Firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, rare flint and chalk. (OADBY MEMBER) ... more gravelly from 1.80m to 2.10m bgl.		(1.80)	
1.20-1.65	1	SPT	N=14						
1.20	5	D							
1.50	6	U							
1.50	7	B							
2.00-2.45	2	SPT	N=15			Medium dense light orange brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, quartzite and chalk. (GLACIOFLUVIAL DEPOSITS)	83.39	2.10	
2.00	8	D							
2.50	9	B						(1.40)	
3.00-3.45	3	SPT	N=16			Medium dense light orange brown slightly clayey SAND AND GRAVELS. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite, flint, ironstone and chalk fragments. (GLACIOFLUVIAL DEPOSITS)	81.99	3.50	
3.00	10	D							
3.50	11	B							
4.00-4.45	4	SPT	N=19			Medium dense to dense light orange brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (GLACIOFLUVIAL DEPOSITS)	80.39	5.10	
4.00	12	D						(1.60)	
4.50	13	B							
5.00-5.45	5	SPT	N=29			Medium dense to dense light orange brown slightly clayey gravelly SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (GLACIOFLUVIAL DEPOSITS)			
5.00	14	D							
5.50	15	B							
6.00-6.45	6	SPT	N=29						
6.00	16	D							
6.50	17	B							
7.00-7.45	7	SPT	N=24						
7.00	18	D							
7.50	19	B							
8.00-8.45	8	SPT	N=27						
8.00	20	D						(6.70)	
8.50	21	B							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
01/09/17	08:00	0.00	None	N/R	Dry	11.80	12.00	01:00	
01/09/17	14:30	2.45	12.00	151	Dry				1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 12.25m bgl. 4. Groundwater encountered at 7.80m bgl and rose to 7.40m bgl after 20 minutes.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
						Checked By: MS			AGS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA9
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 85.49	National Grid Co-ordinate: E:474439.0 N:255569.7		Sheet: 2 of 2



















Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 22	SPT D	N=30			Medium dense to dense light orange brown slightly clayey gravely SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite, flint and chalk. (GLACIOFLUVIAL DEPOSITS) (stratum copied from 5.10m from previous sheet)			
9.50	23	B							
10.00-10.45 10.00	10 24	SPT D	N=31						
10.50	25	B							
11.00-11.45 11.00	11 26	SPT D	N=28						
11.50	27	B							
11.80-11.91	12	SPT	N:50 for 35mm						
							73.69	11.80	
							73.24	12.25	
						Weak dark grey thinly laminated MUDSTONE recovered as gravel sized fragments. (WHITBY MUDSTONE FORMATION) Borehole terminated at 12.25m bgl.			



Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 12.00m bgl upon completion. 6. SPT at 7.00m bgl possibly affected by water and drilling disturbances.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: MS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA10
Contract Ref: 313582	Start: 08.09.17 End: 11.09.17	Ground Level: 93.38	National Grid Co-ordinate: E:474561.3 N:255417.3		Sheet: 1 of 3




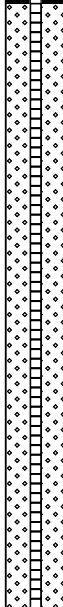




Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
						Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	93.08	0.30	
0.50	1	D	0.0ppm			Soft occasional firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and chalk fragments. (OADBY MEMBER)		(3.20)	
0.50	2	ES							
0.50-1.00	3	B							
0.50		PID	0.0ppm						
1.00	4	D							
1.00-2.00	5	B							
1.00	6	ES	N=6						
1.00		PID							
1.20-1.65	1	SPT							
1.20	7	D	N=7						
1.70	8	D							
2.00-2.45	2	SPT							
2.00-2.50	10	B	N=5						
2.00	9	D							
2.50	11	D							
2.50-3.50	12	B	N=5						
3.00-3.45	3	SPT							
3.00	13	D							
3.50	14	D	N=10			Firm dark grey brown silty CLAY. (OADBY MEMBER)	89.88	3.50	
3.50-4.50	15	B							
4.00-4.45	4	SPT							
4.00	16	D	N=11			... structured from 5.00m bgl.			
4.50	17	D							
4.50-5.50	18	B							
5.00-5.45	5	SPT	37 blows 0% recovery						
5.00	19	D							
5.50	20	D							
5.50	21	U	N=14						
5.50-5.95	6	B							
6.00-6.45	23	SPT							
6.00	24	D	N=18			... stiff from 7.00m bgl.		(8.00)	
6.00-7.00	24	B							
6.50	25	D							
7.00-7.45	7	SPT	67 blows 0% recovery N=21						
7.00	26	D							
7.00-7.50	27	B							
7.50	28	D							
7.50-7.95	29	B							
7.50	30	U							
8.00-8.45	8	SPT							
8.00	32	D							
8.00-9.00	33	B							
8.50		D							


Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
08/09/17	10:00	0.00	None	N/R	Dry				1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 20.45m bgl. 4. Groundwater encountered at 14.00m bgl and rose to 12.00m bgl after 20 minutes.			
08/09/17	17:00	14.00	13.50	151	14.00							
08/09/17	18:00	15.00	15.00	151	12.00							
11/09/17	08:00	15.00	15.00	151	12.00							
11/09/17	17:00	20.45	20.00	151	12.00							
Method Used: Cable Percussion				Plant Used: Dando 3000			Drilled By: Borehole		Logged By: MSouthworth		Checked By: 	



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA10
Contract Ref: 313582	Start: 08.09.17 End: 11.09.17	Ground Level: 93.38	National Grid Co-ordinate: E:474561.3 N:255417.3		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thick- ness)	Material Graphic Legend				
	No	Type	Results										
9.00-9.45	9	SPT	N=23			Firm dark grey brown silty CLAY. (OADBY MEMBER) <i>(stratum copied from 3.50m from previous sheet)</i>							
9.00	34	D											
9.00-10.00	35	B											
9.50	36	D											
9.50	37	U	82 blows										
10.00-10.45	10	SPT	N=23										
10.00	38	D											
10.50	39	D											
11.00	40	D											
11.50-12.00	41	B											
12.00-12.45	11	SPT	N=21			Medium dense orange brown slightly gravelly slightly clayey SAND. Gravel is angular to subrounded fine to medium quartzite and flint. (GLACIOFLUVIAL DEPOSITS)							
12.00	42	D											
12.00-13.00	43	B											
13.00	44	D											
13.00-14.00	45	B											
13.50-13.95	12	SPT	N=29										
13.50	46	D											
14.00-15.00	47	B											
14.50	48	D											
15.00-15.45	13	SPT	N=34										
15.00	49	D											
15.00-16.00	50	B											
16.00	51	D											
16.00-17.00	52	B											
16.50-16.95	14	SPT	N=32										
16.50	53	D											
17.00-18.00	54	B											
17.50	55	D											

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 16.00m bgl upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
						Checked By: MS			



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA10
Contract Ref: 313582	Start: 08.09.17 End: 11.09.17	Ground Level: 93.38	National Grid Co-ordinate: E:474561.3 N:255417.3		Sheet: 3 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thick ness)	Material Graphic Legend
	No	Type	Results						
18.00-18.45 18.00 18.00-19.00	15 56 57	SPT D B	N=37			Medium dense orange brown slightly gravelly slightly clayey SAND. Gravel is angular to subrounded fine to medium quartzite and flint. (GLACIOFLUVIAL DEPOSITS) (stratum copied from 11.50m from previous sheet)			
19.00 19.00-20.00	58 59	D B							
19.50-19.95 19.50	16 60	SPT D	N=44						
20.00	61	D							
							72.93	20.45	
						Borehole terminated at 20.45m bgl.			

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA11
Contract Ref: 313582	Start: 11.09.17 End: 11.09.17	Ground Level: 86.77	National Grid Co-ordinate: E:474991.6 N:254913.2		Sheet: 1 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	86.47	0.30	
0.50	2	D							
0.50	3	ES				Soft to firm orange brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse quartzite, chalk and flint. (OADB MEMBER)			
0.50		PID	0.0ppm						
1.00	4	D							
1.00	5	ES							
1.00		PID	0.0ppm						
1.20-1.65	1	SPT	N=9					(2.70)	
1.20-1.70	6	B							
1.20	7	D							
2.00-2.45	2	SPT	N=8						
2.00-2.50	8	B							
2.00	9	D				Dense orange brown slightly gravelly silty clayey SAND. Gravel is angular to subrounded fine to medium quartzite and flint. (GLACIOFLUVIAL DEPOSITS)			
2.50-3.00	10	B							
2.50-2.95	11	U	50 blows				83.77	3.00	
	12		0% recovery						
2.50	3	D							
3.00-3.45	13	SPT	N=50					(1.30)	
3.00	14	D							
3.00-4.00	15	B							
3.50		D							
4.00-4.45	4	SPT	N=19			Firm to stiff dark blue grey silty structured CLAY. (WHITBY MUDSTONE FORMATION)	82.47	4.30	
4.00-4.50	16	B							
4.00	17	D							
4.50	18	D							
4.50-4.95	19	U	100 blows						
5.00-5.45	5	SPT	N=27						
5.00	20	D							
5.00-5.50	21	B							
5.50	22	D							
6.00-6.45	6	SPT	N=24						
6.00	23	D				... mudstone lithorelicts from 5.00m bgl.			
6.50-6.95	24	U	100 blows						
7.00-7.45	7	SPT	N=25						
7.00	26	D							
7.00-7.50	27	B							
7.50	28	D							
8.00-8.45	8	SPT	N=29						
8.00	29	D						(8.15)	
8.50	30	D							
8.50-8.95	31	U	100 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
11/09/17	08:00	0.00	None	N/R	Dry				1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 12.45m bgl. 4. Groundwater encountered at 4.00m bgl and rose to 3.90m bgl after 20 minutes.
11/09/17	11:00	4.00	3.00	151	4.00				
11/09/17	17:30	12.45	4.50	151	Dry				
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
Checked By: AGS						Checked By: AGS			



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA11
Contract Ref: 313582	Start: 11.09.17 End: 11.09.17	Ground Level: 86.77	National Grid Co-ordinate: E:474991.6 N:254913.2		Sheet: 2 of 2

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45	9	SPT	N=29			Firm to stiff dark blue grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 4.30m from previous sheet)</i> ... stiff to very stiff from 9.00m bgl.			
9.00	32	D							
9.00-9.50	33	B							
9.50	34	D							
10.00-10.45	10	SPT	N=37						
10.00	35	D							
10.50	36	D							
10.50-10.95	37	U	100 blows						
11.00	38	D							
11.00-11.50	39	B							
11.50-11.88	11	SPT	N:50 for 230mm			Borehole terminated at 12.45mbgl.	74.32	12.45	
11.50	40	D							
12.00-12.37	12	SPT	N:50 for 220mm						
12.00	41	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks	
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)		
									5. Gas and groundwater monitoring well installed to 4.00m bgl upon completion. 6. The low SPT N value at 4.00m bgl may possibly be due to the groundwater strike at this depth.	
Method Used: Cable Percussion				Plant Used: Dando 3000			Drilled By: Borehole Solutions Ltd		Logged By: MSouthworth	
									Checked By: [Signature] [AGS]	

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA12
Contract Ref: 313582	Start: 08.09.17 End: 08.09.17	Ground Level: 96.14	National Grid Co-ordinate: E:474262.8 N:254565.8		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Grass over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	95.84	0.30	
0.50	2	ES							
0.50	3	D							
0.50		PID	0.0ppm						
1.00	4	ES							
1.00	5	D							
1.00		PID	0.0ppm						
1.20-1.65	1	SPT	N=7						
1.20-1.70	6	B							
1.20	7	D							
2.00-2.45	2	SPT	N=9						
2.00	8	D							
2.50-2.95	10	U	45 blows						
2.50	9	D				... dark orange brown from 2.50m bgl.		(4.50)	
3.00-3.45	3	SPT	N=6						
3.00-3.50	11	B							
3.00	12	D							
3.50	13	D							
4.00-4.45	4	SPT	N=7						
4.00	14	D							
4.50	15	D							
4.50-4.95	16	U	55 blows 0% recovery				91.34	4.80	
5.00-5.45	5	SPT	N=12			Firm grey brown silty CLAY. (OADBY MEMBER) ... pockets of grey silt from 5.00m bgl.			
5.00-5.50	17	B							
5.00	18	D							
5.50	19	D				... becoming slightly structured from 5.50m bgl.			
6.00-6.45	6	SPT	N=14						
6.00	20	D						(3.10)	
6.50-6.95	21	U	50 blows						
7.00-7.45	7	SPT	N=15						
7.00	22	D							
7.50	23	D							
7.90-8.60	24	B					88.24	7.90	
8.00-8.45	8	SPT	N=10			Loose to medium dense orange brown slightly clayey gravelly SAND. Gravel is angular to subrounded fine to coarse quartzite and flint. (GLACIOFLUVIAL DEPOSITS)		(0.70)	
8.00	25	D							
8.50	26	D					87.54	8.60	
8.50	27	U	100 blows			Description on next sheet			

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
08/09/17	08:00		None	N/R					1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 22.00m bgl. 4. Groundwater encountered at 7.90m bgl and rose to 7.60m bgl after 20 minutes.
08/09/17	11:00	7.90	7.50	151	7.90				
08/09/17	18:30	22.30	13.00	151	Dry				
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
						Checked By: MS			AGS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA12
Contract Ref: 313582	Start: 08.09.17 End: 08.09.17	Ground Level: 96.14	National Grid Co-ordinate: E:474262.8 N:254565.8		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 28	SPT D	N=21			Stiff dark blue grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 8.60m from previous sheet)			
9.50	29	D							
10.00-10.45 10.00-10.50 10.00 10.50 10.50-10.95	10 30 31 32 33	SPT B D D U	N=34 100 blows			... very stiff with frequent mudstone lithorelicts from 10.00m bgl.			
11.00	34	D							
11.50-11.95 11.50	11 35	SPT D	N=44						
12.50 12.50-12.95	36 37	D U	100 blows						
13.00-13.45 13.00-13.50 13.00 13.50	12 38 39 40	SPT B D D	N=42						
14.50-14.95 14.50	13 41	SPT D	N=44						
15.00 15.00-15.95	42 43	D U	100 blows						
15.50	44	D						(13.70)	
16.00-16.45 16.00-16.50 16.00	14 45 46	SPT B D	N=48						
17.00 17.00-17.95	47 48	D U	100 blows						
17.50-17.95 17.50	15 49	SPT D	N=46			... large mudstone lithorelicts from 17.00m bgl.			



Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Gas and groundwater monitoring well installed to 9.00m bgl upon completion. 6. Low SPT N values at 8.00m bgl may be possibly affected by groundwater.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: MS



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA12
Contract Ref: 313582	Start: 08.09.17 End: 08.09.17	Ground Level: 96.14	National Grid Co-ordinate: E:474262.8 N:254565.8		Sheet: 3 of 3

Depth (m)	Samples & Testing			Backfill & Instrumentation	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
18.00	50	D				Stiff dark blue grey silty structured CLAY. (WHITBY MUDSTONE FORMATION) (stratum copied from 8.60m from previous sheet)			
19.00-19.45	16	SPT	N:50 for 295mm						
19.00-19.50	51	B							
19.50	52	D							
19.50-19.95	53	U	100 blows						
20.00	54	D							
20.50-20.88	17	SPT	N:47 for 230mm						
20.50	55	D							
21.50-22.00	56	B							
21.50	57	D							
22.00-22.30	18	SPT	N:50 for 275mm				73.84	22.30	
22.00	58	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks			
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)				
Method Used: Cable Percussion				Plant Used: Dando 3000			Drilled By: Borehole Solutions Ltd		Logged By: MSouthworth		Checked By: 	



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA13
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 99.94	National Grid Co-ordinate: E:474444.2 N:254065.1		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50-1.00	1	B				Light brown orange silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite, chalk and flint. (AGRICULTURAL TOPSOIL) Firm grey mottled orange brown silty very sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse quartzite and chalk. (OADBY MEMBER) ... becoming less mottled orange from 1.70m bgl.	99.79	0.15	
0.50	2	D							
1.00	3	D							
1.20-1.65	1	SPT	N=9					(2.25)	
1.20	4	D							
1.50-2.00	5	B							
1.70	6	D							
2.00-2.45	2	SPT	N=9						
2.00	7	D					97.54	2.40	
2.50	10	D				Firm to stiff dark blue grey silty CLAY. (WHITBY MUDSTONE FORMATION) ... stiff and structured from 5.10m bgl. ... mudstone lithorelicts from 5.50m bgl.			
2.50-3.00	8	B							
2.50	9	U	37 blows						
3.00-3.45	3	SPT	N=16						
3.00	11	D							
3.50-4.00	12	B							
3.50	13	D							
4.00-4.45	4	SPT	N=15						
4.00	14	D							
4.50-5.00	15	B							
4.50	16	D							
4.50	17	U	41 blows						
5.00-5.45	5	SPT	N=17						
5.00	18	D							
5.50-6.00	19	B							
5.50	20	D							
6.00-6.45	6	SPT	N=17						
6.00	21	D							
6.50-7.00	22	B							
6.50	23	D							
6.50	24	U	57 blows						
6.95	25	D							
7.00-7.45	7	SPT	N=21						
7.00	26	D							
7.50-8.00	27	B							
7.50	28	D							
8.00-8.45	8	SPT	N=21						
8.00	29	D							
8.50-9.00	30	B							
8.50	31	D							
8.50	32	U	64 blows						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
01/09/17	07:30	0.00	None	N/R					
01/09/17	18:30	20.45	20.00	151	Dry				1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 20.45m bgl. 4. Groundwater not encountered. 5. Borehole backfilled with arisings upon
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
Checked By: MS						Checked By: AGS			




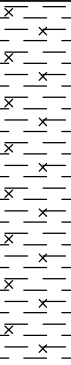


BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA13
Contract Ref: 313582	Start: 01.09.17 End: 01.09.17	Ground Level: 99.94	National Grid Co-ordinate: E:474444.2 N:254065.1		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thick ness)	Material Graphic Legend																																								
	No	Type	Results																																														
8.95	33	D	N=30			Firm to stiff dark blue grey silty CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 2.40m from previous sheet)</i> ... very stiff from 9.00m bgl.		(18.05)																																									
9.00-9.45	9	SPT																																															
9.00	34	D																																															
9.50-10.00	35	B																																															
9.50	36	D																																															
10.00-10.45	10	SPT	N=31								... shelly fragments from 10.60m bgl.		(18.05)																																				
10.00	37	D																																															
10.50-11.00	38	B																																															
10.50	39	U																																															
10.50	40	D																																															
10.95	41	D	74 blows													... shelly fragments from 10.60m bgl.		(18.05)																															
11.50-11.95	11	SPT																		N=38					(18.05)																								
11.50	42	D																																															
12.00	43	D																																															
12.50	44	U																																															
12.95	45	D																																															
13.00-13.45	12	SPT	N=37																									(18.05)																					
13.00	46	D																																															
13.50-14.00	47	B																																															
14.00	48	D																																															
14.50-14.95	13	SPT																												N=43					(18.05)														
14.50	49	D																																															
15.00	50	U	112 blows																																					(18.05)									
15.00	51	D																																															
16.00-16.45	14	SPT																																								N=45					(18.05)		
16.00	52	D																																															
16.50-17.00	53	B																																															
17.00	54	D																																															
17.50-17.95	15	SPT	N=48																																														
17.50	55	D																																															

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
Checked By: MS						Checked By: MS			



Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thick ness)	Material Graphic Legend
	No	Type	Results						
18.00	56	U	115 blows			Firm to stiff dark blue grey silty CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 2.40m from previous sheet)</i>			
18.50	57	D							
19.00-19.33	16	SPT	N:50 for						
19.00	58	D	220mm						
19.50	59	D							
19.50-20.00	60	B							
20.00-20.31	17	SPT	N:50 for			Borehole terminated at 20.45m bgl.	79.49	20.45	
20.00	58	D	200mm						

RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk 13/11/17 16:14 MS8



BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA14
Contract Ref: 313582	Start: 05.09.17 End: 06.09.17	Ground Level: 91.85	National Grid Co-ordinate: E:474201.8 N:254899.5		Sheet: 1 of 3

Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
0.50	1	D				Crop over dark brown slightly gravelly sandy CLAY with frequent roots and rootlets. Gravel is angular to subrounded fine to coarse quartzite. (AGRICULTURAL TOPSOIL)	91.35	(0.50)	
0.50	2	ES							
0.50-1.00	3	B							
0.50		PID	0.0ppm						
1.00	4	D							
1.00	5	ES							
1.00		PID	0.0ppm						
1.20-1.65	1	SPT	N=7						
1.20	6	D							
1.20-1.70	7	B							
2.00-2.45	2	SPT	N=7			... becoming structured from 2.00m bgl.			
2.00	8	D							
2.00-2.50	9	B							
2.50	10	D				... mottled grey from 2.50m bgl.		(4.00)	
2.50-2.95	11	U	65 blows						
2.95	12	D							
3.00-3.45	3	SPT	N=10			... Firm from 3.00m bgl.			
3.00	13	D							
3.50	14	D							
4.00-4.45	4	SPT	N=11						
4.00-4.50	15	B							
4.00	16	D					87.35	4.50	
4.50-4.95	17	U	80 blows			Stiff dark brown grey slightly silty structured CLAY. (WHITBY MUDSTONE FORMATION)			
4.50	18	D							
4.95	19	D				... mudstone lithorelicts from 4.95m bgl.			
5.00-5.45	5	SPT	N=22						
5.00-5.50	20	B							
5.00	21	D							
5.50	22	D							
6.00-6.45	6	SPT	N=24						
6.00	23	D							
6.50-6.95	24	U	85 blows						
6.50	56	D							
6.95	25	D				... an increase in mudstone lithorelicts from 6.95m bgl.			
7.00-7.45	7	SPT	N=25						
7.00	26	D							
7.50	27	D							
8.00-8.45	8	SPT	N=24						
8.00-8.50	28	B							
8.00	29	D							
8.50-8.95	30	U	100 blows						
8.50	31	D							

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
05/09/17	08:00	0.00	None	N/R		18.40	18.50	01:00	1. Location scanned with GPR prior to breaking ground. No services encountered. 2. Hand dug inspection service clearance pit dug to 1.20m bgl. 3. Borehole advanced to 18.50m bgl. 4. Groundwater seepage encountered at 4.40m bgl and rose to 3.00m bgl after 20 minutes
05/09/17	10:00	5.00	3.00	151	4.40				
05/09/17	17:30	12.00	12.00	151					
06/09/17	08:00	12.00	12.00	151					
06/09/17	14:30	18.50	18.00	151					
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Scale: 1:50
						Checked By: MS			AGS




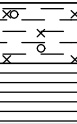

BOREHOLE LOG

Contract: M1 Junction 15 Main Site			Client: Roxhill		Borehole: BHA14
Contract Ref: 313582	Start: 05.09.17 End: 06.09.17	Ground Level: 91.85	National Grid Co-ordinate: E:474201.8 N:254899.5		Sheet: 2 of 3

Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
	No	Type	Results						
9.00-9.45 9.00	9 32	SPT D	N=26			Stiff dark brown grey slightly silty structured CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 4.50m from previous sheet)</i> ... pockets of light yellow grey silt from 9.00m bgl.			
9.50	33	D							
10.00-10.45 10.00	10 34	SPT D	N=26						
10.50-10.95 10.50	35 36	U D	100 blows						
11.00-11.50 11.00	37 38	B D							
11.50-11.95 11.50	11 39	SPT D	N=33						
12.50 12.50-12.95	40 41	D U	100 blows						
13.00-13.45 13.00	12 42	SPT D	N=34						
14.00 14.00-14.45	43 44	D U	100 blows						
14.50-14.95 14.50-15.00	13 45	SPT B	N=37						
14.50 15.00	46 47	D D							
16.00-16.28 16.00	14 48	SPT D	N:50 for 125mm						
16.50-16.95 16.50	49 50	U D	100 blows						
17.00-17.50 17.00	51 52	B D							
17.50-17.62 17.50	15 57	SPT D	N:50 for 70mm						

Boring Progress and Water Observations						Chiselling / Slow Progress			General Remarks
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth	From	To	Duration (hh:mm)	
									5. Borehole backfilled with arisings upon completion.
Method Used: Cable Percussion						Plant Used: Dando 3000			All dimensions in metres Scale: 1:50
Drilled By: Borehole Solutions Ltd						Logged By: MSouthworth			Checked By: MS



Depth (m)	Samples & Testing			Backfill	Water	Description of Strata	Reduced Level	Depth (Thick ness)	Material Graphic Legend
	No	Type	Results						
18.00	53	D	N:50 for 180mm			Stiff dark brown grey slightly silty structured CLAY. (WHITBY MUDSTONE FORMATION) <i>(stratum copied from 4.50m from previous sheet)</i>	73.45	18.40	
18.40-18.73	16	SPT							
18.40	54	D							
18.50-18.53	17	SPT(c)							
18.50	55	D	N:50 for 10mm			Weak grey laminated MUDSTONE recovered as gravel. (WHITBY MUDSTONE FORMATION)	73.04	18.81	
						Borehole terminated at 18.81m bgl.			

RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk 13/11/17 16:14 MS8

APPENDIX F


GROUND GAS MONITORING DATA

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	-	Fluctuating	1012	1012	GA5000 + Dipmeter + Weather: Cloudy + Ground: Damp + Wind: Light + Air Temp: 14DegC
Round 2	-	Fluctuating	1012	1014	GA5000 + Dipmeter + Weather: Cloudy + Ground: Dry + Wind: Medium + Air Temp: 10DegC
Round 3	-	Falling	1010	1011	Weather: Clear + Ground: Wet + Wind: Light + Air Temp: 10DegC
Round 4	-	Fluctuating	1009	1009	GA5000 + Dipmeter

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA1	1	50	1	20.00	---	16.00 to 20.00	22/09/2017	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA1	1	50	1		---	16.00 to 20.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA1	1	50	1 (2)	20.00	---	16.00 to 20.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	15 secs	-	-	-	-	0.1	0.0	20.9	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	90 secs	-	-	-	-	0.1	0.0	20.9	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	120 secs	-	-	-	-	0.1	0.0	20.9	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	180 secs	-	-	-	-	0.1	0.0	21.0	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	240 secs	-	-	-	-	0.1	0.0	21.0	0.0	1	0
BHA1	1	50	1 (2)		---	16.00 to 20.00	300 secs	-	-	-	-	0.1	0.0	21.0	0.0	1	0
BHA1	1	50	1 (3)	20.00	19.44	16.00 to 20.00	22/09/2017 00:07:00	-	-	-	17.75	-	-	-	-	-	-
BHA1	1	50	2	20.00	---	16.00 to 20.00	06/10/2017 10:45:00	1014	1014	-0.4 _(I)	-	-	-	-	-	-	-
BHA1	1	50	2		---	16.00 to 20.00	30 secs	-	-	-0.4 _(SS)	-	-	-	-	-	-	-
BHA1	1	50	2 (2)	20.00	---	16.00 to 20.00	06/10/2017 10:46:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	15 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 1 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA1	1	50	2 (2)		---	16.00 to 20.00	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (2)		---	16.00 to 20.00	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	2 (3)	20.00	19.43	16.00 to 20.00	06/10/2017 10:52:00	-	-	-	17.78	-	-	-	-	-	-
BHA1	1	50	3	20.00	---	16.00 to 20.00	12/10/2017 13:20:00	1011	1011	-0.1 _(I)	-	-	-	-	-	-	-
BHA1	1	50	3		---	16.00 to 20.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
BHA1	1	50	3 (2)	20.00	---	16.00 to 20.00	12/10/2017 13:21:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	15 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (2)		---	16.00 to 20.00	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA1	1	50	3 (3)	20.00	19.44	16.00 to 20.00	12/10/2017 13:27:00	-	-	-	17.79	-	-	-	-	-	-
BHA1	1	50	4	20.00	---	16.00 to 20.00	23/10/2017 14:30:00	1008	1008	-0.1 _(I)	-	-	-	-	-	-	-
BHA1	1	50	4		---	16.00 to 20.00	15 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA1	1	50	4 (2)	20.00	---	16.00 to 20.00	23/10/2017 14:30:30	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	15 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	30 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	60 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	90 secs	-	-	-	-	0.1	0.0	20.9	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 2 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA1	1	50	4 (2)		---	16.00 to 20.00	120 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	180 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	240 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (2)		---	16.00 to 20.00	300 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA1	1	50	4 (3)	20.00	19.45	16.00 to 20.00	23/10/2017 14:36:30	-	-	-	17.75	-	-	-	-	-	-
BHA2	1	50	1	13.00	---	8.00 to 13.00	22/09/2017	1012	1012	0.1 _(I)	-	-	-	-	-	-	-
BHA2	1	50	1		---	8.00 to 13.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA2	1	50	1 (2)	13.00	---	8.00 to 13.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	1.4	0.0	19.8	0.0	10	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	1.8	0.0	18.5	0.0	3	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	1.9	0.0	18.4	0.0	2	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	1.9	0.0	18.4	0.0	2	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	1.9	0.0	18.4	0.0	3	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	1.9	0.0	18.4	0.0	3	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	1.9	0.0	18.5	0.0	2	0
BHA2	1	50	1 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	1.9	0.0	18.5	0.0	2	0
BHA2	1	50	1 (3)	13.00	13.50	8.00 to 13.00	22/09/2017 00:07:00	-	-	-	8.54	-	-	-	-	-	-
BHA2	1	50	2	13.00	---	8.00 to 13.00	04/10/2017 12:03:00	1010	1010	-0.1 _(I)	-	-	-	-	-	-	-
BHA2	1	50	2		---	8.00 to 13.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
BHA2	1	50	2 (2)	13.00	---	8.00 to 13.00	04/10/2017 12:04:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	1.8	0.0	18.2	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	1.8	0.0	17.1	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	1.8	0.0	17.0	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	1.8	0.0	16.9	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 3 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA2	1	50	2 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	1.8	0.0	16.9	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	1.9	0.0	16.8	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	2.0	0.0	16.6	0.0	1	0
BHA2	1	50	2 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	2.1	0.0	16.4	0.0	1	0
BHA2	1	50	2 (3)	13.00	13.48	8.00 to 13.00	04/10/2017 12:10:00	-	-	-	10.39	-	-	-	-	-	-
BHA2	1	50	3	13.00	---	8.00 to 13.00	12/10/2017 11:45:00	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
BHA2	1	50	3		---	8.00 to 13.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA2	1	50	3 (2)	13.00	---	8.00 to 13.00	12/10/2017 11:46:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	2.9	0.0	17.7	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	2.6	0.0	15.3	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	2.3	0.0	15.1	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	1.9	0.0	15.1	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	1.6	0.0	15.1	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	1.3	0.0	15.1	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	1.1	0.0	15.0	0.0	0	0
BHA2	1	50	3 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	1.0	0.0	15.1	0.0	0	0
BHA2	1	50	3 (3)	13.00	13.50	8.00 to 13.00	12/10/2017 11:52:00	-	-	-	10.38	-	-	-	-	-	-
BHA2	1	50	4	13.00	---	8.00 to 13.00	23/10/2017 13:48:00	1009	1009	0.3 _(I)	-	-	-	-	-	-	-
BHA2	1	50	4		---	8.00 to 13.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA2	1	50	4 (2)	13.00	---	8.00 to 13.00	23/10/2017 13:48:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	3.6	0.0	18.4	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	3.5	0.0	14.2	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	3.4	0.0	14.2	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	3.4	0.0	14.3	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	3.4	0.0	14.4	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 4 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA2	1	50	4 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	3.4	0.0	14.4	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	3.5	0.0	14.2	-	0	0
BHA2	1	50	4 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	3.5	0.0	14.2	-	0	0
BHA2	1	50	4 (3)	13.00	13.50	8.00 to 13.00	23/10/2017 13:54:40	-	-	-	10.36	-	-	-	-	-	-
BHA3	1	50	1	16.00	---	11.00 to 16.00	22/09/2017	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
BHA3	1	50	1 (2)	16.00	---	11.00 to 16.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	15 secs	-	-	-	-	0.2	0.0	19.6	0.0	3	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	30 secs	-	-	-	-	0.2	0.0	19.1	0.0	2	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	60 secs	-	-	-	-	0.1	0.0	19.7	0.0	1	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	90 secs	-	-	-	-	0.1	0.0	20.0	0.0	1	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.2	0.0	1	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	20.3	0.0	1	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	20.4	0.0	1	0
BHA3	1	50	1 (2)		---	11.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	20.5	0.0	1	0
BHA3	1	50	1 (3)	16.00	12.62	11.00 to 16.00	22/09/2017 00:07:00	-	-	-	9.01	-	-	-	-	-	-
BHA3	1	50	1	16.00	---	11.00 to 16.00	24/09/2017 00:00:30	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA3	1	50	2	16.00	---	11.00 to 16.00	04/10/2017 10:53:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
BHA3	1	50	2		---	11.00 to 16.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA3	1	50	2 (2)	16.00	---	11.00 to 16.00	04/10/2017 10:54:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	15 secs	-	-	-	-	0.2	0.0	20.9	0.0	1	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	30 secs	-	-	-	-	0.2	0.0	20.6	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	60 secs	-	-	-	-	0.2	0.0	20.6	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	90 secs	-	-	-	-	0.2	0.0	20.6	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	120 secs	-	-	-	-	0.2	0.0	20.6	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 5 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA3	1	50	2 (2)		---	11.00 to 16.00	180 secs	-	-	-	-	0.2	0.0	20.6	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	240 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
BHA3	1	50	2 (2)		---	11.00 to 16.00	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
BHA3	1	50	2 (3)	16.00	14.03	11.00 to 16.00	04/10/2017 11:00:00	-	-	-	10.05	-	-	-	-	-	-
BHA3	1	50	3	16.00	---	11.00 to 16.00	12/10/2017 11:10:00	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
BHA3	1	50	3		---	11.00 to 16.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA3	1	50	3 (2)	16.00	---	11.00 to 16.00	12/10/2017 11:11:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	15 secs	-	-	-	-	0.2	0.0	20.5	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	30 secs	-	-	-	-	0.2	0.0	20.4	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	60 secs	-	-	-	-	0.1	0.0	20.6	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	90 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA3	1	50	3 (2)		---	11.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA3	1	50	3 (3)	16.00	14.03	11.00 to 16.00	12/10/2017 11:17:00	-	-	-	9.92	-	-	-	-	-	-
BHA3	1	50	4	16.00	---	11.00 to 16.00	23/10/2017 14:15:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
BHA3	1	50	4		---	11.00 to 16.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA3	1	50	4 (2)	16.00	---	11.00 to 16.00	23/10/2017 14:15:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	15 secs	-	-	-	-	0.3	0.0	20.7	-	1	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	30 secs	-	-	-	-	0.4	0.0	20.3	-	1	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	60 secs	-	-	-	-	0.3	0.0	20.0	-	0	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	90 secs	-	-	-	-	0.2	0.0	20.3	-	0	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.6	-	0	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	20.7	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 6 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA3	1	50	4 (2)		---	11.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	20.8	-	0	0
BHA3	1	50	4 (2)		---	11.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA3	1	50	4 (3)	16.00	14.00	11.00 to 16.00	23/10/2017 14:21:40	-	-	-	8.55	-	-	-	-	-	-
BHA4	1	50	1	7.00	---	2.00 to 7.00	22/09/2017	1012	1012	0.0 _(l)	-	-	-	-	-	-	-
BHA4	1	50	1 (2)	7.00	---	2.00 to 7.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	15 secs	-	-	-	-	1.1	0.0	20.2	0.0	2	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	30 secs	-	-	-	-	1.2	0.0	19.5	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	60 secs	-	-	-	-	1.3	0.0	19.4	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	90 secs	-	-	-	-	1.4	0.0	19.2	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	120 secs	-	-	-	-	1.7	0.0	18.9	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	180 secs	-	-	-	-	2.0	0.0	18.6	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	240 secs	-	-	-	-	2.1	0.0	18.4	0.0	1	0
BHA4	1	50	1 (2)		---	2.00 to 7.00	300 secs	-	-	-	-	2.1	0.0	18.4	0.0	1	0
BHA4	1	50	1 (3)	7.00	6.34	2.00 to 7.00	22/09/2017 00:07:00	-	-	-	2.30	-	-	-	-	-	-
BHA4	1	50	1	7.00	---	2.00 to 7.00	25/09/2017 00:00:30	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA4	1	50	2	7.00	---	2.00 to 7.00	04/10/2017	1011	1011	0.1 _(l)	-	-	-	-	-	-	-
BHA4	1	50	2		---	2.00 to 7.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA4	1	50	2 (2)	7.00	---	2.00 to 7.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	15 secs	-	-	-	-	1.8	0.0	19.8	0.0	1	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	30 secs	-	-	-	-	1.8	0.0	18.8	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	60 secs	-	-	-	-	1.9	0.0	18.6	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	90 secs	-	-	-	-	2.0	0.0	18.5	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	120 secs	-	-	-	-	2.1	0.0	18.4	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	180 secs	-	-	-	-	2.3	0.0	18.2	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 7 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA4	1	50	2 (2)		---	2.00 to 7.00	240 secs	-	-	-	-	2.3	0.0	18.1	0.0	0	0
BHA4	1	50	2 (2)		---	2.00 to 7.00	300 secs	-	-	-	-	2.3	0.0	18.2	0.0	0	0
BHA4	1	50	2 (3)	7.00	6.48	2.00 to 7.00	04/10/2017 00:07:00	-	-	-	2.11	-	-	-	-	-	-
BHA4	1	50	3	7.00	---	2.00 to 7.00	12/10/2017 15:20:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA4	1	50	3		---	2.00 to 7.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA4	1	50	3 (2)	7.00	---	2.00 to 7.00	12/10/2017 15:21:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	15 secs	-	-	-	-	0.8	0.0	20.7	0.0	1	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	30 secs	-	-	-	-	0.9	0.0	20.3	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	60 secs	-	-	-	-	1.0	0.0	20.1	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	90 secs	-	-	-	-	1.2	0.0	19.9	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	120 secs	-	-	-	-	1.5	0.0	19.6	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	180 secs	-	-	-	-	1.9	0.0	19.3	0.0	0	0
BHA4	1	50	3 (2)		---	2.00 to 7.00	240 secs	-	-	-	-	1.9	0.0	19.2	0.0	0	0
BHA4	1	50	3 (3)	7.00	---	2.00 to 7.00	12/10/2017 15:26:00	-	-	-	-	2.0	0.0	19.1	0.0	0	0
BHA4	1	50	3 (3)		6.35	2.00 to 7.00	360 secs	-	-	-	2.08	-	-	-	-	-	-
BHA4	1	50	4	7.00	---	2.00 to 7.00	24/10/2017 12:13:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
BHA4	1	50	4		---	2.00 to 7.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA4	1	50	4 (2)	7.00	---	2.00 to 7.00	24/10/2017 12:14:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	15 secs	-	-	-	-	0.0	0.0	21.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	30 secs	-	-	-	-	0.0	0.0	21.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	60 secs	-	-	-	-	0.1	0.0	21.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	90 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	120 secs	-	-	-	-	0.7	0.0	20.3	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	180 secs	-	-	-	-	0.7	0.0	20.3	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	240 secs	-	-	-	-	0.8	0.0	20.2	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
Contract: M1 Junction 15 Main Site					Page: 8 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA4	1	50	4 (2)		---	2.00 to 7.00	300 secs	-	-	-	-	1.0	0.0	20.1	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	360 secs	-	-	-	-	1.0	0.0	20.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	420 secs	-	-	-	-	1.0	0.0	20.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	480 secs	-	-	-	-	1.0	0.0	20.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	540 secs	-	-	-	-	1.0	0.0	20.0	-	0	0
BHA4	1	50	4 (2)		---	2.00 to 7.00	600 secs	-	-	-	-	1.0	0.0	20.0	-	0	0
BHA4	1	50	4 (3)	7.00	6.20	2.00 to 7.00	24/10/2017 12:25:00	-	-	-	2.09	-	-	-	-	-	-
BHA5	1	50	1	8.00	---	4.00 to 8.00	26/09/2017 12:15:00	1013	1011	2.1 _(I)	-	-	-	-	-	-	-
BHA5	1	50	1		---	4.00 to 8.00	30 secs	-	-	1.2 _(SS)	-	-	-	-	-	-	-
BHA5	1	50	1 (2)	8.00	---	4.00 to 8.00	26/09/2017 12:16:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	3.2	0.0	2.7	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	3.2	0.0	1.3	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	3.2	0.0	1.0	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	3.2	0.0	1.0	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	3.2	0.0	1.0	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	3.2	0.0	0.9	0.0	0	0
BHA5	1	50	1 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	3.1	0.0	0.9	0.0	0	1
BHA5	1	50	1 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	3.1	0.0	0.9	0.0	0	0
BHA5	1	50	1 (3)	8.00	8.25	4.00 to 8.00	26/09/2017 12:22:00	-	-	-	5.08	-	-	-	-	-	-
BHA5	1	50	2	8.00	---	4.00 to 8.00	04/10/2017	1015	1012	3.1 _(I)	-	-	-	-	-	-	-
BHA5	1	50	2		---	4.00 to 8.00	300 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
BHA5	1	50	2 (2)	8.00	---	4.00 to 8.00	04/10/2017 00:06:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	2.6	0.0	11.2	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	2.7	0.0	7.6	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 9 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA5	1	50	2 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	2.7	0.0	7.4	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	2.7	0.0	7.3	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	2.7	0.0	7.3	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	2.7	0.0	7.2	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	2.7	0.0	7.2	0.0	1	0
BHA5	1	50	2 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	2.7	0.0	7.2	0.0	1	0
BHA5	1	50	2 (3)	8.00	8.26	4.00 to 8.00	04/10/2017 00:12:00	-	-	-	4.34	-	-	-	-	-	-
BHA5	1	50	3	8.00	---	4.00 to 8.00	12/10/2017 09:40:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
BHA5	1	50	3		---	4.00 to 8.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA5	1	50	3 (2)	8.00	---	4.00 to 8.00	12/10/2017 09:41:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	0.4	0.0	20.7	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	0.4	0.0	20.4	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	0.4	0.0	20.4	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	0.4	0.0	20.4	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	0.4	0.0	20.4	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA5	1	50	3 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA5	1	50	3 (3)	8.00	8.24	4.00 to 8.00	12/10/2017 09:47:00	-	-	-	4.05	-	-	-	-	-	-
BHA5	1	50	4	8.00	---	4.00 to 8.00	23/10/2017 14:53:00	1005	1008	0.0 _(I)	-	-	-	-	-	-	-
BHA5	1	50	4		---	4.00 to 8.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA5	1	50	4 (2)	8.00	---	4.00 to 8.00	23/10/2017 14:54:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	0.5	0.0	20.6	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	0.5	0.0	20.2	-	2	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 10 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA5	1	50	4 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	0.5	0.0	20.2	-	2	0
BHA5	1	50	4 (3)	8.00	8.20	4.00 to 8.00	23/10/2017 15:00:00	-	-	-	4.00	-	-	-	-	-	-
BHA6	1	50	1	12.00	---	8.00 to 12.00	22/09/2017	1012	1012	0.1 _(I)	-	-	-	-	-	-	-
BHA6	1	50	1 (2)	12.00	---	8.00 to 12.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	1.3	0.0	16.7	0.0	2	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	1.4	0.0	14.6	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	1.4	0.0	14.4	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	1.4	0.0	14.4	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	1.4	0.0	14.3	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	1.4	0.0	14.2	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	1.4	0.0	14.2	0.0	3	0
BHA6	1	50	1 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	1.4	0.0	14.2	0.0	3	0
BHA6	1	50	1 (3)	12.00	11.84	8.00 to 12.00	22/09/2017 00:07:00	-	-	-	7.97	-	-	-	-	-	-
BHA6	1	50	1	12.00	---	8.00 to 12.00	26/09/2017 00:00:30	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA6	1	50	2	12.00	---	8.00 to 12.00	04/10/2017 16:46:00	1007	1008	-2.9 _(I)	-	-	-	-	-	-	-
BHA6	1	50	2		---	8.00 to 12.00	360 secs	-	-	-0.4 _(SS)	-	-	-	-	-	-	-
BHA6	1	50	2 (2)	12.00	---	8.00 to 12.00	04/10/2017 16:53:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	1.4	0.0	15.3	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	1.5	0.0	12.0	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	1.8	0.0	10.1	0.0	1	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 11 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA6	1	50	2 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	1.9	0.0	9.6	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	1.9	0.0	9.4	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	2.0	0.0	9.1	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	1.9	0.0	9.6	0.0	1	0
BHA6	1	50	2 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	1.8	0.0	10.1	0.0	1	0
BHA6	1	50	2 (3)	12.00	11.83	8.00 to 12.00	04/10/2017 16:59:00	-	-	-	8.18	-	-	-	-	-	-
BHA6	1	50	3	12.00	---	8.00 to 12.00	12/10/2017 15:40:00	1005	1011	-2.0 _(I)	-	-	-	-	-	-	-
BHA6	1	50	3		---	8.00 to 12.00	30 secs	-	-	-2.0	-	-	-	-	-	-	-
BHA6	1	50	3 (2)	12.00	---	8.00 to 12.00	12/10/2017 15:41:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	1.8	0.0	15.7	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	1.9	0.0	8.8	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	1.9	0.0	8.3	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	1.9	0.0	8.2	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	1.9	0.0	8.1	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	1.9	0.0	8.1	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	1.9	0.0	8.0	0.0	1	0
BHA6	1	50	3 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	1.9	0.0	8.0	0.0	1	0
BHA6	1	50	3 (3)	12.00	11.84	8.00 to 12.00	12/10/2017 15:47:00	-	-	-	8.08	-	-	-	-	-	-
BHA6	1	50	4	12.00	---	8.00 to 12.00	24/10/2017 09:32:00	1008	1007	0.4 _(I)	-	-	-	-	-	-	-
BHA6	1	50	4		---	8.00 to 12.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA6	1	50	4 (2)	12.00	---	8.00 to 12.00	24/10/2017 09:33:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	1.8	0.0	17.3	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	1.8	0.0	8.3	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	1.8	0.0	7.2	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	1.8	0.0	7.1	-	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 12 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA6	1	50	4 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	1.8	0.0	7.1	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	1.8	0.0	7.1	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	1.7	0.0	7.7	-	1	0
BHA6	1	50	4 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	1.8	0.0	7.5	-	1	0
BHA6	1	50	4 (3)	12.00	11.80	8.00 to 12.00	24/10/2017 09:39:00	-	-	-	8.25	-	-	-	-	-	-
BHA7	1	50	1	20.00	---	15.00 to 20.00	26/09/2017 09:52:00	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
BHA7	1	50	1		---	15.00 to 20.00	180 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA7	1	50	1 (2)	20.00	---	15.00 to 20.00	26/09/2017 09:56:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	15 secs	-	-	-	-	0.9	0.0	18.8	-	2	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	30 secs	-	-	-	-	0.9	0.0	12.4	-	1	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	60 secs	-	-	-	-	0.9	0.0	11.1	-	2	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	90 secs	-	-	-	-	0.9	0.0	11.0	-	2	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	120 secs	-	-	-	-	0.9	0.0	11.0	-	2	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	180 secs	-	-	-	-	0.9	0.0	10.9	-	2	0
BHA7	1	50	1 (2)		---	15.00 to 20.00	240 secs	-	-	-	-	0.9	0.0	10.9	-	2	0
BHA7	1	50	1 (3)	20.00	18.01	15.00 to 20.00	26/09/2017 10:01:00	-	-	-	17.82	0.9	0.0	10.9	-	2	0
BHA7	1	50	2	20.00	---	15.00 to 20.00	06/10/2017 09:00:00	1017	1017	0.1 _(I)	-	-	-	-	-	-	-
BHA7	1	50	2		---	15.00 to 20.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA7	1	50	2 (2)	20.00	---	15.00 to 20.00	06/10/2017 09:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	15 secs	-	-	-	-	1.4	0.0	14.7	0.0	1	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	30 secs	-	-	-	-	1.4	0.0	9.3	0.0	2	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	60 secs	-	-	-	-	1.4	0.0	9.0	0.0	2	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	90 secs	-	-	-	-	1.4	0.0	8.9	0.0	2	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	120 secs	-	-	-	-	1.5	0.0	8.9	0.0	2	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 13 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA7	1	50	2 (2)		---	15.00 to 20.00	180 secs	-	-	-	-	1.5	0.0	8.9	0.0	2	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	240 secs	-	-	-	-	1.5	0.0	8.9	0.0	2	0
BHA7	1	50	2 (2)		---	15.00 to 20.00	300 secs	-	-	-	-	1.5	0.0	8.9	0.0	2	0
BHA7	1	50	2 (3)	20.00	18.01	15.00 to 20.00	06/10/2017 09:07:00	-	-	-	17.70	-	-	-	-	-	-
BHA7	1	50	3	20.00	---	15.00 to 20.00	12/10/2017 09:00:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
BHA7	1	50	3		---	15.00 to 20.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA7	1	50	3 (2)	20.00	---	15.00 to 20.00	12/10/2017 09:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	15 secs	-	-	-	-	1.7	0.0	14.8	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	30 secs	-	-	-	-	1.7	0.0	8.9	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	60 secs	-	-	-	-	1.7	0.0	8.4	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	90 secs	-	-	-	-	1.8	0.0	8.4	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	120 secs	-	-	-	-	1.8	0.0	8.4	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	180 secs	-	-	-	-	1.8	0.0	8.4	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	240 secs	-	-	-	-	1.8	0.0	8.3	0.0	2	0
BHA7	1	50	3 (2)		---	15.00 to 20.00	300 secs	-	-	-	-	1.8	0.0	8.3	0.0	2	0
BHA7	1	50	3 (3)	20.00	18.01	15.00 to 20.00	12/10/2017 09:07:00	-	-	-	16.75	-	-	-	-	-	-
BHA7	1	50	4	20.00	---	15.00 to 20.00	23/10/2017 10:17:00	1008	1008	-0.1 _(I)	-	-	-	-	-	-	-
BHA7	1	50	4		---	15.00 to 20.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA7	1	50	4 (2)	20.00	---	15.00 to 20.00	23/10/2017 10:17:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	15 secs	-	-	-	-	2.2	0.0	17.4	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	30 secs	-	-	-	-	2.2	0.0	9.2	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	60 secs	-	-	-	-	2.2	0.0	8.5	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	90 secs	-	-	-	-	2.2	0.0	8.5	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	120 secs	-	-	-	-	2.2	0.0	8.5	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	180 secs	-	-	-	-	2.2	0.0	8.5	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 14 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA7	1	50	4 (2)		---	15.00 to 20.00	240 secs	-	-	-	-	2.2	0.0	8.7	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	300 secs	-	-	-	-	2.2	0.0	8.8	-	0	0
BHA7	1	50	4 (2)		---	15.00 to 20.00	360 secs	-	-	-	-	2.2	0.0	8.8	-	0	0
BHA7	1	50	4 (3)	20.00	18.00	15.00 to 20.00	23/10/2017 10:24:40	-	-	-	17.45	-	-	-	-	-	-
BHA8	1	50	1	12.00	---	8.00 to 12.00	26/09/2017 10:41:00	1011	1011	0.1 _(I)	-	-	-	-	-	-	-
BHA8	1	50	1		---	8.00 to 12.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
BHA8	1	50	1 (2)	12.00	---	8.00 to 12.00	26/09/2017 10:42:00	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	0.1	0.0	20.6	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	0.1	0.0	20.5	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	0.1	0.0	20.4	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	0.1	0.0	20.4	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	0.1	0.0	20.4	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	0.1	0.0	20.3	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	0.1	0.0	20.3	0.0	1	0
BHA8	1	50	1 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	0.1	0.0	20.3	0.0	1	0
BHA8	1	50	1 (3)	12.00	12.03	8.00 to 12.00	26/09/2017 10:48:00	-	-	-	10.95	-	-	-	-	-	-
BHA8	1	50	2	12.00	---	8.00 to 12.00	06/10/2017 08:48:00	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
BHA8	1	50	2		---	8.00 to 12.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA8	1	50	2 (2)	12.00	---	8.00 to 12.00	06/10/2017 08:49:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 15 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA8	1	50	2 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA8	1	50	2 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA8	1	50	2 (3)	12.00	12.05	8.00 to 12.00	06/10/2017 08:55:00	-	-	-	11.20	-	-	-	-	-	-
BHA8	1	50	3	12.00	---	8.00 to 12.00	12/10/2017 10:12:00	1012	1012	-0.1 _(I)	-	-	-	-	-	-	-
BHA8	1	50	3		---	8.00 to 12.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
BHA8	1	50	3 (2)	12.00	---	8.00 to 12.00	12/10/2017 10:13:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	0.6	0.0	19.5	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	0.6	0.0	18.1	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	0.6	0.0	17.9	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	0.6	0.0	17.9	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	0.6	0.0	17.9	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	0.6	0.0	17.9	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	0.6	0.0	17.8	-	0	0
BHA8	1	50	3 (2)		---	8.00 to 12.00	360 secs	-	-	-	-	0.6	0.0	17.8	-	0	0
BHA8	1	50	3 (3)	12.00	12.04	8.00 to 12.00	12/10/2017 10:20:00	-	-	-	10.80	0.6	0.0	17.8	-	0	0
BHA8	1	50	4	12.00	---	8.00 to 12.00	23/10/2017 11:10:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
BHA8	1	50	4		---	8.00 to 12.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA8	1	50	4 (2)	12.00	---	8.00 to 12.00	23/10/2017 11:10:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	15 secs	-	-	-	-	1.3	0.0	18.8	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	30 secs	-	-	-	-	1.3	0.0	15.5	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	60 secs	-	-	-	-	1.4	0.0	15.1	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	90 secs	-	-	-	-	1.4	0.0	15.1	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	120 secs	-	-	-	-	1.4	0.0	15.1	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	180 secs	-	-	-	-	1.3	0.0	15.3	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 16 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA8	1	50	4 (2)		---	8.00 to 12.00	240 secs	-	-	-	-	1.3	0.0	15.3	-	0	0
BHA8	1	50	4 (2)		---	8.00 to 12.00	300 secs	-	-	-	-	1.3	0.0	15.3	-	0	0
BHA8	1	50	4 (3)	12.00	12.05	8.00 to 12.00	23/10/2017 11:16:40	-	-	-	10.15	-	-	-	-	-	-
BHA9	1	50	1	12.00	---	6.00 to 12.00	22/09/2017	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA9	1	50	1 (2)	12.00	---	6.00 to 12.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	15 secs	-	-	-	-	0.4	0.0	20.2	0.0	2	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	30 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	60 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	90 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	120 secs	-	-	-	-	0.4	0.0	20.3	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	180 secs	-	-	-	-	0.5	0.0	20.2	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	240 secs	-	-	-	-	0.5	0.0	20.2	0.0	1	0
BHA9	1	50	1 (2)		---	6.00 to 12.00	300 secs	-	-	-	-	0.6	0.0	20.1	0.0	1	0
BHA9	1	50	1 (3)	12.00	10.97	6.00 to 12.00	22/09/2017 00:07:00	-	-	-	6.76	-	-	-	-	-	-
BHA9	1	50	1	12.00	---	6.00 to 12.00	27/09/2017 00:00:30	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA9	1	50	2	12.00	---	6.00 to 12.00	04/10/2017	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
BHA9	1	50	2		---	6.00 to 12.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA9	1	50	2 (2)	12.00	---	6.00 to 12.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	15 secs	-	-	-	-	0.1	0.0	20.1	0.0	1	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	30 secs	-	-	-	-	0.1	0.0	20.0	0.0	2	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	60 secs	-	-	-	-	0.2	0.0	19.9	0.0	1	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	90 secs	-	-	-	-	0.4	0.0	19.8	0.0	1	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	120 secs	-	-	-	-	0.7	0.0	19.5	0.0	1	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	180 secs	-	-	-	-	1.0	0.0	19.0	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 17 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA9	1	50	2 (2)		---	6.00 to 12.00	240 secs	-	-	-	-	1.2	0.0	18.8	0.0	1	0
BHA9	1	50	2 (2)		---	6.00 to 12.00	300 secs	-	-	-	-	1.2	0.0	18.8	0.0	2	0
BHA9	1	50	2 (3)	12.00	10.99	6.00 to 12.00	04/10/2017 00:07:00	-	-	-	6.76	-	-	-	-	-	-
BHA9	1	50	3	12.00	---	6.00 to 12.00	12/10/2017 15:00:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA9	1	50	3		---	6.00 to 12.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA9	1	50	3 (2)	12.00	---	6.00 to 12.00	12/10/2017 15:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA9	1	50	3 (2)		---	6.00 to 12.00	15 secs	-	-	-	-	1.6	0.0	20.2	0.0	11	0
BHA9	1	50	3 (2)		---	6.00 to 12.00	30 secs	-	-	-	-	1.7	0.0	19.2	0.0	2	0
BHA9	1	50	3 (2)		---	6.00 to 12.00	60 secs	-	-	-	-	1.7	0.0	19.1	0.0	1	0
BHA9	1	50	3 (2)		---	6.00 to 12.00	90 secs	-	-	-	-	1.7	0.0	19.1	0.0	1	0
BHA9	1	50	3	12.00	---	6.00 to 12.00	12/10/2017 15:03:00	-	-	-	-	1.7	0.0	19.1	0.0	1	0
BHA9	1	50	3 (2)	12.00	---	6.00 to 12.00	12/10/2017 15:04:00	-	-	-	-	1.7	0.0	19.1	0.0	1	0
BHA9	1	50	3 (2)		---	6.00 to 12.00	240 secs	-	-	-	-	1.7	0.0	19.0	0.0	1	0
BHA9	1	50	3 (3)	12.00	---	6.00 to 12.00	12/10/2017 15:06:00	-	-	-	-	1.7	0.0	19.1	0.0	1	0
BHA9	1	50	3 (3)		10.00	6.00 to 12.00	360 secs	-	-	-	6.77	-	-	-	-	-	-
BHA9	1	50	4	12.00	---	6.00 to 12.00	23/10/2017 12:36:00	1010	1010	-0.1 _(I)	-	-	-	-	-	-	-
BHA9	1	50	4		---	6.00 to 12.00	20 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
BHA9	1	50	4 (2)	12.00	---	6.00 to 12.00	23/10/2017 12:36:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	15 secs	-	-	-	-	1.4	0.0	20.2	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	30 secs	-	-	-	-	1.3	0.0	19.5	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	60 secs	-	-	-	-	1.3	0.0	19.4	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	90 secs	-	-	-	-	1.3	0.0	19.4	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	120 secs	-	-	-	-	1.3	0.0	19.4	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	180 secs	-	-	-	-	1.3	0.0	19.4	-	1	0
BHA9	1	50	4 (2)		---	6.00 to 12.00	240 secs	-	-	-	-	1.3	0.0	19.4	-	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 18 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA9	1	50	4 (2)		---	6.00 to 12.00	300 secs	-	-	-	-	1.3	0.0	19.4	-	1	0
BHA9	1	50	4 (3)	12.00	10.00	6.00 to 12.00	23/10/2017 12:42:40	-	-	-	6.79	-	-	-	-	-	-
BHA10	1	50	1	16.00	---	12.00 to 16.00	22/09/2017 10:30:00	1007	1009	-1.3 _(I)	-	-	-	-	-	-	-
BHA10	1	50	1		---	12.00 to 16.00	30 secs	-	-	-1.3 _(SS)	-	-	-	-	-	-	-
BHA10	1	50	1 (2)	16.00	---	12.00 to 16.00	22/09/2017 10:31:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	15 secs	-	-	-	-	0.7	0.0	19.2	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	30 secs	-	-	-	-	0.7	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	60 secs	-	-	-	-	0.7	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	90 secs	-	-	-	-	0.7	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	120 secs	-	-	-	-	0.7	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	180 secs	-	-	-	-	0.6	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	240 secs	-	-	-	-	0.6	0.0	18.4	0.0	3	0
BHA10	1	50	1 (2)		---	12.00 to 16.00	300 secs	-	-	-	-	0.6	0.0	18.4	0.0	3	0
BHA10	1	50	1 (3)	16.00	15.80	12.00 to 16.00	22/09/2017 10:37:00	-	-	-	14.48	-	-	-	-	-	-
BHA10	1	50	2	16.00	---	12.00 to 16.00	06/10/2017 10:06:00	1011	1014	-1.8 _(I)	-	-	-	-	-	-	-
BHA10	1	50	2		---	12.00 to 16.00	30 secs	-	-	-1.8 _(SS)	-	-	-	-	-	-	-
BHA10	1	50	2 (2)	16.00	---	12.00 to 16.00	06/10/2017 10:07:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	15 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	30 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	2 (2)		---	12.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 19 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA10	1	50	2 (2)		---	12.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	20.7	0.0	0	0
BHA10	1	50	2 (3)	16.00	15.78	12.00 to 16.00	06/10/2017 10:13:00	-	-	-	14.53	-	-	-	-	-	-
BHA10	1	50	3	16.00	---	12.00 to 16.00	12/10/2017 14:20:00	1007	1011	-1.9 _(I)	-	-	-	-	-	-	-
BHA10	1	50	3		---	12.00 to 16.00	30 secs	-	-	-1.9 _(SS)	-	-	-	-	-	-	-
BHA10	1	50	3 (2)	16.00	---	12.00 to 16.00	12/10/2017 14:21:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	15 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	90 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
BHA10	1	50	3 (2)		---	12.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
BHA10	1	50	3 (3)	16.00	15.80	12.00 to 16.00	12/10/2017 14:27:00	-	-	-	14.50	-	-	-	-	-	-
BHA10	1	50	4	16.00	---	12.00 to 16.00	23/10/2017 12:10:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
BHA10	1	50	4		---	12.00 to 16.00	15 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA10	1	50	4 (2)	16.00	---	12.00 to 16.00	23/10/2017 12:10:30	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	15 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	30 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	60 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	90 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	120 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	180 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	240 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA10	1	50	4 (2)		---	12.00 to 16.00	300 secs	-	-	-	-	0.1	0.0	20.9	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 20 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA10	1	50	4 (3)	16.00	15.80	12.00 to 16.00	23/10/2017 12:16:30	-	-	-	14.50	-	-	-	-	-	-
BHA11	1	50	1	4.00	---	1.00 to 4.00	22/09/2017 13:46:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA11	1	50	1		---	1.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA11	1	50	1 (2)	4.00	---	1.00 to 4.00	22/09/2017 13:47:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	15 secs	-	-	-	-	1.4	0.0	18.7	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	30 secs	-	-	-	-	1.3	0.0	18.7	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	60 secs	-	-	-	-	1.3	0.0	18.6	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	90 secs	-	-	-	-	1.3	0.0	18.6	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	120 secs	-	-	-	-	1.3	0.0	18.6	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	180 secs	-	-	-	-	1.3	0.0	18.7	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	240 secs	-	-	-	-	1.3	0.0	18.7	0.0	2	0
BHA11	1	50	1 (2)		---	1.00 to 4.00	300 secs	-	-	-	-	1.3	0.0	18.7	0.0	2	0
BHA11	1	50	1 (3)	4.00	4.20	1.00 to 4.00	22/09/2017 13:53:00	-	-	-	3.95	-	-	-	-	-	-
BHA11	1	50	2	4.00	---	1.00 to 4.00	04/10/2017 16:02:00	1009	1009	-0.1 _(I)	-	-	-	-	-	-	-
BHA11	1	50	2		---	1.00 to 4.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
BHA11	1	50	2 (2)	4.00	---	1.00 to 4.00	04/10/2017 16:03:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	15 secs	-	-	-	-	1.3	0.0	19.3	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	30 secs	-	-	-	-	1.3	0.0	18.9	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	60 secs	-	-	-	-	1.3	0.0	18.9	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	90 secs	-	-	-	-	1.3	0.0	18.9	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	120 secs	-	-	-	-	1.3	0.0	18.9	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	180 secs	-	-	-	-	1.3	0.0	18.8	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	240 secs	-	-	-	-	1.3	0.0	18.8	0.0	1	0
BHA11	1	50	2 (2)		---	1.00 to 4.00	300 secs	-	-	-	-	1.3	0.0	18.8	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 21 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA11	1	50	2 (3)	4.00	4.16	1.00 to 4.00	04/10/2017 16:09:00	-	-	-	3.97	-	-	-	-	-	-
BHA11	1	50	3	4.00	---	1.00 to 4.00	12/10/2017 11:59:00	1014	1014	0.3 _(I)	-	-	-	-	-	-	-
BHA11	1	50	3		---	1.00 to 4.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
BHA11	1	50	3 (2)	4.00	---	1.00 to 4.00	12/10/2017 12:00:00	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	60 secs	-	-	-	-	2.1	0.0	19.1	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	90 secs	-	-	-	-	2.0	0.0	17.6	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	120 secs	-	-	-	-	2.0	0.0	17.6	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	150 secs	-	-	-	-	2.0	0.0	17.6	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	180 secs	-	-	-	-	2.0	0.0	17.5	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	240 secs	-	-	-	-	2.0	0.0	17.5	-	0	0
BHA11	1	50	3 (2)		---	1.00 to 4.00	300 secs	-	-	-	-	2.0	0.0	17.5	-	0	0
BHA11	1	50	3 (3)	4.00	4.19	1.00 to 4.00	12/10/2017 12:07:00	-	-	-	3.95	2.0	0.0	17.5	-	0	0
BHA11	1	50	4	4.00	---	1.00 to 4.00	24/10/2017 10:25:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
BHA11	1	50	4		---	1.00 to 4.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA11	1	50	4 (2)	4.00	---	1.00 to 4.00	24/10/2017 10:25:40	-	-	-	-	0.1	0.0	20.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	15 secs	-	-	-	-	1.6	0.0	20.4	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	30 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	60 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	90 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	120 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	180 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	240 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (2)		---	1.00 to 4.00	300 secs	-	-	-	-	1.5	0.0	19.9	-	0	0
BHA11	1	50	4 (3)	4.00	4.18	1.00 to 4.00	24/10/2017 10:31:40	-	-	-	3.96	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 22 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
BHA12	1	50	1	9.00	---	8.00 to 9.00	26/09/2017	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
BHA12	1	50	1		---	8.00 to 9.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA12	1	50	1 (2)	9.00	---	8.00 to 9.00	26/09/2017 00:01:00	-	-	-	-	0.1	0.0	20.9	0.0	0	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	15 secs	-	-	-	-	0.1	0.0	19.2	0.0	5	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	30 secs	-	-	-	-	0.0	0.0	19.2	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	60 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	90 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	120 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	180 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	240 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (2)		---	8.00 to 9.00	300 secs	-	-	-	-	0.0	0.0	19.1	0.0	6	0
BHA12	1	50	1 (3)	9.00	7.97	8.00 to 9.00	26/09/2017 00:07:00	-	-	-	7.08	-	-	-	-	-	-
BHA12	1	50	2	9.00	---	8.00 to 9.00	04/10/2017	1025	1012	0.0 _(I)	-	-	-	-	-	-	-
BHA12	1	50	2		---	8.00 to 9.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
BHA12	1	50	2 (2)	9.00	---	8.00 to 9.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	15 secs	-	-	-	-	0.2	0.0	19.4	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	30 secs	-	-	-	-	0.2	0.0	18.2	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	60 secs	-	-	-	-	0.2	0.0	18.0	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	90 secs	-	-	-	-	0.2	0.0	18.0	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	120 secs	-	-	-	-	0.2	0.0	18.0	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	180 secs	-	-	-	-	0.2	0.0	18.0	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	240 secs	-	-	-	-	0.2	0.0	17.9	0.0	5	0
BHA12	1	50	2 (2)		---	8.00 to 9.00	300 secs	-	-	-	-	0.2	0.0	17.9	0.0	5	0
BHA12	1	50	2 (3)	9.00	8.02	8.00 to 9.00	04/10/2017 00:07:00	-	-	-	6.90	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 23 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP1	1	50	1	15.00	---	8.00 to 15.00	22/09/2017 10:15:00	1008	1009	-0.7 _(I)	-	-	-	-	-	-	-
CP1	1	50	1		---	8.00 to 15.00	30 secs	-	-	-0.7 _(SS)	-	-	-	-	-	-	-
CP1	1	50	1 (2)	15.00	---	8.00 to 15.00	22/09/2017 10:16:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	15 secs	-	-	-	-	1.5	0.0	19.1	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	30 secs	-	-	-	-	1.4	0.0	18.6	0.0	1	0
CP1	1	50	1 (2)		---	8.00 to 15.00	60 secs	-	-	-	-	1.4	0.0	18.5	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	90 secs	-	-	-	-	1.4	0.0	18.5	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	120 secs	-	-	-	-	1.4	0.0	18.5	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	180 secs	-	-	-	-	1.4	0.0	18.5	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	240 secs	-	-	-	-	1.4	0.0	18.6	0.0	0	0
CP1	1	50	1 (2)		---	8.00 to 15.00	300 secs	-	-	-	-	1.4	0.0	18.6	0.0	0	0
CP1	1	50	1 (3)	15.00	11.35	8.00 to 15.00	22/09/2017 10:22:00	-	-	-	DRY	-	-	-	-	-	-
CP1	1	50	2	15.00	---	8.00 to 15.00	06/10/2017 09:49:00	1011	1014	-1.6 _(I)	-	-	-	-	-	-	-
CP1	1	50	2		---	8.00 to 15.00	30 secs	-	-	-1.6 _(SS)	-	-	-	-	-	-	-
CP1	1	50	2 (2)	15.00	---	8.00 to 15.00	06/10/2017 09:50:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	15 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	30 secs	-	-	-	-	1.4	0.0	17.2	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	60 secs	-	-	-	-	1.5	0.0	17.2	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	90 secs	-	-	-	-	1.4	0.0	17.2	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	120 secs	-	-	-	-	1.4	0.0	17.2	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	180 secs	-	-	-	-	1.4	0.0	17.2	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	240 secs	-	-	-	-	1.4	0.0	17.3	0.0	0	0
CP1	1	50	2 (2)		---	8.00 to 15.00	300 secs	-	-	-	-	1.4	0.0	17.3	0.0	0	0
CP1	1	50	2 (3)	15.00	11.42	8.00 to 15.00	06/10/2017 09:56:00	-	-	-	DRY	-	-	-	-	-	-
CP1	1	50	3	15.00	---	8.00 to 15.00	12/10/2017 14:40:00	1009	1011	-1.3 _(I)	-	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 24 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP1	1	50	3		---	8.00 to 15.00	30 secs	-	-	-1.3 _(SS)	-	-	-	-	-	-	-
CP1	1	50	3 (2)	15.00	---	8.00 to 15.00	12/10/2017 14:41:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	15 secs	-	-	-	-	1.3	0.0	19.8	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	30 secs	-	-	-	-	1.5	0.0	18.2	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	60 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	90 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	120 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	180 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	240 secs	-	-	-	-	1.5	0.0	18.0	0.0	0	0
CP1	1	50	3 (2)		---	8.00 to 15.00	300 secs	-	-	-	-	1.5	0.0	17.9	0.0	0	0
CP1	1	50	3 (3)	15.00	11.43	8.00 to 15.00	12/10/2017 14:47:00	-	-	-	DRY	-	-	-	-	-	-
CP1	1	50	4	15.00	---	8.00 to 15.00	23/10/2017 12:19:00	1009	1009	-0.1 _(I)	-	-	-	-	-	-	-
CP1	1	50	4		---	8.00 to 15.00	20 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
CP1	1	50	4 (2)	15.00	---	8.00 to 15.00	23/10/2017 12:19:40	-	-	-	-	0.1	0.0	20.9	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	15 secs	-	-	-	-	1.0	0.0	20.1	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	30 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	60 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	90 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	120 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	180 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	240 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (2)		---	8.00 to 15.00	300 secs	-	-	-	-	1.0	0.0	19.0	-	0	0
CP1	1	50	4 (3)	15.00	11.40	8.00 to 15.00	23/10/2017 12:25:40	-	-	-	11.40	-	-	-	-	-	-
CP2	1	50	1	20.00	---	14.00 to 20.00	22/09/2017 10:43:00	1007	1009	-1.4 _(I)	-	-	-	-	-	-	-


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 25 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP2	1	50	1		---	14.00 to 20.00	30 secs	-	-	-1.4 _(SS)	-	-	-	-	-	-	-
CP2	1	50	1 (2)	20.00	---	14.00 to 20.00	22/09/2017 10:44:00	-	-	-	-	0.1	0.0	21.0	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	15 secs	-	-	-	-	0.4	0.0	20.5	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	30 secs	-	-	-	-	0.3	0.0	20.4	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	60 secs	-	-	-	-	0.3	0.0	20.4	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	90 secs	-	-	-	-	0.3	0.0	20.4	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	120 secs	-	-	-	-	0.3	0.0	20.4	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	240 secs	-	-	-	-	0.3	0.0	20.5	0.0	1	0
CP2	1	50	1 (2)		---	14.00 to 20.00	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
CP2	1	50	1 (3)	20.00	19.55	14.00 to 20.00	22/09/2017 10:50:00	-	-	-	16.92	-	-	-	-	-	-
CP2	1	50	2	20.00	---	14.00 to 20.00	06/10/2017 10:20:00	1009	1014	-2.5 _(I)	-	-	-	-	-	-	-
CP2	1	50	2		---	14.00 to 20.00	30 secs	-	-	-2.5 _(SS)	-	-	-	-	-	-	-
CP2	1	50	2 (2)	20.00	---	14.00 to 20.00	06/10/2017 10:21:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	15 secs	-	-	-	-	1.1	0.0	20.0	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	30 secs	-	-	-	-	1.1	0.0	19.9	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	60 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	90 secs	-	-	-	-	1.0	0.0	19.9	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	120 secs	-	-	-	-	1.0	0.0	19.9	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	180 secs	-	-	-	-	1.0	0.0	19.9	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	240 secs	-	-	-	-	0.9	0.0	20.0	0.0	0	0
CP2	1	50	2 (2)		---	14.00 to 20.00	300 secs	-	-	-	-	0.9	0.0	20.0	0.0	0	0
CP2	1	50	2 (3)	20.00	19.52	14.00 to 20.00	06/10/2017 10:27:00	-	-	-	16.95	-	-	-	-	-	-
CP2	1	50	3	20.00	---	14.00 to 20.00	12/10/2017 13:55:00	1006	1011	-2.8 _(I)	-	-	-	-	-	-	-
CP2	1	50	3		---	14.00 to 20.00	30 secs	-	-	-2.8 _(SS)	-	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 26 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP2	1	50	3 (2)	20.00	---	14.00 to 20.00	12/10/2017 13:56:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	15 secs	-	-	-	-	0.2	0.0	20.2	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	30 secs	-	-	-	-	0.2	0.0	20.2	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	60 secs	-	-	-	-	0.2	0.0	20.1	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	90 secs	-	-	-	-	0.2	0.0	20.1	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	120 secs	-	-	-	-	0.2	0.0	20.1	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	180 secs	-	-	-	-	0.3	0.0	20.1	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	240 secs	-	-	-	-	0.3	0.0	20.0	0.0	0	0
CP2	1	50	3 (2)		---	14.00 to 20.00	300 secs	-	-	-	-	0.3	0.0	20.0	0.0	0	0
CP2	1	50	3 (3)	20.00	19.56	14.00 to 20.00	12/10/2017 14:02:00	-	-	-	16.95	-	-	-	-	-	-
CP2	1	50	4	20.00	---	14.00 to 20.00	23/10/2017 11:49:00	1008	1008	0.0 _(I)	-	-	-	-	-	-	-
CP2	1	50	4		---	14.00 to 20.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP2	1	50	4 (2)	20.00	---	14.00 to 20.00	23/10/2017 11:49:40	-	-	-	-	0.1	0.0	20.9	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	15 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	30 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	60 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	90 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	120 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	180 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	240 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (2)		---	14.00 to 20.00	300 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP2	1	50	4 (3)	20.00	19.55	14.00 to 20.00	23/10/2017 11:55:40	-	-	-	16.92	-	-	-	-	-	-
CP5	1	50	1	8.00	---	4.00 to 8.00	22/09/2017	1013	1013	0.1 _(I)	-	-	-	-	-	-	-
CP5	1	50	1		---	4.00 to 8.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 27 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP5	1	50	1 (2)	8.00	---	4.00 to 8.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	1.9	0.0	18.2	0.0	4	0
CP5	1	50	1 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	1.9	0.0	16.5	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	1.9	0.0	16.4	0.0	0	0
CP5	1	50	1 (3)	8.00	6.42	4.00 to 8.00	22/09/2017 00:07:00	-	-	-	5.40	-	-	-	-	-	-
CP5	1	50	2	8.00	---	4.00 to 8.00	04/10/2017 14:37:00	1009	1009	0.2 _(I)	-	-	-	-	-	-	-
CP5	1	50	2		---	4.00 to 8.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
CP5	1	50	2 (2)	8.00	---	4.00 to 8.00	04/10/2017 14:38:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	1.8	0.0	18.5	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	1.8	0.0	18.1	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	1.8	0.0	18.0	0.0	0	0
CP5	1	50	2 (3)	8.00	6.48	4.00 to 8.00	04/10/2017 14:44:00	-	-	-	5.50	-	-	-	-	-	-
CP5	1	50	3	8.00	---	4.00 to 8.00	12/10/2017 11:00:00	1012	1013	0.0 _(I)	-	-	-	-	-	-	-
CP5	1	50	3		---	4.00 to 8.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP5	1	50	3 (2)	8.00	---	4.00 to 8.00	12/10/2017 11:01:00	-	-	-	-	0.1	0.0	20.9	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 28 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP5	1	50	3 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP5	1	50	3 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	0.3	0.0	20.6	-	0	0
CP5	1	50	3 (3)	8.00	6.45	4.00 to 8.00	12/10/2017 11:09:00	-	-	-	5.44	0.5	0.0	20.3	-	0	0
CP5	1	50	4	8.00	---	4.00 to 8.00	24/10/2017 11:57:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
CP5	1	50	4		---	4.00 to 8.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP5	1	50	4 (2)	8.00	---	4.00 to 8.00	24/10/2017 11:57:40	-	-	-	-	0.1	0.0	20.9	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	15 secs	-	-	-	-	1.6	0.0	19.7	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	30 secs	-	-	-	-	1.5	0.0	18.6	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	60 secs	-	-	-	-	1.5	0.0	18.5	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	90 secs	-	-	-	-	1.5	0.0	18.5	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	120 secs	-	-	-	-	1.5	0.0	18.5	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	180 secs	-	-	-	-	1.5	0.0	18.5	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	240 secs	-	-	-	-	1.5	0.0	18.5	-	0	0
CP5	1	50	4 (2)		---	4.00 to 8.00	300 secs	-	-	-	-	1.5	0.0	18.4	-	0	0
CP5	1	50	4 (3)	8.00	6.47	4.00 to 8.00	24/10/2017 12:03:40	-	-	-	5.45	-	-	-	-	-	-
CP8	1	50	1	9.10	---	2.00 to 5.00	25/09/2017	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
CP8	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP8	1	50	1 (2)	9.10	---	2.00 to 5.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	2	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 29 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP8	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP8	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP8	1	50	1 (3)	9.10	2.40	2.00 to 5.00	25/09/2017 00:07:00	-	-	-	2.14	-	-	-	-	-	-
CP8	1	50	2	9.10	---	2.00 to 5.00	06/10/2017 10:25:00	1018	1018	0.2 _(I)	-	-	-	-	-	-	-
CP8	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
CP8	1	50	2 (2)	9.10	---	2.00 to 5.00	06/10/2017 10:26:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP8	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP8	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP8	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.4	0.0	20.6	0.0	1	0
CP8	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.4	0.0	20.6	0.0	0	0
CP8	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.4	0.0	20.6	0.0	0	0
CP8	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.5	0.0	20.6	0.0	1	0
CP8	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.5	0.0	20.6	0.0	1	0
CP8	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.5	0.0	20.6	0.0	1	0
CP8	1	50	2 (3)	9.10	2.41	2.00 to 5.00	06/10/2017 10:32:00	-	-	-	1.87	-	-	-	-	-	-
CP8	1	50	3	9.10	---	2.00 to 5.00	12/10/2017 13:59:00	1015	1015	0.0 _(I)	-	-	-	-	-	-	-
CP8	1	50	3		---	2.00 to 5.00	30 secs	-	-	10.1 _(SS)	-	-	-	-	-	-	-
CP8	1	50	3 (2)	9.10	---	2.00 to 5.00	12/10/2017 14:00:00	-	-	-	-	0.1	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.2	0.0	20.9	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 30 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP8	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP8	1	50	3 (3)	9.10	2.40	2.00 to 5.00	12/10/2017 14:06:00	-	-	-	1.85	0.2	0.0	20.9	-	0	0
CP8	1	50	4	9.10	---	2.00 to 5.00	24/10/2017 11:45:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
CP8	1	50	4		---	2.00 to 5.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
CP8	1	50	4 (2)	9.10	---	2.00 to 5.00	24/10/2017 11:45:40	-	-	-	-	0.1	0.0	20.9	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.0	20.8	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.3	0.0	20.7	-	0	0
CP8	1	50	4 (3)	9.10	2.40	2.00 to 5.00	24/10/2017 11:51:40	-	-	-	1.80	-	-	-	-	-	-
CP13	1	50	1	13.00	---	8.00 to 13.00	25/09/2017	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
CP13	1	50	1		---	8.00 to 13.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP13	1	50	1 (2)	13.00	---	8.00 to 13.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	0.1	0.0	20.8	0.0	3	0
CP13	1	50	1 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 31 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP13	1	50	1 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
CP13	1	50	1 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	1.0	0.0	20.8	0.0	0	0
CP13	1	50	1 (3)	13.00	12.01	8.00 to 13.00	25/09/2017 00:07:00	-	-	-	2.93	-	-	-	-	-	-
CP13	1	50	2	13.00	---	8.00 to 13.00	06/10/2017 10:00:00	1018	1018	0.0 _(I)	-	-	-	-	-	-	-
CP13	1	50	2		---	8.00 to 13.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP13	1	50	2 (2)	13.00	---	8.00 to 13.00	06/10/2017 10:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	0.1	0.0	21.1	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	0.1	0.0	21.1	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	0.1	0.0	21.1	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	0.1	0.0	21.1	0.0	0	0
CP13	1	50	2 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	0.1	0.0	21.1	0.0	0	0
CP13	1	50	2 (3)	13.00	12.02	8.00 to 13.00	06/10/2017 10:07:00	-	-	-	3.11	-	-	-	-	-	-
CP13	1	50	3	13.00	---	8.00 to 13.00	12/10/2017 09:33:00	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
CP13	1	50	3		---	8.00 to 13.00	60 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP13	1	50	3 (2)	13.00	---	8.00 to 13.00	12/10/2017 09:35:00	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	0.1	0.0	20.9	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 32 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP13	1	50	3 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	3 (3)	13.00	10.00	8.00 to 13.00	12/10/2017 09:41:00	-	-	-	3.13	0.1	0.0	20.9	-	0	0
CP13	1	50	4	13.00	---	8.00 to 13.00	23/10/2017 09:27:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
CP13	1	50	4		---	8.00 to 13.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP13	1	50	4 (2)	13.00	---	8.00 to 13.00	23/10/2017 09:27:40	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	15 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	30 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	60 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	90 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	120 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	180 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	240 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (2)		---	8.00 to 13.00	300 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP13	1	50	4 (3)	13.00	12.00	8.00 to 13.00	23/10/2017 09:33:40	-	-	-	3.18	-	-	-	-	-	-
CP16	1	50	1	5.00	---	2.00 to 5.00	25/09/2017	1010	1012	0.0 _(I)	-	-	-	-	-	-	-
CP16	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP16	1	50	1 (2)	5.00	---	2.00 to 5.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.6	0.0	20.6	0.0	1	0
CP16	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.5	0.0	20.4	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 33 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP16	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
CP16	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.1	0.0	21.0	0.0	0	0
CP16	1	50	1 (3)	5.00	4.46	2.00 to 5.00	25/09/2017 00:07:00	-	-	-	1.80	-	-	-	-	-	-
CP16	1	50	2	5.00	---	2.00 to 5.00	06/10/2017	1018	1018	0.0 _(I)	-	-	-	-	-	-	-
CP16	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP16	1	50	2 (2)	5.00	---	2.00 to 5.00	06/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.2	0.0	20.8	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.2	0.0	20.9	0.0	0	0
CP16	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.2	0.0	21.0	0.0	0	0
CP16	1	50	2 (3)	5.00	4.50	2.00 to 5.00	06/10/2017 00:07:00	-	-	-	1.64	-	-	-	-	-	-
CP16	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 13:48:00	1014	1014	0.3 _(I)	-	-	-	-	-	-	-
CP16	1	50	3		---	2.00 to 5.00	60 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
CP16	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 13:50:00	-	-	-	-	0.1	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	40 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.2	0.0	20.9	-	0	0
CP16	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.1	0.0	20.9	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 34 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
CP16	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	20.9	-	0	0
CP16	1	50	3 (3)	5.00	4.50	2.00 to 5.00	12/10/2017 13:55:00	-	-	-	1.65	0.1	0.0	20.9	-	0	0
CP16	1	50	4	5.00	---	2.00 to 5.00	24/10/2017 11:36:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
CP16	1	50	4		---	2.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
CP16	1	50	4 (2)	5.00	---	2.00 to 5.00	24/10/2017 11:36:30	-	-	-	-	0.1	0.0	20.9	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.3	0.0	20.8	-	0	0
CP16	1	50	4 (3)	5.00	4.50	2.00 to 5.00	24/10/2017 11:42:30	-	-	-	1.60	-	-	-	-	-	-
WS2	1	50	1	3.00	---	1.00 to 3.00	22/09/2017 13:14:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
WS2	1	50	1		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS2	1	50	1 (2)	3.00	---	1.00 to 3.00	22/09/2017 13:15:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS2	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.9	0.0	18.7	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.8	0.0	18.5	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.7	0.0	18.4	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.7	0.0	18.4	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.7	0.0	18.3	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.8	0.0	18.3	0.0	1	0
WS2	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.8	0.0	18.2	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 35 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS2	1	50	1 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.8	0.0	18.2	0.0	1	0
WS2	1	50	1 (3)	3.00	2.95	1.00 to 3.00	22/09/2017 13:21:00	-	-	-	DRY	-	-	-	-	-	-
WS2	1	50	2	3.00	---	1.00 to 3.00	04/10/2017 15:10:00	1009	1009	0.2 _(I)	-	-	-	-	-	-	-
WS2	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WS2	1	50	2 (2)	3.00	---	1.00 to 3.00	04/10/2017 15:11:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.3	0.0	18.2	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	17.9	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WS2	1	50	2 (3)	3.00	2.92	1.00 to 3.00	04/10/2017 15:17:00	-	-	-	DRY	-	-	-	-	-	-
WS2	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 11:26:00	1014	1014	0.2 _(I)	-	-	-	-	-	-	-
WS2	1	50	3		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS2	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 11:27:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.3	0.0	19.8	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.1	0.0	18.4	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.1	0.0	18.4	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.2	0.0	18.4	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.2	0.0	18.3	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.2	0.0	18.3	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.2	0.0	18.3	-	0	0
WS2	1	50	3 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	2.2	0.0	18.3	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 36 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS2	1	50	3 (3)	3.00	2.95	1.00 to 3.00	12/10/2017 11:33:30	-	-	-	2.95	2.1	0.0	18.3	-	0	0
WS2	1	50	4	3.00	---	1.00 to 3.00	24/10/2017 09:55:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
WS2	1	50	4		---	1.00 to 3.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WS2	1	50	4 (2)	3.00	---	1.00 to 3.00	24/10/2017 09:56:40	-	-	-	-	0.1	0.0	20.8	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.1	0.0	20.2	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WS2	1	50	4 (3)	3.00	2.95	1.00 to 3.00	24/10/2017 10:02:40	-	-	-	2.95	-	-	-	-	-	-
WS4	1	50	1	5.00	---	2.00 to 5.00	22/09/2017	1013	1013	0.1 _(I)	-	-	-	-	-	-	-
WS4	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WS4	1	50	1 (2)	5.00	---	2.00 to 5.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.4	0.0	19.8	0.0	8	0
WS4	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.4	0.0	19.1	0.0	1	0
WS4	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.4	0.0	19.1	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.4	0.0	19.1	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.4	0.0	19.1	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.4	0.0	19.2	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.4	0.0	19.2	0.0	0	0
WS4	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.4	0.0	19.2	0.0	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 37 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS4	1	50	1 (3)	5.00	4.93	2.00 to 5.00	22/09/2017 00:07:00	-	-	-	DRY	-	-	-	-	-	-
WS4	1	50	2	5.00	---	2.00 to 5.00	04/10/2017 14:21:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WS4	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS4	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 14:22:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.5	0.0	19.5	0.0	1	0
WS4	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.4	0.0	18.9	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.4	0.0	18.8	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.4	0.0	18.8	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.4	0.0	18.8	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.4	0.0	18.8	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.4	0.0	18.7	0.0	0	0
WS4	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.4	0.0	18.7	0.0	0	0
WS4	1	50	2 (3)	5.00	4.93	2.00 to 5.00	04/10/2017 14:28:00	-	-	-	DRY	-	-	-	-	-	-
WS4	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 14:24:00	101	101	0.0 _(I)	-	-	-	-	-	-	-
WS4	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS4	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 14:26:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	20 secs	-	-	-	-	1.2	0.0	20.6	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	40 secs	-	-	-	-	1.1	0.0	19.9	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WS4	1	50	3 (3)	5.00	4.95	2.00 to 5.00	12/10/2017 14:36:00	-	-	-	4.95	1.1	0.0	19.8	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 38 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS4	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 15:23:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WS4	1	50	4		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS4	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 15:24:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.2	0.0	20.4	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.1	0.0	19.7	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.1	0.0	19.5	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.1	0.0	19.5	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.1	0.0	19.4	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.2	0.0	19.4	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.2	0.0	19.4	-	0	0
WS4	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.2	0.0	19.3	-	0	0
WS4	1	50	4 (3)	5.00	4.95	2.00 to 5.00	23/10/2017 15:30:00	-	-	-	4.95	-	-	-	-	-	-
WS8	1	50	1	5.00	---	2.00 to 4.00	22/09/2017	1011	1011	0.1 _(I)	-	-	-	-	-	-	-
WS8	1	50	1		---	2.00 to 4.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WS8	1	50	1 (2)	5.00	---	2.00 to 4.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	0.6	0.0	20.6	0.0	15	0
WS8	1	50	1 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	0.6	0.0	20.4	0.0	3	0
WS8	1	50	1 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	0.5	0.0	20.5	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	0.3	0.0	20.7	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
WS8	1	50	1 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
WS8	1	50	1 (3)	5.00	2.16	2.00 to 4.00	22/09/2017 00:07:00	-	-	-	1.92	-	-	-	-	-	-



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 39 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS8	1	50	2	5.00	---	2.00 to 4.00	06/10/2017 10:33:00	1014	1014	-0.1 _(I)	-	-	-	-	-	-	-
WS8	1	50	2		---	2.00 to 4.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WS8	1	50	2 (2)	5.00	---	2.00 to 4.00	06/10/2017 10:34:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS8	1	50	2 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	1	0
WS8	1	50	2 (3)	5.00	2.12	2.00 to 4.00	06/10/2017 10:40:00	-	-	-	1.77	-	-	-	-	-	-
WS8	1	50	3	5.00	---	2.00 to 4.00	12/10/2017 13:35:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
WS8	1	50	3		---	2.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS8	1	50	3 (2)	5.00	---	2.00 to 4.00	12/10/2017 13:36:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	0.2	0.0	20.4	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	0.3	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	0.2	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS8	1	50	3 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS8	1	50	3 (3)	5.00	2.19	2.00 to 4.00	12/10/2017 13:42:00	-	-	-	1.78	-	-	-	-	-	-
WS8	1	50	4	5.00	---	2.00 to 4.00	23/10/2017 11:58:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 40 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS8	1	50	4		---	2.00 to 4.00	20 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WS8	1	50	4 (2)	5.00	---	2.00 to 4.00	23/10/2017 11:58:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	0.8	0.0	20.5	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	0.7	0.0	20.2	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	0.7	0.0	20.2	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	0.7	0.0	20.2	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	0.7	0.0	20.1	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	0.7	0.0	20.1	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	0.7	0.0	20.2	-	0	0
WS8	1	50	4 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	0.7	0.0	20.2	-	0	0
WS8	1	50	4 (3)	5.00	2.15	2.00 to 4.00	23/10/2017 12:04:40	-	-	-	1.80	-	-	-	-	-	-
WS11	1	50	1	4.00	---	2.00 to 4.00	22/09/2017	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WS11	1	50	1		---	2.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS11	1	50	1 (2)	4.00	---	2.00 to 4.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	2.7	0.0	19.2	0.0	1	0
WS11	1	50	1 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	2.7	0.0	18.2	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	2.8	0.0	18.1	0.0	0	0
WS11	1	50	1 (3)	4.00	3.77	2.00 to 4.00	22/09/2017 00:07:00	-	-	-	3.00	-	-	-	-	-	-
WS11	1	50	2	4.00	---	2.00 to 4.00	04/10/2017 15:50:00	1012	1012	0.0 _(I)	-	-	-	-	-	-	-



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 41 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS11	1	50	2		---	2.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS11	1	50	2 (2)	4.00	---	2.00 to 4.00	04/10/2017 15:51:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	2.7	0.0	18.3	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	2.7	0.0	18.3	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	2.6	0.0	18.2	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	2.6	0.0	18.2	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	2.7	0.0	18.2	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	2.7	0.0	18.2	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	2.7	0.0	18.2	0.0	0	0
WS11	1	50	2 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	2.7	0.0	18.2	0.0	0	0
WS11	1	50	2 (3)	4.00	3.75	2.00 to 4.00	04/10/2017 15:57:00	-	-	-	3.03	-	-	-	-	-	-
WS11	1	50	3	4.00	---	2.00 to 4.00	12/10/2017 12:09:00	1014	1014	0.0 _(I)	-	-	-	-	-	-	-
WS11	1	50	3		---	2.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS11	1	50	3 (2)	4.00	---	2.00 to 4.00	12/10/2017 12:10:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	2.4	0.0	19.7	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	2.2	0.0	18.3	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	2.3	0.0	18.2	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	2.3	0.0	18.1	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	2.3	0.0	18.1	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	2.3	0.0	18.1	-	0	0
WS11	1	50	3 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	2.3	0.0	18.2	-	0	0
WS11	1	50	3 (3)	4.00	3.75	2.00 to 4.00	12/10/2017 12:16:00	-	-	-	3.00	2.3	0.0	18.2	-	0	0
WS11	1	50	4	4.00	---	2.00 to 4.00	24/10/2017 10:34:00	1009	1009	-0.1 _(I)	-	-	-	-	-	-	-
WS11	1	50	4		---	2.00 to 4.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WS11	1	50	4 (2)	4.00	---	2.00 to 4.00	24/10/2017 10:34:40	-	-	-	-	0.1	0.0	20.9	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 42 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS11	1	50	4 (2)		---	2.00 to 4.00	15 secs	-	-	-	-	2.5	0.0	20.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	30 secs	-	-	-	-	2.3	0.0	19.1	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	60 secs	-	-	-	-	2.3	0.0	19.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	90 secs	-	-	-	-	2.3	0.0	19.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	120 secs	-	-	-	-	2.3	0.0	19.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	180 secs	-	-	-	-	2.3	0.0	19.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	240 secs	-	-	-	-	2.3	0.0	19.0	-	0	0
WS11	1	50	4 (2)		---	2.00 to 4.00	300 secs	-	-	-	-	2.4	0.0	19.0	-	0	0
WS11	1	50	4 (3)	4.00	3.70	2.00 to 4.00	24/10/2017 10:40:40	-	-	-	3.00	-	-	-	-	-	-
WSA1	1	50	1	3.00	---	1.00 to 3.00	22/09/2017 11:23:00	1009	1009	-0.1 _(I)	-	-	-	-	-	-	-
WSA1	1	50	1		---	1.00 to 3.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WSA1	1	50	1 (2)	3.00	---	1.00 to 3.00	22/09/2017 11:24:00	-	-	-	-	0.1	0.0	20.9	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.2	0.0	16.0	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	14.2	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.2	0.0	14.0	0.0	1	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.2	0.0	14.0	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.2	0.0	14.0	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.2	0.0	14.0	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.2	0.0	13.9	0.0	0	0
WSA1	1	50	1 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.2	0.0	13.9	0.0	0	0
WSA1	1	50	1 (3)	3.00	3.12	1.00 to 3.00	22/09/2017 11:30:00	-	-	-	1.98	-	-	-	-	-	-
WSA1	1	50	2	3.00	---	1.00 to 3.00	04/10/2017 12:51:00	1011	1011	0.1 _(I)	-	-	-	-	-	-	-
WSA1	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA1	1	50	2 (2)	3.00	---	1.00 to 3.00	04/10/2017 12:52:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 43 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA1	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.5	0.0	13.2	0.0	0	0
WSA1	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.5	0.0	11.7	0.0	0	0
WSA1	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.5	0.0	11.4	0.0	0	1
WSA1	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.5	0.0	11.3	0.0	0	1
WSA1	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.5	0.0	11.3	0.0	0	1
WSA1	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.5	0.0	11.3	0.0	0	1
WSA1	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.5	0.0	11.1	0.0	0	1
WSA1	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.5	0.0	11.3	0.0	0	1
WSA1	1	50	2 (3)	3.00	3.10	1.00 to 3.00	04/10/2017 12:58:00	-	-	-	1.75	-	-	-	-	-	-
WSA1	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 12:05:00	1012	1012	-0.1 _(l)	-	-	-	-	-	-	-
WSA1	1	50	3		---	1.00 to 3.00	30 secs	-	-	-0.1 _(ss)	-	-	-	-	-	-	-
WSA1	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 12:06:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.4	0.0	17.7	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.4	0.0	15.3	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.4	0.0	15.1	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.4	0.0	15.1	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.4	0.0	5.1	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.4	0.0	15.1	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.4	0.0	15.0	0.0	0	0
WSA1	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.4	0.0	15.1	0.0	0	0
WSA1	1	50	3 (3)	3.00	3.13	1.00 to 3.00	12/10/2017 12:12:00	-	-	-	2.78	-	-	-	-	-	-
WSA1	1	50	4	3.00	---	1.00 to 3.00	23/10/2017 12:54:00	1010	1010	0.2 _(l)	-	-	-	-	-	-	-
WSA1	1	50	4		---	1.00 to 3.00	20 secs	-	-	0.2 _(ss)	-	-	-	-	-	-	-
WSA1	1	50	4 (2)	3.00	---	1.00 to 3.00	23/10/2017 12:54:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.7	0.0	19.3	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 44 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA1	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.7	0.0	17.1	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.8	0.0	16.9	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	16.8	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	16.8	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	16.9	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.8	0.0	16.9	-	0	0
WSA1	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.8	0.0	16.9	-	0	0
WSA1	1	50	4 (3)	3.00	3.13	1.00 to 3.00	23/10/2017 13:00:40	-	-	-	1.80	-	-	-	-	-	-
WSA2	1	50	1	4.50	---	2.50 to 4.50	22/09/2017 11:48:00	1010	1010	0.0 _(l)	-	-	-	-	-	-	-
WSA2	1	50	1		---	2.50 to 4.50	30 secs	-	-	0.0 _(ss)	-	-	-	-	-	-	-
WSA2	1	50	1 (2)	4.50	---	2.50 to 4.50	22/09/2017 11:49:00	-	-	-	-	0.1	0.0	20.7	0.0	0	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	15 secs	-	-	-	-	1.4	0.0	18.9	0.0	1	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	30 secs	-	-	-	-	1.4	0.0	18.4	0.0	1	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	60 secs	-	-	-	-	1.4	0.0	18.3	0.0	1	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	90 secs	-	-	-	-	1.4	0.0	18.3	0.0	1	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	120 secs	-	-	-	-	1.4	0.0	18.3	0.0	1	0
WSA2	1	50	1 (2)		---	2.50 to 4.50	180 secs	-	-	-	-	1.3	0.0	18.4	0.0	1	1
WSA2	1	50	1 (2)		---	2.50 to 4.50	240 secs	-	-	-	-	1.3	0.0	18.4	0.0	1	1
WSA2	1	50	1 (2)		---	2.50 to 4.50	300 secs	-	-	-	-	1.3	0.0	18.4	0.0	1	0
WSA2	1	50	1 (3)	4.50	4.53	2.50 to 4.50	22/09/2017 11:55:00	-	-	-	1.96	-	-	-	-	-	-
WSA2	1	50	2	4.50	---	2.50 to 4.50	04/10/2017 11:41:00	1010	1010	0.0 _(l)	-	-	-	-	-	-	-
WSA2	1	50	2		---	2.50 to 4.50	30 secs	-	-	0.0 _(ss)	-	-	-	-	-	-	-
WSA2	1	50	2 (2)	4.50	---	2.50 to 4.50	04/10/2017 11:42:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	15 secs	-	-	-	-	1.4	0.0	19.4	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 45 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA2	1	50	2 (2)		---	2.50 to 4.50	30 secs	-	-	-	-	1.4	0.0	18.0	0.0	0	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	60 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	90 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	120 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	180 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	240 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (2)		---	2.50 to 4.50	300 secs	-	-	-	-	1.4	0.0	17.9	0.0	1	0
WSA2	1	50	2 (3)	4.50	4.50	2.50 to 4.50	04/10/2017 11:48:00	-	-	-	1.90	-	-	-	-	-	-
WSA2	1	50	3	4.50	---	2.50 to 4.50	12/10/2017 11:30:00	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
WSA2	1	50	3		---	2.50 to 4.50	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA2	1	50	3 (2)	4.50	---	2.50 to 4.50	12/10/2017 11:31:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	15 secs	-	-	-	-	1.3	0.0	19.4	0.0	1	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	30 secs	-	-	-	-	1.3	0.0	18.3	0.0	1	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	60 secs	-	-	-	-	1.3	0.0	18.2	0.0	1	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	90 secs	-	-	-	-	1.3	0.0	18.2	0.0	1	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	120 secs	-	-	-	-	1.4	0.0	18.2	0.0	0	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	180 secs	-	-	-	-	1.4	0.0	18.2	0.0	0	0
WSA2	1	50	3 (2)		---	2.50 to 4.50	240 secs	-	-	-	-	1.5	0.0	18.1	0.0	0	0
WSA2	1	50	3 (3)	4.50	---	2.50 to 4.50	12/10/2017 11:36:00	-	-	-	-	1.5	0.0	18.1	0.0	0	0
WSA2	1	50	3 (3)		4.50	2.50 to 4.50	360 secs	-	-	-	1.86	-	-	-	-	-	-
WSA3	1	50	1	5.00	---	2.00 to 5.00	22/09/2017 12:09:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
WSA3	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA3	1	50	1 (2)	5.00	---	2.00 to 5.00	22/09/2017 12:10:00	-	-	-	-	0.1	0.0	20.7	0.0	0	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.8	0.0	17.9	0.0	1	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 46 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA3	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.8	0.0	17.4	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.9	0.0	17.4	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.9	0.0	17.4	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.9	0.0	17.4	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.8	0.0	17.5	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.8	0.0	17.6	0.0	1	0
WSA3	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.8	0.0	17.5	0.0	1	0
WSA3	1	50	1 (3)	5.00	5.10	2.00 to 5.00	22/09/2017 12:16:00	-	-	-	DRY	-	-	-	-	-	-
WSA3	1	50	2	5.00	---	2.00 to 5.00	04/10/2017	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
WSA3	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA3	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.9	0.0	19.1	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.9	0.0	17.5	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	3.0	0.0	17.3	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	3.1	0.0	17.2	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	3.1	0.0	17.1	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	3.1	0.0	17.1	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	3.2	0.0	17.0	0.0	1	0
WSA3	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	3.2	0.0	17.0	0.0	1	0
WSA3	1	50	2 (3)	5.00	5.08	2.00 to 5.00	04/10/2017 00:07:00	-	-	-	DRY	-	-	-	-	-	-
WSA4	1	50	1	5.00	---	2.00 to 5.00	26/09/2017 13:11:00	1011	1011	5.8 _(I)	-	-	-	-	-	-	-
WSA4	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.3 _(SS)	-	-	-	-	-	-	-
WSA4	1	50	1 (2)	5.00	---	2.00 to 5.00	26/09/2017 13:12:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA4	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.6	0.0	17.5	0.0	8	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 47 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA4	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.6	0.0	17.1	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.6	0.0	17.0	0.0	8	1
WSA4	1	50	1 (3)	5.00	5.07	2.00 to 5.00	26/09/2017 13:18:00	-	-	-	2.08	-	-	-	-	-	-
WSA4	1	50	2	5.00	---	2.00 to 5.00	04/10/2017	1015	1012	5.3 _(I)	-	-	-	-	-	-	-
WSA4	1	50	2		---	2.00 to 5.00	300 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA4	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 00:06:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	3.0	0.0	16.1	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	3.0	0.0	13.7	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	3.0	0.0	13.5	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	3.0	0.0	13.5	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	3.0	0.0	13.5	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	3.0	0.0	13.5	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	3.0	0.0	13.4	0.0	1	0
WSA4	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	3.0	0.0	13.5	0.0	1	0
WSA4	1	50	2 (3)	5.00	5.09	2.00 to 5.00	04/10/2017 00:12:00	-	-	-	2.03	-	-	-	-	-	-
WSA4	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 15:05:00	1008	1008	-0.1 _(I)	-	-	-	-	-	-	-
WSA4	1	50	4		---	2.00 to 5.00	20 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WSA4	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 15:05:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.7	0.0	18.0	-	2	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.7	0.0	14.1	-	2	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 48 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA4	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.7	0.0	13.7	-	3	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.7	0.0	13.7	-	3	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.7	0.0	13.7	-	3	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.6	0.0	13.8	-	2	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.6	0.0	13.8	-	2	0
WSA4	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.6	0.0	13.8	-	2	0
WSA4	1	50	4 (3)	5.00	5.05	2.00 to 5.00	23/10/2017 15:11:40	-	-	-	1.95	-	-	-	-	-	-
WSA5	1	50	1	5.00	---	2.00 to 5.00	26/09/2017 10:17:00	1015	1015	0.3 _(I)	-	-	-	-	-	-	-
WSA5	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA5	1	50	1 (2)	5.00	---	2.00 to 5.00	26/09/2017 10:18:00	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.6	0.0	20.3	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.6	0.0	19.7	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.6	0.0	19.6	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	150 secs	-	-	-	-	1.5	0.0	19.6	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.5	0.0	19.6	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.5	0.0	19.6	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.5	0.0	19.6	-	0	0
WSA5	1	50	1 (2)		---	2.00 to 5.00	360 secs	-	-	-	-	1.5	0.0	19.7	-	0	0
WSA5	1	50	1 (3)	5.00	5.00	2.00 to 5.00	26/09/2017 10:25:00	-	-	-	4.05	-	-	-	-	-	-
WSA5	1	50	2	5.00	---	2.00 to 5.00	06/10/2017 08:45:00	1017	1017	0.0 _(I)	-	-	-	-	-	-	-
WSA5	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA5	1	50	2 (2)	5.00	---	2.00 to 5.00	06/10/2017 08:46:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	3.0	0.0	19.6	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	3.1	0.0	18.5	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 49 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA5	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	3.1	0.0	18.5	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	3.1	0.0	18.4	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	3.1	0.0	18.4	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	3.1	0.0	18.4	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	3.1	0.0	18.4	0.0	0	0
WSA5	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	3.1	0.0	18.4	0.0	0	0
WSA5	1	50	2 (3)	5.00	5.10	2.00 to 5.00	06/10/2017 08:52:00	-	-	-	4.33	-	-	-	-	-	-
WSA5	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 08:45:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
WSA5	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA5	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 08:46:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	3.0	0.0	20.1	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	3.1	0.0	18.8	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	3.1	0.0	18.7	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	3.1	0.0	18.7	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	3.1	0.0	18.6	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	3.1	0.0	18.6	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	3.1	0.0	18.6	0.0	1	0
WSA5	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	3.1	0.0	18.5	0.0	1	0
WSA5	1	50	3 (3)	5.00	5.10	2.00 to 5.00	12/10/2017 08:52:00	-	-	-	4.02	-	-	-	-	-	-
WSA5	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 10:36:00	1009	1009	0.3 _(I)	-	-	-	-	-	-	-
WSA5	1	50	4		---	2.00 to 5.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA5	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 10:36:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.9	0.0	20.6	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.9	0.0	19.3	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.8	0.0	19.3	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 50 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA5	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.8	0.0	19.3	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.8	0.0	19.3	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.8	0.0	19.3	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.8	0.0	19.3	-	0	0
WSA5	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.8	0.0	19.3	-	0	0
WSA5	1	50	4 (3)	5.00	5.08	2.00 to 5.00	23/10/2017 10:42:40	-	-	-	3.59	-	-	-	-	-	-
WSA6	1	50	1	3.00	---	1.00 to 3.00	26/09/2017 10:34:00	1015	1016	0.1 _(I)	-	-	-	-	-	-	-
WSA6	1	50	1		---	1.00 to 3.00	20 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA6	1	50	1 (2)	3.00	---	1.00 to 3.00	26/09/2017 10:34:40	-	-	-	-	0.1	0.0	20.7	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	20 secs	-	-	-	-	1.1	0.0	20.1	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	50 secs	-	-	-	-	1.1	0.0	19.0	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	80 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	110 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	140 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	200 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	260 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (2)		---	1.00 to 3.00	320 secs	-	-	-	-	1.1	0.0	18.9	-	0	0
WSA6	1	50	1 (3)	3.00	2.80	1.00 to 3.00	26/09/2017 10:42:00	-	-	-	DRY	-	-	-	-	-	-
WSA6	1	50	2	3.00	---	1.00 to 3.00	06/10/2017 08:25:00	1017	1017	0.3 _(I)	-	-	-	-	-	-	-
WSA6	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.3 _(SS)	-	-	-	-	-	-	-
WSA6	1	50	2 (2)	3.00	---	1.00 to 3.00	06/10/2017 08:26:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.1	0.0	20.2	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 51 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA6	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.1	0.0	19.6	0.0	0	0
WSA6	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.1	0.0	19.7	0.0	0	0
WSA6	1	50	2 (3)	3.00	2.79	1.00 to 3.00	06/10/2017 08:32:00	-	-	-	DRY	-	-	-	-	-	-
WSA6	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 08:30:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA6	1	50	3		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA6	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 08:31:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.0	0.0	20.6	0.0	1	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.0	0.0	19.9	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.0	0.0	19.8	0.0	0	0
WSA6	1	50	3 (3)	3.00	2.80	1.00 to 3.00	12/10/2017 08:37:00	-	-	-	DRY	-	-	-	-	-	-
WSA6	1	50	4	3.00	---	1.00 to 3.00	23/10/2017 10:48:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
WSA6	1	50	4		---	1.00 to 3.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA6	1	50	4 (2)	3.00	---	1.00 to 3.00	23/10/2017 10:48:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.1	0.0	20.6	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.1	0.0	19.9	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.1	0.0	19.8	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 52 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA6	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.1	0.0	19.9	-	0	0
WSA6	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.1	0.0	19.8	-	0	0
WSA6	1	50	4 (3)	3.00	2.80	1.00 to 3.00	23/10/2017 10:54:40	-	-	-	2.80	-	-	-	-	-	-
WSA7	1	50	1	3.00	---	1.00 to 3.00	26/09/2017 11:08:00	1015	1016	0.0 _(I)	-	-	-	-	-	-	-
WSA7	1	50	1		---	1.00 to 3.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA7	1	50	1 (2)	3.00	---	1.00 to 3.00	26/09/2017 11:08:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	20 secs	-	-	-	-	2.0	0.0	18.4	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	50 secs	-	-	-	-	2.0	0.0	13.7	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	80 secs	-	-	-	-	2.0	0.0	13.3	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	110 secs	-	-	-	-	2.0	0.0	13.3	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	140 secs	-	-	-	-	2.0	0.0	13.3	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	200 secs	-	-	-	-	2.0	0.0	13.3	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	260 secs	-	-	-	-	1.9	0.0	13.7	-	0	0
WSA7	1	50	1 (2)		---	1.00 to 3.00	320 secs	-	-	-	-	1.9	0.0	13.6	-	0	0
WSA7	1	50	1 (3)	3.00	3.12	1.00 to 3.00	26/09/2017 11:15:00	-	-	-	2.20	-	-	-	-	-	-
WSA7	1	50	2	3.00	---	1.00 to 3.00	06/10/2017 07:45:00	1017	1017	0.0 _(I)	-	-	-	-	-	-	-
WSA7	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA7	1	50	2 (2)	3.00	---	1.00 to 3.00	06/10/2017 07:46:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.7	0.0	17.0	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.7	0.0	12.1	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.7	0.0	11.8	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.7	0.0	11.8	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 53 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA7	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.7	0.0	11.8	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.7	0.0	11.8	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.7	0.0	11.7	0.0	0	0
WSA7	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.7	0.0	11.7	0.0	0	0
WSA7	1	50	2 (3)	3.00	3.10	1.00 to 3.00	06/10/2017 07:52:00	-	-	-	1.93	-	-	-	-	-	-
WSA7	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 08:00:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA7	1	50	3		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA7	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 08:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.8	0.0	16.5	0.0	1	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.8	0.0	11.7	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.8	0.0	11.2	0.0	1	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.8	0.0	11.2	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.8	0.0	11.1	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.8	0.0	11.1	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.8	0.0	11.0	0.0	0	0
WSA7	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.8	0.0	11.0	0.0	0	0
WSA7	1	50	3 (3)	3.00	3.09	1.00 to 3.00	12/10/2017 08:07:00	-	-	-	1.82	-	-	-	-	-	-
WSA7	1	50	4	3.00	---	1.00 to 3.00	23/10/2017 10:01:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA7	1	50	4		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA7	1	50	4 (2)	3.00	---	1.00 to 3.00	23/10/2017 10:02:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.0	0.0	17.7	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.1	0.0	12.0	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.1	0.0	11.5	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.1	0.0	11.4	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.1	0.0	11.4	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 54 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA7	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.0	0.0	11.6	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	11.9	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	11.7	-	0	0
WSA7	1	50	4 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	2.0	0.0	11.7	-	0	0
WSA7	1	50	4 (3)	3.00	3.10	1.00 to 3.00	23/10/2017 10:09:00	-	-	-	1.75	-	-	-	-	-	-
WSA8	1	50	1	5.00	---	2.00 to 5.00	26/09/2017 10:49:00	1015	1016	0.0 _(I)	-	-	-	-	-	-	-
WSA8	1	50	1		---	2.00 to 5.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA8	1	50	1 (2)	5.00	---	2.00 to 5.00	26/09/2017 10:49:40	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	20 secs	-	-	-	-	1.7	0.0	20.3	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	40 secs	-	-	-	-	1.7	0.0	18.9	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.8	0.0	18.8	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	80 secs	-	-	-	-	1.8	0.0	18.7	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	110 secs	-	-	-	-	1.9	0.0	18.7	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	140 secs	-	-	-	-	1.9	0.0	18.6	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	200 secs	-	-	-	-	1.8	0.0	18.8	-	0	0
WSA8	1	50	1 (2)		---	2.00 to 5.00	260 secs	-	-	-	-	1.8	0.0	18.8	-	0	0
WSA8	1	50	1 (3)	5.00	5.08	2.00 to 5.00	26/09/2017 10:56:00	-	-	-	DRY	-	-	-	-	-	-
WSA8	1	50	2	5.00	---	2.00 to 5.00	06/10/2017 08:10:00	1017	1017	0.0 _(I)	-	-	-	-	-	-	-
WSA8	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA8	1	50	2 (2)	5.00	---	2.00 to 5.00	06/10/2017 08:11:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.1	21.0	2.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	21.0	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	21.0	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	21.0	0.0	0	0


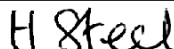
Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 55 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA8	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.3	0.0	21.0	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.4	0.0	21.0	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.5	0.0	21.0	0.0	0	0
WSA8	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.5	0.0	21.0	0.0	0	0
WSA8	1	50	2 (3)	5.00	5.08	2.00 to 5.00	06/10/2017 08:17:00	-	-	-	DRY	-	-	-	-	-	-
WSA8	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 08:15:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA8	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA8	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 08:16:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.3	0.0	20.7	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	20.7	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.4	0.0	20.6	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.5	0.0	20.5	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.5	0.0	20.4	0.0	1	0
WSA8	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.6	0.0	20.3	0.0	1	0
WSA8	1	50	3 (3)	5.00	5.07	2.00 to 5.00	12/10/2017 08:22:00	-	-	-	DRY	-	-	-	-	-	-
WSA8	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 10:59:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA8	1	50	4		---	2.00 to 5.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA8	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 10:59:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	0.4	0.0	20.8	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.4	0.0	20.5	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.5	0.0	20.5	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.5	0.0	20.5	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.5	0.0	20.4	-	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref: 313582
	 Contract:	13/11/17			
M1 Junction 15 Main Site					Page: 56 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA8	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.6	0.0	20.4	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.6	0.0	20.4	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.5	0.0	20.4	-	0	0
WSA8	1	50	4 (2)		---	2.00 to 5.00	360 secs	-	-	-	-	0.5	0.0	20.4	-	0	0
WSA8	1	50	4 (3)	5.00	5.05	2.00 to 5.00	23/10/2017 11:06:40	-	-	-	5.05	-	-	-	-	-	-
WSA9	1	50	1	5.00	---	2.00 to 5.00	25/09/2017	1012	1012	4.2 _(I)	-	-	-	-	-	-	-
WSA9	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA9	1	50	1 (2)	5.00	---	2.00 to 5.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA9	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.4	0.0	18.5	0.0	13	0
WSA9	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.4	0.0	16.7	0.0	16	0
WSA9	1	50	1 (2)		---	2.00 to 5.00	67 secs	-	-	-	-	1.4	0.0	16.4	0.0	17	0
WSA9	1	50	1 (3)	5.00	5.00	2.00 to 5.00	25/09/2017 00:02:30	-	-	-	0.61	-	-	-	-	-	-
Remarks: Pump flow failure at 67 seconds.																	
WSA9	1	50	2	5.00	---	2.00 to 5.00	04/10/2017	1029	1011	14.1 _(I)	-	-	-	-	-	-	-
WSA9	1	50	2		---	2.00 to 5.00	360 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA9	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 00:07:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.1	0.0	19.1	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.2	0.0	17.9	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0
WSA9	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.2	0.0	17.8	0.0	1	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 57 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA9	1	50	2 (3)	5.00	5.10	2.00 to 5.00	04/10/2017 00:13:00	-	-	-	3.49	-	-	-	-	-	-
WSA9	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 08:57:00	1012	1012	8.7 _(I)	-	-	-	-	-	-	-
WSA9	1	50	3		---	2.00 to 5.00	180 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA9	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 09:01:00	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.4	0.0	19.7	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.4	0.0	17.5	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.4	0.0	17.3	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	150 secs	-	-	-	-	2.4	0.0	17.3	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.4	0.0	17.3	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.5	0.0	17.3	-	0	0
WSA9	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.4	0.0	17.4	-	0	0
WSA9	1	50	3 (3)	5.00	5.11	2.00 to 5.00	12/10/2017 09:07:00	-	-	-	3.50	2.4	0.0	17.4	-	0	0
WSA9	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 09:03:00	1009	1009	2.0 _(I)	-	-	-	-	-	-	-
WSA9	1	50	4		---	2.00 to 5.00	60 secs	-	-	0.3 _(SS)	-	-	-	-	-	-	-
WSA9	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 09:05:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	2.7	0.0	19.4	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.7	0.0	16.0	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.7	0.0	15.6	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.7	0.0	15.6	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.7	0.0	15.6	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	2.6	0.0	15.7	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	2.6	0.0	15.8	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	2.6	0.0	15.7	-	0	0
WSA9	1	50	4 (2)		---	2.00 to 5.00	360 secs	-	-	-	-	2.6	0.0	15.7	-	0	0
WSA9	1	50	4 (3)	5.00	5.10	2.00 to 5.00	23/10/2017 09:12:00	-	-	-	2.45	-	-	-	-	-	-


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 58 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA10	1	50	1	5.00	---	2.00 to 5.00	26/09/2017 11:36:00	1014	1015	0.0 _(I)	-	-	-	-	-	-	-
WSA10	1	50	1		---	2.00 to 5.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA10	1	50	1 (2)	5.00	---	2.00 to 5.00	26/09/2017 11:36:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	20 secs	-	-	-	-	4.6	0.0	19.1	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	80 secs	-	-	-	-	4.6	0.0	15.7	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	110 secs	-	-	-	-	4.6	0.0	15.5	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	140 secs	-	-	-	-	4.6	0.0	15.5	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	170 secs	-	-	-	-	4.6	0.0	15.5	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	200 secs	-	-	-	-	4.6	0.0	15.5	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	260 secs	-	-	-	-	4.4	0.0	15.8	-	0	0
WSA10	1	50	1 (2)		---	2.00 to 5.00	320 secs	-	-	-	-	4.4	0.0	15.7	-	0	0
WSA10	1	50	1 (3)	5.00	5.10	2.00 to 5.00	26/09/2017 11:44:00	-	-	-	DRY	-	-	-	-	-	-
WSA10	1	50	2	5.00	---	2.00 to 5.00	06/10/2017 09:03:00	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WSA10	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA10	1	50	2 (2)	5.00	---	2.00 to 5.00	06/10/2017 09:04:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	4.4	0.0	18.1	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	4.4	0.0	15.7	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	4.4	0.0	15.6	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	4.5	0.0	15.6	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	4.4	0.0	15.6	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	4.4	0.0	15.7	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	4.3	0.0	15.7	0.0	0	0
WSA10	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	4.4	0.0	15.6	0.0	0	0
WSA10	1	50	2 (3)	5.00	5.08	2.00 to 5.00	06/10/2017 09:10:00	-	-	-	5.07	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.


 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 59 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA10	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 10:35:00	1012	1012	0.0 _(I)	-	-	-	-	-	-	-
WSA10	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA10	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 10:36:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	4.1	0.0	18.8	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	4.2	0.0	16.0	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	4.2	0.0	15.7	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	4.2	0.0	15.7	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	4.2	0.0	15.7	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	4.1	0.0	15.8	-	0	0
WSA10	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	4.0	0.0	15.9	-	0	0
WSA10	1	50	3 (3)	5.00	5.10	2.00 to 5.00	12/10/2017 10:47:00	-	-	-	5.10	4.1	0.0	15.9	-	0	0
WSA10	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 11:31:00	1008	1008	0.0 _(I)	-	-	-	-	-	-	-
WSA10	1	50	4		---	2.00 to 5.00	20 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA10	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 11:31:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	3.9	0.0	19.6	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	4.0	0.0	17.0	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	4.0	0.0	16.8	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	4.0	0.0	16.8	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	4.0	0.0	16.8	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	3.9	0.0	16.9	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	3.9	0.0	16.9	-	0	0
WSA10	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	3.9	0.0	16.9	-	0	0
WSA10	1	50	4 (3)	5.00	5.10	2.00 to 5.00	23/10/2017 11:37:40	-	-	-	4.96	-	-	-	-	-	-
WSA11	1	50	1	5.00	---	2.00 to 5.00	26/09/2017	1011	1011	0.0 _(I)	-	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
Contract: M1 Junction 15 Main Site					Page: 60 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA11	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA11	1	50	1 (2)	5.00	---	2.00 to 5.00	26/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.7	0.0	19.1	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.7	0.0	18.5	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.7	0.0	18.4	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.7	0.0	18.3	0.0	0	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.8	0.0	18.3	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.8	0.0	18.3	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.7	0.0	18.4	0.0	1	0
WSA11	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.7	0.0	18.4	0.0	1	0
WSA11	1	50	1 (3)	5.00	4.90	2.00 to 5.00	26/09/2017 00:07:00	-	-	-	3.80	-	-	-	-	-	-
WSA11	1	50	2	5.00	---	2.00 to 5.00	06/10/2017 08:30:00	1013	1013	0.1 _(I)	-	-	-	-	-	-	-
WSA11	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA11	1	50	2 (2)	5.00	---	2.00 to 5.00	06/10/2017 08:31:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.9	0.0	18.3	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.0	0.0	16.2	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.0	0.0	16.1	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.0	0.0	16.1	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.0	0.0	16.1	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.9	0.0	16.2	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.9	0.0	16.3	0.0	0	0
WSA11	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.9	0.0	16.2	0.0	0	0
WSA11	1	50	2 (3)	5.00	4.90	2.00 to 5.00	06/10/2017 08:37:00	-	-	-	3.80	-	-	-	-	-	-
WSA11	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 10:24:00	1013	1013	-0.1 _(I)	-	-	-	-	-	-	-
WSA11	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 61 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA11	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 10:25:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	20 secs	-	-	-	-	1.9	0.0	18.9	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	40 secs	-	-	-	-	1.9	0.0	15.6	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.9	0.0	15.4	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.9	0.0	15.3	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.9	0.0	15.3	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.9	0.0	15.4	-	0	0
WSA11	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.8	0.0	15.6	-	0	0
WSA11	1	50	3 (3)	5.00	4.92	2.00 to 5.00	12/10/2017 10:31:00	-	-	-	3.77	1.8	0.0	15.5	-	0	0
WSA11	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 11:20:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA11	1	50	4		---	2.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA11	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 11:20:30	-	-	-	-	0.2	0.0	20.7	-	0	0
WSA11	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 11:20:45	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.9	0.0	19.2	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	2.0	0.0	16.3	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	2.0	0.0	16.0	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	2.0	0.0	16.0	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	2.0	0.0	16.0	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.9	0.0	16.2	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.9	0.0	16.2	-	0	0
WSA11	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.9	0.0	16.1	-	0	0
WSA11	1	50	4 (3)	5.00	4.93	2.00 to 5.00	23/10/2017 11:26:45	-	-	-	3.75	-	-	-	-	-	-
WSA12	1	50	1	4.00	---	3.00 to 4.00	22/09/2017	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WSA12	1	50	1 (2)	4.00	---	3.00 to 4.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 62 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA12	1	50	1 (2)		---	3.00 to 4.00	15 secs	-	-	-	-	1.2	0.0	17.0	0.0	12	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	30 secs	-	-	-	-	1.1	0.0	15.5	0.0	13	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	60 secs	-	-	-	-	0.8	0.0	16.8	0.0	10	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	90 secs	-	-	-	-	0.8	0.0	17.1	0.0	8	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	120 secs	-	-	-	-	0.7	0.0	17.3	0.0	8	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	180 secs	-	-	-	-	0.7	0.0	17.3	0.0	8	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	240 secs	-	-	-	-	0.7	0.0	17.4	0.0	8	0
WSA12	1	50	1 (2)		---	3.00 to 4.00	300 secs	-	-	-	-	0.7	0.0	17.4	0.0	8	0
WSA12	1	50	1 (3)	4.00	4.07	3.00 to 4.00	22/09/2017 00:07:00	-	-	-	2.81	-	-	-	-	-	-
WSA12	1	50	1	4.00	---	3.00 to 4.00	28/09/2017 00:00:30	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA12	1	50	2	4.00	---	3.00 to 4.00	04/10/2017	1012	1012	-0.1 _(I)	-	-	-	-	-	-	-
WSA12	1	50	2		---	3.00 to 4.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA12	1	50	2 (2)	4.00	---	3.00 to 4.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	15 secs	-	-	-	-	1.9	0.0	14.5	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	30 secs	-	-	-	-	1.8	0.0	13.2	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	60 secs	-	-	-	-	1.8	0.0	13.0	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	90 secs	-	-	-	-	1.8	0.0	12.9	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	120 secs	-	-	-	-	1.8	0.0	12.9	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	180 secs	-	-	-	-	1.8	0.0	12.8	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	240 secs	-	-	-	-	1.8	0.0	12.8	0.0	4	0
WSA12	1	50	2 (2)		---	3.00 to 4.00	300 secs	-	-	-	-	1.8	0.0	12.8	0.0	3	0
WSA12	1	50	2 (3)	4.00	4.08	3.00 to 4.00	04/10/2017 00:07:00	-	-	-	2.80	-	-	-	-	-	-
WSA12	1	50	3	4.00	---	3.00 to 4.00	12/10/2017 11:14:00	1014	1014	0.1 _(I)	-	-	-	-	-	-	-
WSA12	1	50	3		---	3.00 to 4.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA12	1	50	3 (2)	4.00	---	3.00 to 4.00	12/10/2017 11:15:00	-	-	-	-	0.1	0.0	20.9	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 63 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA12	1	50	3 (2)		---	3.00 to 4.00	20 secs	-	-	-	-	2.3	0.0	16.6	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	30 secs	-	-	-	-	2.2	0.0	11.9	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	60 secs	-	-	-	-	2.1	0.0	11.7	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	90 secs	-	-	-	-	2.1	0.0	11.7	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	120 secs	-	-	-	-	2.1	0.0	11.6	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	180 secs	-	-	-	-	2.1	0.0	11.6	-	0	0
WSA12	1	50	3 (2)		---	3.00 to 4.00	240 secs	-	-	-	-	2.1	0.0	11.6	-	0	0
WSA12	1	50	3 (3)	4.00	4.08	3.00 to 4.00	12/10/2017 11:21:00	-	-	-	2.81	2.2	0.0	11.5	-	0	0
WSA12	1	50	4	4.00	---	3.00 to 4.00	24/10/2017 09:44:00	1008	1008	0.2 _(I)	-	-	-	-	-	-	-
WSA12	1	50	4		---	3.00 to 4.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA12	1	50	4 (2)	4.00	---	3.00 to 4.00	24/10/2017 09:45:00	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	15 secs	-	-	-	-	2.9	0.0	16.0	-	2	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	30 secs	-	-	-	-	2.8	0.0	10.2	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	60 secs	-	-	-	-	2.8	0.0	9.8	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	90 secs	-	-	-	-	2.8	0.0	9.7	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	120 secs	-	-	-	-	2.8	0.0	9.7	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	180 secs	-	-	-	-	2.8	0.0	9.6	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	240 secs	-	-	-	-	2.8	0.0	9.6	-	3	0
WSA12	1	50	4 (2)		---	3.00 to 4.00	300 secs	-	-	-	-	2.8	0.0	9.6	-	3	0
WSA12	1	50	4 (3)	4.00	4.10	3.00 to 4.00	24/10/2017 09:51:00	-	-	-	2.80	-	-	-	-	-	-
WSA13	1	50	1	3.00	---	2.00 to 3.00	22/09/2017 14:08:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
WSA13	1	50	1		---	2.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA13	1	50	1 (2)	3.00	---	2.00 to 3.00	22/09/2017 14:09:00	-	-	-	-	0.0	0.0	20.8	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	15 secs	-	-	-	-	3.0	0.0	15.6	0.0	1	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 64 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA13	1	50	1 (2)		---	2.00 to 3.00	30 secs	-	-	-	-	3.1	0.0	14.4	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	60 secs	-	-	-	-	3.1	0.0	14.3	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	90 secs	-	-	-	-	3.1	0.0	14.3	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	120 secs	-	-	-	-	3.1	0.0	14.3	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	180 secs	-	-	-	-	3.0	0.0	14.6	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	240 secs	-	-	-	-	3.0	0.0	14.6	0.0	0	0
WSA13	1	50	1 (2)		---	2.00 to 3.00	300 secs	-	-	-	-	3.0	0.0	14.4	0.0	0	0
WSA13	1	50	1 (3)	3.00	3.15	2.00 to 3.00	22/09/2017 14:15:00	-	-	-	2.55	-	-	-	-	-	-
WSA13	1	50	2	3.00	---	2.00 to 3.00	04/10/2017 14:54:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA13	1	50	2		---	2.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA13	1	50	2 (2)	3.00	---	2.00 to 3.00	04/10/2017 14:55:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	15 secs	-	-	-	-	3.2	0.0	14.6	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	13.1	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	12.9	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	12.9	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	13.0	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	13.2	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	240 secs	-	-	-	-	3.2	0.0	13.2	0.0	0	0
WSA13	1	50	2 (2)		---	2.00 to 3.00	300 secs	-	-	-	-	3.2	0.0	13.0	0.0	0	0
WSA13	1	50	2 (3)	3.00	3.12	2.00 to 3.00	04/10/2017 15:01:00	-	-	-	2.53	-	-	-	-	-	-
WSA13	1	50	3	3.00	---	2.00 to 3.00	12/10/2017 11:47:00	1014	1014	0.0 _(I)	-	-	-	-	-	-	-
WSA13	1	50	3		---	2.00 to 3.00	60 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA13	1	50	3 (2)	3.00	---	2.00 to 3.00	12/10/2017 11:48:30	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	30 secs	-	-	-	-	3.2	0.0	17.2	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	13.8	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 65 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA13	1	50	3 (2)		---	2.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	13.5	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	13.5	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	150 secs	-	-	-	-	3.3	0.0	13.5	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	210 secs	-	-	-	-	3.1	0.0	13.8	-	0	0
WSA13	1	50	3 (2)		---	2.00 to 3.00	270 secs	-	-	-	-	3.1	0.0	13.9	-	0	0
WSA13	1	50	3 (3)	3.00	3.15	2.00 to 3.00	12/10/2017 11:55:00	-	-	-	2.53	3.2	0.0	13.6	-	0	0
WSA13	1	50	4	3.00	---	2.00 to 3.00	24/10/2017 10:16:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
WSA13	1	50	4		---	2.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA13	1	50	4 (2)	3.00	---	2.00 to 3.00	24/10/2017 10:17:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	15 secs	-	-	-	-	3.2	0.0	18.6	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	15.5	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	15.2	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	15.2	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	15.2	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	15.4	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	240 secs	-	-	-	-	3.1	0.0	15.5	-	0	0
WSA13	1	50	4 (2)		---	2.00 to 3.00	300 secs	-	-	-	-	3.2	0.0	15.3	-	0	0
WSA13	1	50	4 (3)	3.00	3.15	2.00 to 3.00	24/10/2017 10:23:00	-	-	-	2.55	-	-	-	-	-	-
WSA14	1	50	1	5.00	---	2.00 to 5.00	22/09/2017 13:29:00	1011	1011	0.1 _(I)	-	-	-	-	-	-	-
WSA14	1	50	1		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA14	1	50	1 (2)	5.00	---	2.00 to 5.00	22/09/2017 13:30:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA14	1	50	1 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.0	0.0	20.0	0.0	133	0
WSA14	1	50	1 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.0	0.0	19.8	0.0	137	0
WSA14	1	50	1 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.0	0.0	19.8	0.0	129	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 66 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA14	1	50	1 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.0	0.0	19.7	0.0	125	1
WSA14	1	50	1 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.0	0.0	19.7	0.0	122	1
WSA14	1	50	1 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.0	0.0	19.7	0.0	119	1
WSA14	1	50	1 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.9	0.0	19.7	0.0	121	1
WSA14	1	50	1 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.0	0.0	19.6	0.0	130	1
WSA14	1	50	1 (3)	5.00	5.05	2.00 to 5.00	22/09/2017 13:36:00	-	-	-	2.26	-	-	-	-	-	-
WSA14	1	50	2	5.00	---	2.00 to 5.00	04/10/2017	1012	1012	0.2 _(I)	-	-	-	-	-	-	-
WSA14	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA14	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.8	0.0	19.7	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.9	0.0	17.9	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.9	0.0	17.8	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.9	0.0	17.8	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.9	0.0	17.7	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.9	0.0	17.7	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.9	0.0	17.6	0.0	1	0
WSA14	1	50	2 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.9	0.0	17.6	0.0	1	0
WSA14	1	50	2 (3)	5.00	5.04	2.00 to 5.00	04/10/2017 00:07:00	-	-	-	2.21	-	-	-	-	-	-
WSA14	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 11:37:00	1015	1015	0.0 _(I)	-	-	-	-	-	-	-
WSA14	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA14	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 11:38:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	0.9	0.0	20.2	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.9	0.0	19.8	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.9	0.0	19.7	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.9	0.0	19.7	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 67 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA14	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.9	0.0	19.7	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.9	0.0	19.8	-	0	0
WSA14	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	0.9	0.0	19.8	-	0	0
WSA14	1	50	3 (3)	5.00	5.02	2.00 to 5.00	12/10/2017 11:44:00	-	-	-	2.20	0.9	0.0	19.8	-	0	0
WSA14	1	50	4	5.00	---	2.00 to 5.00	24/10/2017 10:06:00	1009	1009	0.1 _(I)	-	-	-	-	-	-	-
WSA14	1	50	4		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA14	1	50	4 (2)	5.00	---	2.00 to 5.00	24/10/2017 10:07:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.1	0.0	20.5	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.1	0.0	19.8	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.1	0.0	19.7	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.1	0.0	19.8	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.1	0.0	19.8	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.1	0.0	19.8	-	3	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.1	0.0	19.8	-	2	0
WSA14	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.1	0.0	19.8	-	3	0
WSA14	1	50	4 (3)	5.00	5.00	2.00 to 5.00	24/10/2017 10:13:00	-	-	-	2.20	-	-	-	-	-	-
WSA15	1	50	1	3.00	---	1.00 to 3.00	22/09/2017	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WSA15	1	50	1		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA15	1	50	1 (2)	3.00	---	1.00 to 3.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.3	0.0	18.1	0.0	1	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.4	0.0	16.5	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.4	0.0	16.4	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.4	0.0	16.4	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.4	0.0	16.4	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
Contract: M1 Junction 15 Main Site					Page: 68 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA15	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.4	0.0	16.4	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.4	0.0	16.5	0.0	0	0
WSA15	1	50	1 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.4	0.0	16.5	0.0	0	0
WSA15	1	50	1 (3)	3.00	3.09	1.00 to 3.00	22/09/2017 00:07:00	-	-	-	DRY	-	-	-	-	-	-
WSA15	1	50	2	3.00	---	1.00 to 3.00	04/10/2017 15:26:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA15	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA15	1	50	2 (2)	3.00	---	1.00 to 3.00	04/10/2017 15:27:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.9	0.0	15.0	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.9	0.0	15.0	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.9	0.0	15.0	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	15.1	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	15.1	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	15.2	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.8	0.0	15.3	0.0	0	0
WSA15	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.8	0.0	15.2	0.0	0	0
WSA15	1	50	2 (3)	3.00	3.06	1.00 to 3.00	04/10/2017 15:33:00	-	-	-	DRY	-	-	-	-	-	-
WSA15	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 12:28:00	1015	1015	-0.1 _(I)	-	-	-	-	-	-	-
WSA15	1	50	3		---	1.00 to 3.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WSA15	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 12:29:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.7	0.0	18.6	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.8	0.0	16.0	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	15.8	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	15.8	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	15.9	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.7	0.0	16.0	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 69 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA15	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.7	0.0	16.2	-	0	0
WSA15	1	50	3 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	2.7	0.0	16.1	-	0	0
WSA15	1	50	3 (3)	3.00	3.08	1.00 to 3.00	12/10/2017 12:36:00	-	-	-	3.08	0.5	0.0	17.5	-	0	0
WSA15	1	50	4	3.00	---	1.00 to 3.00	24/10/2017 11:09:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA15	1	50	4		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA15	1	50	4 (2)	3.00	---	1.00 to 3.00	24/10/2017 11:10:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.6	0.0	19.4	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.6	0.0	16.9	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.6	0.0	16.7	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.6	0.0	16.7	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.6	0.0	16.7	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.6	0.0	16.6	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.5	0.0	16.8	-	0	0
WSA15	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.5	0.0	16.8	-	0	0
WSA15	1	50	4 (3)	3.00	3.08	1.00 to 3.00	24/10/2017 11:16:00	-	-	-	3.08	-	-	-	-	-	-
WSA16	1	50	1	3.00	---	1.00 to 3.00	22/09/2017	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WSA16	1	50	1 (2)	3.00	---	1.00 to 3.00	22/09/2017 00:00:30	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA16	1	50	1 (2)	3.00	---	1.00 to 3.00	22/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.9	0.0	19.1	0.0	1	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	<i>H Steel</i>	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 70 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA16	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	1 (2)		3.03	1.00 to 3.00	300 secs	-	-	-	DRY	-	-	-	-	-	-
WSA16	1	50	1 (3)	3.00	---	1.00 to 3.00	22/09/2017 00:07:00	-	-	-	-	2.0	0.0	18.0	0.0	0	0
WSA16	1	50	2	3.00	---	1.00 to 3.00	04/10/2017 15:39:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA16	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA16	1	50	2 (2)	3.00	---	1.00 to 3.00	04/10/2017 15:40:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.2	0.0	18.7	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.2	0.0	17.8	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.1	0.0	17.9	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.1	0.0	17.9	0.0	0	0
WSA16	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.1	0.0	17.9	0.0	0	0
WSA16	1	50	2 (3)	3.00	3.05	1.00 to 3.00	04/10/2017 15:46:00	-	-	-	DRY	-	-	-	-	-	-
WSA16	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 12:18:00	1014	1014	-0.1 _(I)	-	-	-	-	-	-	-
WSA16	1	50	3		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA16	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 12:19:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.1	0.0	19.6	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.1	0.0	18.2	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.1	0.0	18.1	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	150 secs	-	-	-	-	2.1	0.0	18.1	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.1	0.0	18.1	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.1	0.0	18.2	-	0	0
WSA16	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.1	0.0	18.3	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 71 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA16	1	50	3 (3)	3.00	3.07	1.00 to 3.00	12/10/2017 12:25:00	-	-	-	3.07	2.1	0.0	18.3	-	0	0
WSA16	1	50	4	3.00	---	1.00 to 3.00	24/10/2017 10:44:00	1009	1009	0.0 _(I)	-	-	-	-	-	-	-
WSA16	1	50	4		---	1.00 to 3.00	15 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA16	1	50	4 (2)	3.00	---	1.00 to 3.00	24/10/2017 10:44:30	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	2.1	0.0	20.2	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.1	0.0	19.1	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.1	0.0	19.0	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.1	0.0	19.0	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.1	0.0	19.0	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.1	0.0	19.0	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WSA16	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	19.1	-	0	0
WSA16	1	50	4 (3)	3.00	3.08	1.00 to 3.00	24/10/2017 10:50:30	-	-	-	3.08	-	-	-	-	-	-
WSA17	1	50	1	3.00	---	1.00 to 3.00	25/09/2017	1026	1012	0.0 _(I)	-	-	-	-	-	-	-
WSA17	1	50	1		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA17	1	50	1 (2)	3.00	---	1.00 to 3.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	0.8	0.1	16.9	2.0	6	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	0.8	0.1	12.6	2.0	2	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.9	0.1	12.2	2.0	2	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.9	0.1	11.9	2.0	2	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.9	0.1	11.7	2.0	2	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.9	0.1	11.4	2.0	2	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.9	0.1	11.2	2.0	1	0
WSA17	1	50	1 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.9	0.1	11.0	2.0	1	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 72 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA17	1	50	1 (3)	3.00	2.96	1.00 to 3.00	25/09/2017 00:07:00	-	-	-	2.10	-	-	-	-	-	-
WSA17	1	50	2	3.00	---	1.00 to 3.00	06/10/2017 09:40:00	1017	1018	-0.1 _(I)	-	-	-	-	-	-	-
WSA17	1	50	2		---	1.00 to 3.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WSA17	1	50	2 (2)	3.00	---	1.00 to 3.00	06/10/2017 09:41:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	0.5	0.0	17.1	0.0	8	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	0.5	0.0	15.4	0.0	5	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.5	0.0	15.1	0.0	2	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	14.7	0.0	1	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.6	0.0	14.1	0.0	1	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.7	0.0	13.1	0.0	1	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.7	0.0	12.3	0.0	0	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.8	0.0	11.6	0.0	0	0
WSA17	1	50	2 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	0.8	0.0	11.1	0.0	0	0
WSA17	1	50	2 (3)	3.00	2.98	1.00 to 3.00	06/10/2017 09:48:00	-	-	-	2.44	-	-	-	-	-	-
WSA17	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 09:56:00	1019	1013	-0.1 _(I)	-	-	-	-	-	-	-
WSA17	1	50	3		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA17	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 09:57:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.9	0.0	20.0	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.9	0.0	14.7	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	100 secs	-	-	-	-	0.9	0.0	12.3	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.9	0.0	11.3	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	150 secs	-	-	-	-	0.9	0.0	11.0	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.9	0.0	10.9	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.9	0.0	10.9	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.9	0.0	10.9	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 73 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA17	1	50	3 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	0.9	0.0	11.0	-	0	0
WSA17	1	50	3 (2)		---	1.00 to 3.00	420 secs	-	-	-	-	0.9	0.0	11.3	-	0	0
WSA17	1	50	3 (3)	3.00	2.98	1.00 to 3.00	12/10/2017 10:06:00	-	-	-	2.39	0.9	0.0	11.4	-	0	0
WSA17	1	50	4	3.00	---	1.00 to 3.00	23/10/2017 09:46:00	1010	1010	0.0 _(I)	-	-	-	-	-	-	-
WSA17	1	50	4		---	1.00 to 3.00	60 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA17	1	50	4 (2)	3.00	---	1.00 to 3.00	23/10/2017 09:47:30	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	0.9	0.0	18.5	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	0.9	0.0	13.7	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.8	0.0	13.4	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.9	0.0	13.3	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.9	0.0	12.7	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.9	0.0	12.6	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.9	0.0	12.6	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.9	0.0	12.6	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	0.9	0.0	12.5	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	420 secs	-	-	-	-	0.9	0.0	12.5	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	480 secs	-	-	-	-	0.9	0.0	12.5	-	0	0
WSA17	1	50	4 (2)		---	1.00 to 3.00	540 secs	-	-	-	-	0.9	0.0	12.5	-	0	0
WSA17	1	50	4 (3)	3.00	2.98	1.00 to 3.00	23/10/2017 09:57:30	-	-	-	2.32	-	-	-	-	-	-
WSA18	1	50	1	5.00	5.10	2.00 to 5.00	25/09/2017	-	-	-	0.00	-	-	-	-	-	-
Remarks: Area around borehole flooded. Opened bung, water remained. Dip only.																	
WSA18	1	50	2	5.00	---	2.00 to 5.00	04/10/2017	1013	1012	3.6 _(I)	-	-	-	-	-	-	-
WSA18	1	50	2		---	2.00 to 5.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA18	1	50	2 (2)	5.00	---	2.00 to 5.00	04/10/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 74 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA18	1	50	2 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.3	0.0	19.6	0.0	1	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.1	0.0	19.2	0.0	0	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	0.6	0.0	20.1	0.0	0	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
WSA18	1	50	2 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
WSA18	1	50	2 (3)	5.00	---	2.00 to 5.00	04/10/2017 00:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0	0
WSA18	1	50	2 (3)		5.08	2.00 to 5.00	360 secs	-	-	-	1.08	-	-	-	-	-	-
WSA18	1	50	3	5.00	---	2.00 to 5.00	12/10/2017 09:45:00	1014	1014	0.5 _(I)	-	-	-	-	-	-	-
WSA18	1	50	3		---	2.00 to 5.00	30 secs	-	-	0.2 _(SS)	-	-	-	-	-	-	-
WSA18	1	50	3 (2)	5.00	---	2.00 to 5.00	12/10/2017 09:46:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.9	0.0	20.0	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.9	0.0	18.1	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.9	0.0	17.9	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	150 secs	-	-	-	-	1.9	0.0	17.9	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.9	0.0	17.9	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.8	0.0	18.0	-	0	0
WSA18	1	50	3 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.8	0.0	18.0	-	0	0
WSA18	1	50	3 (3)	5.00	5.06	2.00 to 5.00	12/10/2017 09:52:00	-	-	-	2.54	1.8	0.0	18.0	-	0	0
WSA18	1	50	4	5.00	---	2.00 to 5.00	23/10/2017 09:35:00	1010	1010	0.1 _(I)	-	-	-	-	-	-	-
WSA18	1	50	4		---	2.00 to 5.00	20 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA18	1	50	4 (2)	5.00	---	2.00 to 5.00	23/10/2017 09:35:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	15 secs	-	-	-	-	1.9	0.0	19.7	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	30 secs	-	-	-	-	1.9	0.0	17.7	-	1	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 75 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA18	1	50	4 (2)		---	2.00 to 5.00	60 secs	-	-	-	-	1.9	0.0	17.5	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	90 secs	-	-	-	-	1.9	0.0	17.5	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	120 secs	-	-	-	-	1.9	0.0	17.5	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	180 secs	-	-	-	-	1.8	0.0	17.6	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	240 secs	-	-	-	-	1.8	0.0	17.6	-	1	0
WSA18	1	50	4 (2)		---	2.00 to 5.00	300 secs	-	-	-	-	1.8	0.0	17.6	-	1	0
WSA18	1	50	4 (3)	5.00	5.07	2.00 to 5.00	23/10/2017 09:41:40	-	-	-	2.16	-	-	-	-	-	-
WSA19	1	50	1	3.00	---	1.00 to 3.00	25/09/2017	1010	1012	-2.5 _(I)	-	-	-	-	-	-	-
WSA19	1	50	1		---	1.00 to 3.00	30 secs	-	-	-0.1 _(SS)	-	-	-	-	-	-	-
WSA19	1	50	1 (2)	3.00	---	1.00 to 3.00	25/09/2017 00:01:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.8	0.0	18.4	0.0	1	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	2.0	0.0	15.5	0.0	1	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	2.2	0.0	14.8	0.0	0	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	2.2	0.0	14.6	0.0	0	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	2.3	0.0	14.6	0.0	0	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	2.3	0.0	14.5	0.0	0	0
WSA19	1	50	1 (2)		---	1.00 to 3.00	222 secs	-	-	-	-	2.3	0.0	14.5	0.0	0	0
WSA19	1	50	1 (3)	3.00	3.00	1.00 to 3.00	25/09/2017 00:06:00	-	-	-	0.55	-	-	-	-	-	-
Remarks: Pump flow failed at 222 seconds due to intake of water.																	
WSA19	1	50	2	3.00	---	1.00 to 3.00	04/10/2017	1013	1012	3.6 _(I)	-	-	-	-	-	-	-
WSA19	1	50	2		---	1.00 to 3.00	180 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA19	1	50	2 (2)	3.00	---	1.00 to 3.00	04/10/2017 00:04:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.3	0.0	19.6	0.0	1	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.1	0.0	19.2	0.0	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 76 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA19	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.6	0.0	20.1	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.2	0.0	20.7	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0	0
WSA19	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.1	0.0	20.9	0.0	0	0
WSA19	1	50	2 (3)	3.00	5.08	1.00 to 3.00	04/10/2017 00:10:00	-	-	-	1.70	-	-	-	-	-	-
WSA19	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 12:48:00	1015	1015	0.3 _(I)	-	-	-	-	-	-	-
WSA19	1	50	3		---	1.00 to 3.00	60 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA19	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 12:50:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	14.5	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	40 secs	-	-	-	-	3.3	0.0	8.4	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	8.0	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	8.0	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	8.0	-	0	0
WSA19	1	50	3 (3)	3.00	---	1.00 to 3.00	12/10/2017 12:53:00	-	-	-	-	3.3	0.0	8.0	-	0	0
WSA19	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 12:54:00	-	-	-	-	3.2	0.0	8.5	-	0	0
WSA19	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	3.2	0.0	8.5	-	0	0
WSA19	1	50	3 (3)	3.00	3.00	1.00 to 3.00	12/10/2017 12:56:00	-	-	-	1.31	3.2	0.0	8.4	-	0	0
WSA19	1	50	4	3.00	---	1.00 to 3.00	24/10/2017 11:25:00	1010	1010	0.3 _(I)	-	-	-	-	-	-	-
WSA19	1	50	4		---	1.00 to 3.00	30 secs	-	-	0.1 _(SS)	-	-	-	-	-	-	-
WSA19	1	50	4 (2)	3.00	---	1.00 to 3.00	24/10/2017 11:26:00	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	3.9	0.0	15.8	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	4.0	0.0	11.3	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	4.0	0.0	11.0	-	0	0


Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 77 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA19	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	4.0	0.0	11.0	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	4.0	0.0	11.0	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	3.9	0.0	11.2	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	3.8	0.0	11.5	-	0	0
WSA19	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	3.9	0.0	11.3	-	0	0
WSA19	1	50	4 (3)	3.00	3.00	1.00 to 3.00	24/10/2017 11:32:00	-	-	-	1.32	-	-	-	-	-	-
WSA20	1	50	1	3.00	---	1.00 to 3.00	26/09/2017 10:58:00	1011	1011	0.0 _(I)	-	-	-	-	-	-	-
WSA20	1	50	1		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA20	1	50	1 (2)	3.00	---	1.00 to 3.00	26/09/2017 10:59:00	-	-	-	-	0.1	0.0	20.9	0.0	0	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	0.2	0.0	20.3	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	0.3	0.0	20.0	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.4	0.0	19.8	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	19.5	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	19.2	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.9	0.0	18.7	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.9	0.0	18.7	0.0	1	0
WSA20	1	50	1 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.7	0.0	19.1	0.0	1	0
WSA20	1	50	1 (3)	3.00	2.99	1.00 to 3.00	26/09/2017 11:05:00	-	-	-	2.45	-	-	-	-	-	-
WSA20	1	50	2	3.00	---	1.00 to 3.00	06/10/2017 08:15:00	1013	1013	0.0 _(I)	-	-	-	-	-	-	-
WSA20	1	50	2		---	1.00 to 3.00	30 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA20	1	50	2 (2)	3.00	---	1.00 to 3.00	06/10/2017 08:16:00	-	-	-	-	0.0	0.0	20.9	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	1.0	0.0	20.6	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.



 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 78 of 80



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA20	1	50	2 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	1.0	0.0	20.3	0.0	0	0
WSA20	1	50	2 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	1.0	0.0	20.4	0.0	0	0
WSA20	1	50	2 (3)	3.00	2.99	1.00 to 3.00	06/10/2017 08:22:00	-	-	-	2.87	-	-	-	-	-	-
WSA20	1	50	3	3.00	---	1.00 to 3.00	12/10/2017 09:14:00	1012	1012	0.1 _(I)	-	-	-	-	-	-	-
WSA20	1	50	3		---	1.00 to 3.00	240 secs	-	-	0.0 _(SS)	-	-	-	-	-	-	-
WSA20	1	50	3 (2)	3.00	---	1.00 to 3.00	12/10/2017 09:19:00	-	-	-	-	0.1	0.0	20.8	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.8	0.0	20.8	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.8	0.0	20.4	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.8	0.0	20.3	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	150 secs	-	-	-	-	0.8	0.0	20.3	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.8	0.0	20.3	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.8	0.0	20.3	-	0	0
WSA20	1	50	3 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.8	0.0	20.3	-	0	0
WSA20	1	50	3 (3)	3.00	3.02	1.00 to 3.00	12/10/2017 09:26:00	-	-	-	2.74	0.8	0.0	20.3	-	0	0
WSA20	1	50	4	3.00	---	1.00 to 3.00	23/10/2017 09:15:00	1009	1009	2.0 _(I)	-	-	-	-	-	-	-
WSA20	1	50	4		---	1.00 to 3.00	20 secs	-	-	0.3 _(SS)	-	-	-	-	-	-	-
WSA20	1	50	4 (2)	3.00	---	1.00 to 3.00	23/10/2017 09:15:40	-	-	-	-	0.1	0.0	20.9	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	15 secs	-	-	-	-	0.7	0.0	20.7	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	30 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	60 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	90 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	20.4	-	0	0



Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 79 of 80 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WSA20	1	50	4 (2)		---	1.00 to 3.00	180 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	240 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	300 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (2)		---	1.00 to 3.00	360 secs	-	-	-	-	0.7	0.0	20.4	-	0	0
WSA20	1	50	4 (3)	3.00	3.00	1.00 to 3.00	23/10/2017 09:22:40	-	-	-	2.59	-	-	-	-	-	-

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	H Steel	13/11/17			313582
Contract: M1 Junction 15 Main Site					Page: 80 of 80 

APPENDIX G




GROUNDWATER MONITORING RECORDS

IN-SITU WATER MONITORING RESULTS

	<u>Weather</u>	<u>Ground Conditions</u>	<u>Wind Conditions</u>	<u>Air Temperature (°C)</u>	<u>Equipment Used & Remarks</u>
Round 4	Cloudy	Dry	Medium	10	GA5000 + Dipmeter

Exploratory Position ID	Pipe Ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring	Water Depth (mbgl)	pH	Redox (mV)	Conductivity (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/l)	Remarks
BHA2	1	50	4 / 1	13.00	13.48	8.00 to 13.00	04/10/2017	10.39	9.09	336	3933	12.0	3.8	General Remarks: Samples taken, no odour.
BHA3	1	50	4 / 1	16.00	14.03	11.00 to 16.00	04/10/2017	10.05	9.08	298	1204	11.6	3.5	General Remarks: Samples taken.
BHA4	1	50	4 / 1	7.00	6.48	2.00 to 7.00	04/10/2017	2.11	7.81	309	1704	12.7	2.4	General Remarks: Samples taken, cloudy orange and no odour.
BHA5	1	50	4 / 1	8.00	8.26	4.00 to 8.00	04/10/2017	4.34	7.59	279	4223	12.7	4.1	General Remarks: Samples taken, cloudy brown and no odour.
BHA9	1	50	4 / 1	12.00	10.99	6.00 to 12.00	04/10/2017	6.76	7.79	312	1629	11.9	6.8	General Remarks: Samples taken, cloudy orange and no odour.
WSA9	1	50	4 / 1	5.00	5.10	2.00 to 5.00	04/10/2017	3.49	---	---	---	---	---	General Remarks: Unable to take sample as ran dry.
WSA14	1	50	4 / 1	5.00	5.04	2.00 to 5.00	04/10/2017	2.21	7.77	341	1710	13.2	6.8	General Remarks: Samples taken, cloudy orange and no odour.
WSA18	1	50	4 / 1	5.00	5.08	2.00 to 5.00	04/10/2017	1.70	7.87	284	1970	13.3	3.7	General Remarks: Samples taken, cloudy grey and no odour.

Key: NDA denotes 'no data available'.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
		10/11/17			313582
	Contract: M1 Junction 15 Main Site				Page: 1 of 1 

APPENDIX H LABORATORY CERTIFICATES FOR SOIL ANALYSIS

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06446
Issue Number: 1

Date: 05 October, 2017

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Darren Bench
Project Name: M1 Junction 15 Main Site
Project Ref: 313582
Order No: N/A
Date Samples Received: 04/09/17
Date Instructions Received: 22/09/17
Date Analysis Completed: 05/10/17

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Richard Wong
Client Manager

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	1.5	<0.1	3.9	0.2	% w/w	A-T-044
pH _D ^{M#}	7.52	7.45	7.55	7.00	7.53	7.88	7.71	7.45	pH	A-T-031s
Total Organic Carbon _D ^{M#}	2.28	0.76	3.15	2.17	0.76	0.92	0.56	0.60	% w/w	A-T-032s
Arsenic _D ^{M#}	7	5	8	1	<1	<1	7	6	mg/kg	A-T-024s
Cadmium _D ^{M#}	1.2	1.2	1.0	0.9	0.9	0.7	1.0	0.9	mg/kg	A-T-024s
Copper _D ^{M#}	20	7	36	18	9	11	10	10	mg/kg	A-T-024s
Chromium _D ^{M#}	38	36	31	36	44	35	23	23	mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead _D ^{M#}	72	16	21	21	20	16	15	16	mg/kg	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	A-T-024s
Nickel _D ^{M#}	28	24	33	18	20	19	19	19	mg/kg	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	1	<1	<1	<1	<1	mg/kg	A-T-024s
Zinc _D ^{M#}	481	66	66	57	55	50	57	54	mg/kg	A-T-024s

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
Nitrogen Pesticides										
Ametryn _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Atraton _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Atrazine _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Prometon _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Prometryn _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Propazine _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Simazine _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Simetryn _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Terbuthylazine _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Terbutryn _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
Pest-c										
Mevinphos _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Dichlorvos _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
alpha-Hexachlorocyclohexane (HCH) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Diazinon _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
gamma-Hexachlorocyclohexane (HCH / Lindane) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Heptachlor _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Aldrin _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
beta-Hexachlorocyclohexane (HCH) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Methyl Parathion _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Malathion _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Fenitrothion _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Heptachlor Epoxide _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Parathion (Ethyl Parathion) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
p,p-DDE _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
p,p-DDT _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
p,p-Methoxychlor _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
p,p-TDE (DDD) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
o,p-DDE _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
o,p-DDT _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
o,p-Methoxychlor _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
o,p-TDE (DDD) _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Endosulphan I _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Endosulphan II _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Endosulphan Sulphate _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Endrin _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Ethion _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Dieldrin _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon
Azinphos-methyl _A	<50	<50	-	-	-	<50	-	-	µg/kg	Subcon

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
PAH 16										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	A-T-019s

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/1	17/06446/3	17/06446/5	17/06446/6	17/06446/7	17/06446/9	17/06446/28	17/06446/29	Units	Method ref
Client Sample No							E1	E2		
Client Sample ID	WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6		
Depth to Top	0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80		
Depth To Bottom										
Date Sampled	30-Aug-17	30-Aug-17	31-Aug-17	30-Aug-17	31-Aug-17	31-Aug-17	29-Aug-17	29-Aug-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	6E	6E	6E	6E	6	6E	6A	6		
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Ali >C21-C35 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Total Aliphatics _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
Aro >C10-C12 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C12-C16 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C16-C21 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Aro >C21-C35 _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
Total Aromatics _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
TPH (Ali & Aro) _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	A-T-022s

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/33	17/06446/44							Units	Method ref
Client Sample No	E2									
Client Sample ID	BHA8	TPA3								
Depth to Top	1.00	0.10								
Depth To Bottom										
Date Sampled	29-Aug-17	12-Sep-17								
Sample Type	Soil	Soil								
Sample Matrix Code	6A	6A								
% Stones >10mm _A	<0.1	2.1							% w/w	A-T-044
pH _D ^{M#}	8.25	7.75							pH	A-T-031s
Total Organic Carbon _D ^{M#}	0.40	1.52							% w/w	A-T-032s
Arsenic _D ^{M#}	6	13							mg/kg	A-T-024s
Cadmium _D ^{M#}	0.8	1.0							mg/kg	A-T-024s
Copper _D ^{M#}	15	13							mg/kg	A-T-024s
Chromium _D ^{M#}	26	26							mg/kg	A-T-024s
Chromium (hexavalent) _D	<1	<1							mg/kg	A-T-040s
Lead _D ^{M#}	11	1000							mg/kg	A-T-024s
Mercury _D	0.30	<0.17							mg/kg	A-T-024s
Nickel _D ^{M#}	29	23							mg/kg	A-T-024s
Selenium _D ^{M#}	1	<1							mg/kg	A-T-024s
Zinc _D ^{M#}	46	58							mg/kg	A-T-024s

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/33	17/06446/44							Units	Method ref
Client Sample No	E2									
Client Sample ID	BHA8	TPA3								
Depth to Top	1.00	0.10								
Depth To Bottom										
Date Sampled	29-Aug-17	12-Sep-17								
Sample Type	Soil	Soil								
Sample Matrix Code	6A	6A								
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A								

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/33	17/06446/44							Units	Method ref
Client Sample No	E2									
Client Sample ID	BHA8	TPA3								
Depth to Top	1.00	0.10								
Depth To Bottom										
Date Sampled	29-Aug-17	12-Sep-17								
Sample Type	Soil	Soil								
Sample Matrix Code	6A	6A								
PAH 16										
Acenaphthene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02							mg/kg	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05							mg/kg	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05							mg/kg	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07							mg/kg	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06							mg/kg	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04							mg/kg	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08							mg/kg	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01							mg/kg	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03							mg/kg	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03							mg/kg	A-T-019s
Phenanthrene _A ^{M#}	<0.03	<0.03							mg/kg	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07							mg/kg	A-T-019s
PAH (total 16) _A ^{M#}	<0.08	<0.08							mg/kg	A-T-019s

Envirolab Job Number: 17/06446

Client Project Name: M1 Junction 15 Main Site

Client Project Ref: 313582

Lab Sample ID	17/06446/33	17/06446/44							Units	Method ref
Client Sample No	E2									
Client Sample ID	BHA8	TPA3								
Depth to Top	1.00	0.10								
Depth To Bottom										
Date Sampled	29-Aug-17	12-Sep-17								
Sample Type	Soil	Soil								
Sample Matrix Code	6A	6A								
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Ali >C8-C10 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Ali >C10-C12 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C12-C16 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C16-C21 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Ali >C21-C35 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Total Aliphatics _A	<0.1	<0.1							mg/kg	A-T-023s
Aro >C5-C7 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C8-C9 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C9-C10 _A [#]	<0.01	<0.01							mg/kg	A-T-022s
Aro >C10-C12 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Aro >C12-C16 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Aro >C16-C21 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Aro >C21-C35 _A [#]	<0.1	<0.1							mg/kg	A-T-023s
Total Aromatics _A	<0.1	<0.1							mg/kg	A-T-023s
TPH (Ali & Aro) _A	<0.1	<0.1							mg/kg	A-T-023s
BTEX - Benzene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01							mg/kg	A-T-022s
MTBE _A [#]	<0.01	<0.01							mg/kg	A-T-022s

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

APPENDIX I

LABORATORY CERTIFICATES FOR

GROUNDWATER ANALYSIS

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06887

Issue Number: 1

Date: 16 October, 2017

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Darren Bench

Project Name: Junc 15 M1

Project Ref: 313582

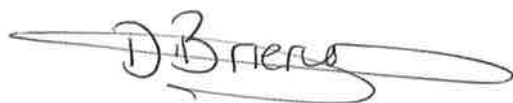
Order No: N/A

Date Samples Received: 06/10/17

Date Instructions Received: 10/10/17

Date Analysis Completed: 16/10/17

Prepared by:

A handwritten signature in black ink, appearing to read "D Brierley".

Danielle Brierley
Client Manager

Approved by:

A handwritten signature in black ink, appearing to read "I Haslock".

Iain Haslock
Analytical Consultant

Envirolab Job Number: 17/06887

Client Project Name: Junc 15 M1

Client Project Ref: 313582

Lab Sample ID	17/06887/1	17/06887/2	17/06887/3	17/06887/4	17/06887/5	17/06887/6	17/06887/7		Units	Method ref
Client Sample No										
Client Sample ID	BHA2	BHA3	BHA4	BHA5	BHA9	WSA14	WSA18			
Depth to Top	10.39	10.05	2.15	4.40	6.80	2.25	1.70			
Depth To Bottom										
Date Sampled	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17			
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW			
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
pH (w) _A [#]	6.60	6.85	6.86	6.83	6.88	6.84	6.99		pH	A-T-031w
Alkalinity (total) (w) Colorimetry _A [#]	335	333	305	247	214	257	296		mg/l Ca CO3	A-T-038w
Hardness Total _A [#]	724	2690	485	1760	350	492	491		mg/l Ca CO3	A-T-049w
DOC (w) _A [#]	3.1	3.4	4.6	1.7	2.8	1.8	7.2		mg/l	A-T-032w
Arsenic (dissolved) _A [#]	<1	<1	2	6	<1	<1	1		µg/l	A-T-025w
Boron (dissolved) _A [#]	267	3310	102	161	66	50	92		µg/l	A-T-025w
Cadmium (dissolved) _A [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		µg/l	A-T-025w
Calcium (dissolved) _A [#]	244	546	171	528	116	188	136		mg/l	A-T-049w
Copper (dissolved) _A [#]	<1	1	<1	<1	1	<1	3		µg/l	A-T-025w
Chromium (dissolved) _A [#]	6	3	<1	<1	6	3	6		µg/l	A-T-025w
Chromium (hexavalent) (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		mg/l	A-T-040w
Lead (dissolved) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-025w
Mercury (dissolved) _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		µg/l	A-T-025w
Nickel (dissolved) _A [#]	1	50	5	5	22	2	3		µg/l	A-T-025w
Selenium (dissolved) _A [#]	<1	1	<1	2	<1	<1	40		µg/l	A-T-025w
Zinc (dissolved) _A [#]	8	22	<1	5	5	2	4		µg/l	A-T-025w

Envirolab Job Number: 17/06887

Client Project Name: Junc 15 M1

Client Project Ref: 313582

Lab Sample ID	17/06887/1	17/06887/2	17/06887/3	17/06887/4	17/06887/5	17/06887/6	17/06887/7		Units	Method ref
Client Sample No										
Client Sample ID	BHA2	BHA3	BHA4	BHA5	BHA9	WSA14	WSA18			
Depth to Top	10.39	10.05	2.15	4.40	6.80	2.25	1.70			
Depth To Bottom										
Date Sampled	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17			
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW			
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
PAH 16MS (w)										
Acenaphthene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Acenaphthylene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Anthracene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Benzo(a)anthracene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Benzo(a)pyrene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01		µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01		µg/l	A-T-019w
Benzo(ghi)perylene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Chrysene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01		µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Fluoranthene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01		µg/l	A-T-019w
Fluorene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Naphthalene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Phenanthrene (w) _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		µg/l	A-T-019w
Pyrene (w) _A [#]	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01		µg/l	A-T-019w
PAH (total 16) (w) _A [#]	0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01		µg/l	A-T-019w

Envirolab Job Number: 17/06887

Client Project Name: Junc 15 M1

Client Project Ref: 313582

Lab Sample ID	17/06887/1	17/06887/2	17/06887/3	17/06887/4	17/06887/5	17/06887/6	17/06887/7		Units	Method ref
Client Sample No										
Client Sample ID	BHA2	BHA3	BHA4	BHA5	BHA9	WSA14	WSA18			
Depth to Top	10.39	10.05	2.15	4.40	6.80	2.25	1.70			
Depth To Bottom										
Date Sampled	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17	04-Oct-17			
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW			
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
TPH CWG										
Ali >C5-C6 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Ali >C8-C10 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Ali >C10-C12 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Ali >C12-C16 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Ali >C16-C21 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Ali >C21-C35 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Total Aliphatics (w) _A	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-022+23w
Aro >C5-C7 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Aro >C8-C9 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Aro >C9-C10 (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
Aro >C10-C12 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Aro >C12-C16 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Aro >C16-C21 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Aro >C21-C35 (w) _A [#]	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-023w
Total Aromatics (w) _A	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-022+23w
TPH (Ali & Aro) (w) _A	<5	<5	<5	<5	<5	<5	<5		µg/l	A-T-022+23w
BTEX - Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w
MTBE (w) _A [#]	<1	<1	<1	<1	<1	<1	<1		µg/l	A-T-022w

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

APPENDIX J

HUMAN HEALTH GENERIC ASSESSMENT CRITERIA

Generic assessment criteria for human health: commercial scenario

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009⁽¹⁾. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009⁽²⁾. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC: 2015

In 2014, the publication of Category 4 Screening Levels (C4SL)^(3,4), as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)⁽⁵⁾ used in the generation of SGVs.

C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010⁽³⁾). Where a C4SL has been published, the RSK GAC duplicates the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and adopts them as GAC for these six substances.

For all other substances the only C4SL exposure modification relevant to a commercial end use are daily inhalation rates.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015⁽⁷⁾, where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the Contaminated Land Exposure Assessment (CLEA) tool v1.06, supporting EA guidance^(5,8,9) and revised exposure scenarios published for the C4SL⁽³⁾. Groundwater assessment criteria (GrAC) protective of human health via the inhalation pathway were derived using the RBCA 1.3b model. RSK has updated the inputs within RBCA to reflect EA guidance^(1,5,8,9). The SAC and GrAC collectively are termed GAC.

Pathway selection

In accordance with SR3⁽⁵⁾ the commercial scenario considers risks to a female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery but may be appropriate for a sports centre or shopping centre where children are present. In accordance with Box 3.5, SR3⁽⁵⁾ the pathways considered for production of the SAC in the commercial scenario are

- direct soil and dust ingestion
- dermal contact with soil both indoors and outdoors

- indoor air inhalation from soil and vapour and outdoor inhalation of soil and vapour.

The pathway considered in production of the GrAC is the volatilisation of compounds from groundwater and subsequent vapour inhalation by residents while indoors. Figure 2 illustrates this linkage. Although the outdoor air inhalation pathway is also valid, this contributes little to the overall risks owing to the dilution in outdoor air. Within RBCA, the solubility limit of the chemical restricts the extent of volatilisation, which in turn drives the indoor air inhalation pathway. While the same restriction is not built into the CLEA model, the CLEA model output cells are flagged red where the soil saturation limit has been exceeded.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase⁽⁹⁾. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached⁽⁹⁾. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required⁽⁹⁾:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook⁽⁹⁾, this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook⁽⁹⁾, which explains how to calculate an effective assessment criterion manually.

SR3⁽⁵⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the

polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽¹⁰⁾, the EA TOX⁽¹⁾ reports, the C4SL SP1010 project report and associated appendices^(3,6) or the 2015 LQM/CIEH report⁽⁷⁾. Where a C4SL has been published, the RSK GAC have duplicated the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and has adopted them as GAC for these six substances. Toxicological and specific chemical parameters for aromatic hydrocarbon C₈–C₉ (styrene), 1,2,4-trimethylbenzene and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽¹¹⁾.

For TPH, aromatic hydrocarbons C₅–C₈ were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C₈–C₉ hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C₈–C₉ have been taken from styrene.

Owing to the lack of UK-specific data, default information in the RBCA model was used to evaluate MTBE. No published UK data was available for 1,3,5-trimethylbenzene, so information was obtained from the RBCA model. RBCA uses toxicity data for the inhalation pathway in different units to the CLEA model and cannot consider separately the mean daily intake (MDI), occupancy periods or breathing rates. Therefore, the HCV in RBCA was amended to take account of

- amendments to the MDI using Table 3.4 of SR2⁽⁸⁾
- an adult weighing 70kg and breathing 14.8m³ air per day in accordance with the UK TOX reports⁽¹²⁾ and SR3⁽⁵⁾. Inhalation rates used in the derivation of the GrAC have not been updated in line with the 2011 USEPA published values⁽¹²⁾; these will be updated in subsequent revisions of the RSK GAC.
- the 50% rule (for petroleum hydrocarbons, trimethylbenzenes and MTBE)^(8,9) where MDI data is not available but background exposure is considered important in the overall exposure.

Physical parameters

For the commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3⁽⁵⁾ notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3⁽⁵⁾ have been used.

The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3⁽⁵⁾. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

For the GrAC, the depth to groundwater was taken as 2.5m based on RSK's experience of assessing the volatilisation pathway from groundwater. The GrAC were produced using the input parameters in Table 3. Inhalation rates have not been updated.

Summary of modifications to the default CLEA 1.06/SR3⁽⁵⁾ input parameters for a commercial land use

In summary, the RSK commercial GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3⁽⁵⁾. Modifications to the default SR3⁽⁵⁾ exposure scenarios based on the C4SL exposure scenarios⁽³⁾ are presented in Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 4 with the combined GAC in Table 5.

Figure 1: Conceptual model for CLEA commercial scenario

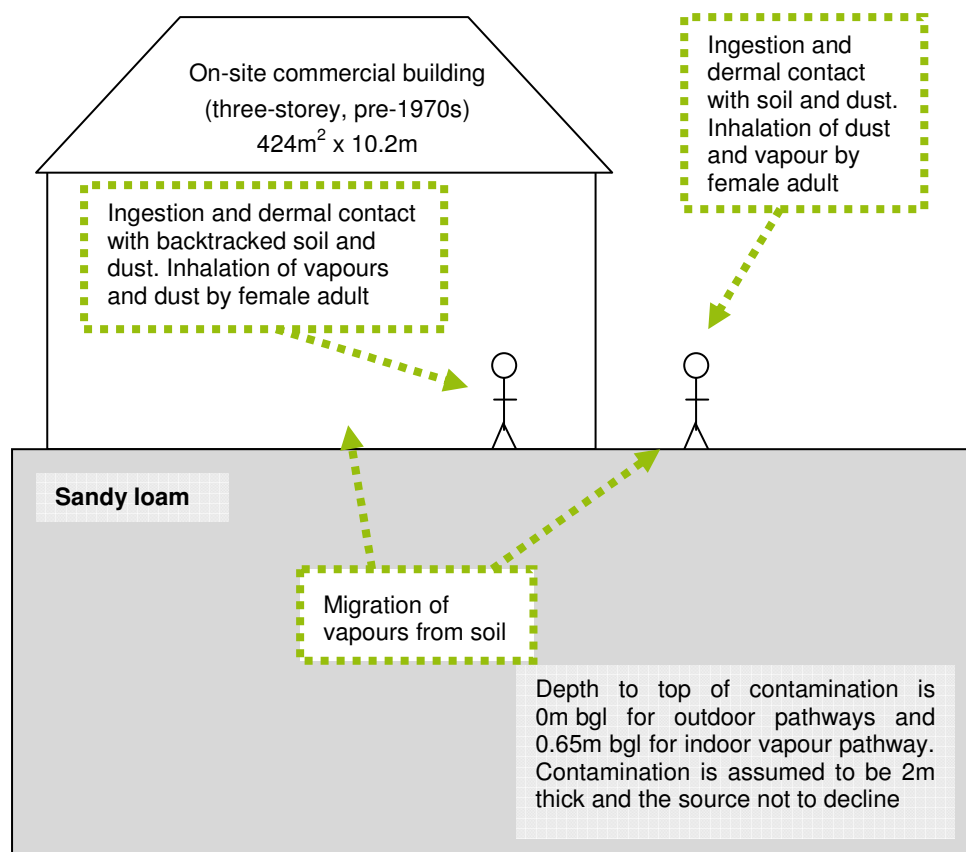


Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 16 to 65 years, Box 3.5, SR3 ⁽⁵⁾
Building	Office (pre-1970)	Key generic assumption given in Box 3.5, SR3 ⁽⁵⁾ . Pre-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4.6, SR3 ⁽⁵⁾)
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3 ⁽⁵⁾)
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 16 to 65 years. Assumption given in Box 3.5, SR3 ⁽⁵⁾
End AC	17	
SOM (%)	6	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
	1	To provide SAC for sites where SOM < 6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m ³ day ⁻¹	15.7	Mean value USEPA, 2011 ⁽¹²⁾ ; Table 3.2, SP1010 ⁽³⁾

Figure 2: GrAC conceptual model for RBCA commercial scenario

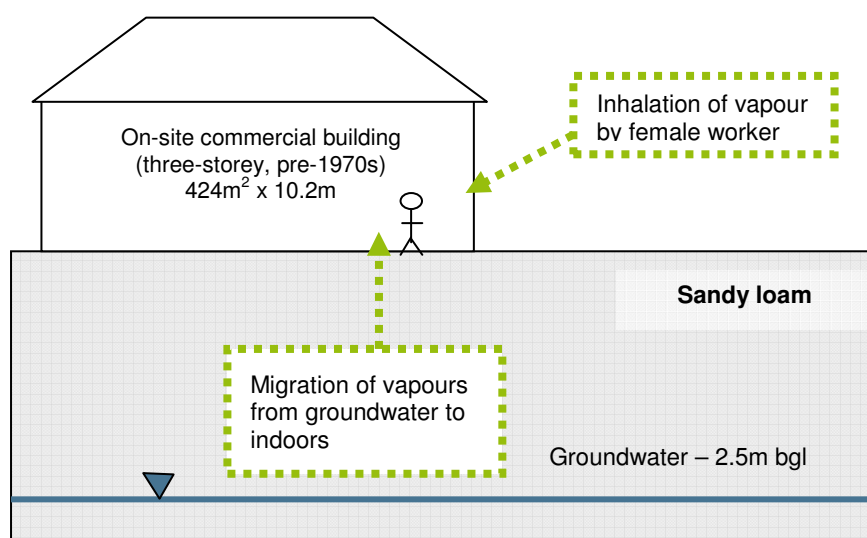


Table 3: Commercial – RBCA inputs

Parameter	Unit	Value	Justification
Receptor			
Averaging time	Years	49	From Box 3.5, SR3 ⁽⁵⁾
Receptor weight	kg	70	Female adult, Table 4.6, SR3 ⁽⁵⁾
Exposure duration	Years	49	From Box 3.5, SR3 ⁽⁵⁾
Exposure frequency	Days/yr	86.25	Weighted using occupancy period of 9 hours per day for 230 days of the year ((9hours x 230 days)/24 hours)
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3 ⁽⁵⁾
Volumetric water content	-	0.33	
Volumetric air content	-	0.20	

Parameter	Unit	Value	Justification
Dry bulk density	g cm ⁻³	1.21	
Vertical hydraulic conductivity	cm s ⁻¹	3.56E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3 ⁽⁵⁾
Vapour permeability	m ²	3.05E-12	Calculated for sandy loam using equations in Appendix 1, SR3 ⁽⁵⁾
Capillary zone thickness	m	0.1	Professional judgement
Building			
Building volume/area ratio	m	9.6	Table 3.10, SR3 ⁽⁵⁾
Foundation area	m ²	424	Table 3.10, SR3 ⁽⁵⁾
Foundation perimeter	m	82.40	Based on square root of building area being 20.59m
Building air exchange rate	d ⁻¹	24	Table 3.10, SR3 ⁽⁵⁾
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	Table 3.10, SR3 ⁽⁵⁾
Foundation crack fraction	-	3.89E-04	Calculated from floor crack area of 0.165m ² and building footprint of 424m ² in Table 4.21, SR3 ⁽⁵⁾
Volumetric water content of cracks	-	0.33	Assumed equal to underlying soil type in assumption that cracks become filled with soil over time. Parameters for sandy loam from Table 4.4, SR3 ⁽⁵⁾
Volumetric air content of cracks	-	0.2	
Indoor/outdoor differential pressure	Pa	4.4	From Table 3.10, SR3 ⁽⁵⁾

References

1. Environment Agency (2009), 'Science Reports SC050021 - SGV and TOX reports for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs'; 'Supplementary information for the derivation of SGV for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs', and 'Contaminants in soil: updated collation of toxicological data and intake values for humans: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin-like PCBs'. Available at: <https://www.gov.uk/government/publications/contaminants-in-soil-updated-collation-of-toxicological-data-and-intake-values-for-humans> and <https://www.gov.uk/government/publications/land-contamination-soil-guideline-values-sgvs> (accessed 4 February 2015)
2. Nathanial, C. P., McCaffrey, C., Ashmore, M., Cheng, Y., Gillet, A. G., Ogden, R. C. and Scott, D. (2009), *LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment*, second edition (Nottingham: Land Quality Press).
3. Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination', Revision 2, DEFRA research project SP1010.
4. Department for Environment, Food and Rural Affairs (Defra) (2014), 'SP1010: Development of Category 4 Screening Levels for assessment of land affected by contamination – Policy Companion Document', Revision 2.
5. Environment Agency (2009), *Science Report – SC050021/SR3. Updated technical background to the CLEA model* (Bristol: Environment Agency).
6. Contaminated Land: Applications in Real Environment (CL:AIRE) (2014). 'Appendices C to H). DEFRA research project SP1010'.
7. Nathanial, C. P., McCaffrey, C., Gillet, A. G., Ogden, R. C. and Nathanial, J. F. (2015), *The LQM/CIEH S4ULs for Human Health Risk Assessment* (Nottingham: Land Quality Press).
8. Environment Agency (2009), *Human health toxicological assessment of contaminants in soil. Science Report – Final SC050021/SR2* (Bristol: Environment Agency).
9. Environment Agency (2009), *Science Report – SC050021/SR4 CLEA Software (version 1.05) Handbook* (Bristol: Environment Agency).
10. Environment Agency (2008), *Science Report SC050021/SR7. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values* (Bristol: Environment Agency).
11. CL:AIRE (2009), *Soil Generic Assessment Criteria for Human Health Risk Assessment* (London: CL:AIRE).
12. USEPA (2011), *Exposure factors handbook*, EPA/600/R-090/052F (Washington, DC: Office of Research and Development).
13. Environment Agency (2009), 'Changes made to the CLEA framework documents after the three-month evaluation period in 2008', released January 2009.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 4

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (mg/l)	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals														
Arsenic	(a,b)	-	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Cadmium	(a)	-	NR	NR	4.10E+02	NR	NR	NR	4.10E+02	NR	NR	NR	4.10E+02	NR
Chromium (III) - trivalent	(c)	-	3.31E+05	8.57E+03	8.35E+03	NR	3.31E+05	8.57E+03	8.35E+03	NR	3.31E+05	8.57E+03	8.35E+03	NR
Chromium (VI) - hexavalent	(a,d)	-	7.52E+02	4.91E+01	NR	NR	7.52E+02	4.91E+01	NR	NR	7.52E+02	4.91E+01	NR	NR
Copper		-	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	-	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg ⁰)	(d)	5.60E-02	NR	1.54E+01	NR	4.31E+00	NR	3.26E+01	NR	1.07E+01	NR	5.80E+01	NR	2.58E+01
Inorganic Mercury (Hg ²⁺)		-	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR
Methyl Mercury (Hg ⁴⁺)		1.00E+02	3.38E+02	2.13E+03	2.92E+02	7.33E+01	3.38E+02	3.87E+03	3.11E+02	1.42E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	-	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	-	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Zinc	(b)	-	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide		-	1.69E+04	1.95E+03	1.81E+03	NR	1.69E+04	1.95E+03	1.81E+03	NR	1.69E+04	1.95E+03	1.81E+03	NR
Volatile Organic Compounds														
Benzene	(a)	1.40E+02	1.09E+03	2.79E+01	2.72E+01	1.22E+03	1.09E+03	5.19E+01	4.96E+01	2.26E+03	1.09E+03	1.08E+02	9.80E+01	4.71E+03
Toluene		5.90E+02	4.24E+05	6.49E+04	5.63E+04	8.69E+02	4.24E+05	1.43E+05	1.07E+05	1.92E+03	4.24E+05	3.24E+05	1.84E+05	4.36E+03
Ethylbenzene		1.80E+02	1.91E+05	5.89E+03	5.71E+03	5.18E+02	1.91E+05	1.38E+04	1.28E+04	1.22E+03	1.91E+05	3.21E+04	2.75E+04	2.84E+03
Xylene - m		2.00E+02	3.43E+05	6.26E+03	6.15E+03	6.25E+02	3.43E+05	1.47E+04	1.41E+04	1.47E+03	3.43E+05	3.44E+04	3.12E+04	3.46E+03
Xylene - o		1.70E+02	3.43E+05	6.73E+03	6.60E+03	4.78E+02	3.43E+05	1.57E+04	1.50E+04	1.12E+03	3.43E+05	3.65E+04	3.30E+04	2.62E+03
Xylene - p		2.00E+02	3.43E+05	6.03E+03	5.92E+03	5.76E+02	3.43E+05	1.41E+04	1.36E+04	1.35E+03	3.43E+05	3.28E+04	3.00E+04	3.17E+03
Total xylene		2.00E+02	3.43E+05	6.03E+03	5.92E+03	6.25E+02	3.43E+05	1.41E+04	1.36E+04	1.47E+03	3.43E+05	3.28E+04	3.00E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		4.80E+04	5.72E+05	7.54E+04	6.66E+04	2.04E+04	5.72E+05	1.22E+05	1.01E+05	3.31E+04	5.72E+05	2.31E+05	1.65E+05	6.27E+04
Trichloroethene		3.60E+01	9.53E+02	1.23E+00	1.23E+00	1.54E+03	9.53E+02	2.58E+00	2.57E+00	3.22E+03	9.53E+02	5.72E+00	5.69E+00	7.14E+03
Tetrachloroethene		2.30E+02	1.12E+04	1.86E+01	1.86E+01	4.24E+02	1.12E+04	4.17E+01	4.16E+01	9.51E+02	1.12E+04	9.57E+01	9.49E+01	2.18E+03
1,1,1-Trichloroethane		1.30E+03	1.14E+06	6.60E+02	6.60E+02	1.43E+03	1.14E+06	1.35E+03	1.35E+03	2.92E+03	1.14E+06	2.96E+03	2.95E+03	6.39E+03
1,1,1,2-Tetrachloroethane		1.10E+03	1.10E+04	1.09E+02	1.08E+02	2.60E+03	1.10E+04	2.53E+02	2.47E+02	6.02E+03	1.10E+04	5.88E+02	5.59E+02	1.40E+04
1,1,2,2-Tetrachloroethane		1.10E+03	1.10E+04	2.81E+02	2.74E+02	2.67E+03	1.10E+04	5.75E+02	5.46E+02	5.46E+03	1.10E+04	1.26E+03	1.13E+03	1.20E+04
Carbon Tetrachloride		5.70E+00	7.62E+03	2.87E+00	2.87E+00	1.52E+03	7.62E+03	6.29E+00	6.28E+00	3.32E+03	7.62E+03	1.43E+01	1.42E+01	7.54E+03
1,2-Dichloroethane		6.10E+00	2.29E+02	6.73E-01	6.71E-01	3.41E+03	2.29E+02	9.71E-01	9.67E-01	4.91E+03	2.29E+02	1.67E+00	1.65E+00	8.43E+03
Vinyl Chloride		4.10E-01	2.67E+01	5.95E-02	5.94E-02	1.36E+03	2.67E+01	7.70E-02	7.67E-02	1.76E+03	2.67E+01	1.18E-01	1.17E-01	2.69E+03
1,2,4-Trimethylbenzene		5.70E+01	NR	3.29E+02	NR	4.74E+02	NR	6.41E+02	NR	1.16E+03	NR	1.04E+03	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	3.80E+01	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
Semi-Volatile Organic Compounds														
Acenaphthene		3.20E+00	1.10E+05	2.75E+06	1.06E+05	5.70E+01	1.10E+05	5.36E+06	1.08E+05	1.41E+02	1.10E+05	8.83E+06	1.08E+05	3.36E+02
Acenaphthylene		1.61E+01	1.10E+05	2.68E+06	1.05E+05	8.61E+01	1.10E+05	5.23E+06	1.07E+05	2.12E+02	1.10E+05	8.65E+06	1.08E+05	5.06E+02
Anthracene		2.10E-02	5.49E+05	1.13E+07	5.23E+05	1.17E+00	5.49E+05	2.35E+07	5.36E+05	2.91E+00	5.49E+05	4.13E+07	5.42E+05	6.96E+00
Benzo(a)anthracene		3.80E-03	2.84E+02	4.08E+02	1.67E+02	1.71E+00	2.84E+02	4.47E+02	1.74E+02	4.28E+00	2.84E+02	4.67E+02	1.76E+02	1.03E+01
Benzo(b)fluoranthene		2.00E-03	7.13E+01	1.17E+02	4.43E+01	1.22E+00	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.21E+02	4.49E+01	7.29E+00
Benzo(g,h,i)perylene		2.60E-04	6.29E+03	1.05E+04	3.93E+03	1.54E-02	6.29E+03	1.06E+04	3.95E+03	3.85E-02	6.29E+03	1.07E+04	3.96E+03	9.23E-02
Benzo(k)fluoranthene		8.00E-04	1.88E+03	3.11E+03	1.17E+03	6.87E-01	1.88E+03	3.17E+03	1.18E+03	1.72E+00	1.88E+03	3.21E+03	1.19E+03	4.12E+00
Chrysene		2.00E-03	5.67E+02	8.89E+02	3.46E+02	4.40E-01	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	9.47E+02	3.55E+02	2.64E+00
Dibenzo(a,h)anthracene		6.00E-04	5.67E+00	9.32E+00	3.53E+00	3.93E-03	5.67E+00	9.52E+00	3.55E+00	9.82E-03	5.67E+00	9.64E+00	3.57E+00	2.36E-02
Fluoranthene		2.30E-01	2.29E+04	1.89E+06	2.26E+04	1.89E+01	2.29E+04	2.72E+06	2.27E+04	4.73E+01	2.29E+04	3.32E+06	2.27E+04	1.13E+02
Fluorene		1.90E+00	7.31E+04	4.55E+05	6.30E+04	3.09E+01	7.31E+04	1.06E+06	6.84E+04	7.65E+01	7.31E+04	2.24E+06	7.08E+04	1.83E+02
Indeno(1,2,3-cd)pyrene		2.00E-04	8.10E+02	1.31E+03	5.01E+02	6.13E-02	8.10E+02	1.35E+03	5.06E+02	1.53E-01	8.10E+02	1.37E+03	5.09E+02	3.68E-01
Phenanthrene		5.30E-01	2.28E+04	5.35E+05	2.19E+04	3.60E+01	2.28E+04	1.09E+06	2.24E+04	8.96E+01	2.28E+04	1.86E+06	2.25E+04	2.14E+02
Pyrene		1.30E-01	5.49E+04	4.47E+06	5.42E+04	2.20E+00	5.49E+04	6.46E+06	5.44E+04	5.49E+00	5.49E+04	7.91E+06	5.45E+04	1.32E+01
Benzo(a)pyrene	(a)	3.80E-03	7.68E+01	2.04E+02	5.58E+01	9.11E-01	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.63E+01	5.46E+00
Naphthalene		1.90E+01	3.64E+04	1.87E+03	1.78E+03	7.64E+01	3.64E+04	4.39E+03	3.92E+03	1.83E+02	3.64E+04	9.94E+03	7.81E+03	4.32E+02
Phenol		-	1.10E+06	2.65E+04	2.59E+04	2.42E+04	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 4
Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (mg/l)	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Total petroleum hydrocarbons														
Aliphatic hydrocarbons EC5-EC6		3.60E+01	4.77E+06	3.19E+03	3.19E+03	3.04E+02	4.77E+06	5.86E+03	5.86E+03	5.58E+02	4.77E+06	1.21E+04	1.21E+04	1.15E+03
Aliphatic hydrocarbons >EC6-EC8		5.40E+00	4.77E+06	7.79E+03	7.78E+03	1.44E+02	4.77E+06	1.74E+04	1.74E+04	3.22E+02	4.77E+06	3.97E+04	3.96E+04	7.36E+02
Aliphatic hydrocarbons >EC8-EC10		4.30E-01	9.53E+04	2.02E+03	2.00E+03	7.77E+01	9.53E+04	4.91E+03	4.85E+03	1.90E+02	9.53E+04	1.17E+04	1.13E+04	4.51E+02
Aliphatic hydrocarbons >EC10-EC12		3.40E-02	9.53E+04	9.97E+03	9.69E+03	4.75E+01	9.53E+04	2.47E+04	2.29E+04	1.18E+02	9.53E+04	5.89E+04	4.73E+04	2.83E+02
Aliphatic hydrocarbons >EC12-EC16		7.60E-04	9.53E+04	8.26E+04	5.88E+04	2.37E+01	9.53E+04	2.04E+05	8.17E+04	5.91E+01	9.53E+04	4.81E+05	9.02E+04	1.42E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	-	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	-	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC9 (styrene)		6.50E+01	2.29E+04	3.66E+04	1.41E+04	6.26E+02	2.29E+04	8.39E+04	1.80E+04	1.44E+03	2.29E+04	1.93E+05	2.04E+04	3.35E+03
Aromatic hydrocarbons >EC9-EC10		6.50E+01	3.81E+04	3.55E+03	3.46E+03	6.13E+02	3.81E+04	8.66E+03	8.11E+03	1.50E+03	3.81E+04	2.05E+04	1.70E+04	3.58E+03
Aromatic hydrocarbons >EC10-EC12		2.50E+01	3.81E+04	1.92E+04	1.62E+04	3.64E+02	3.81E+04	4.69E+04	2.79E+04	8.99E+02	3.81E+04	1.10E+05	3.42E+04	2.15E+03
Aromatic hydrocarbons >EC12-EC16		5.80E+00	3.81E+04	2.02E+05	3.62E+04	1.69E+02	3.81E+04	4.76E+05	3.73E+04	4.19E+02	3.81E+04	1.03E+06	3.78E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	-	2.82E+04	NR	NR	5.37E+01	2.83E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	-	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	-	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. GrAC - groundwater screening value. SAC - soil screening value.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

	Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%. This shading has also been used for the RBCA output where the theoretical solubility limit has been exceeded.
	Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.
	Calculated SAC does not exceed the soil saturation limit.

For consistency where the theoretical solubility limit within RBCA has been exceeded in production of the GrAC, these cells have also been hatched red and the GrAC set at the solubility limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.



Table 5
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	GrAC for Groundwater (mg/l)	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals				
Arsenic	-	640	640	640
Cadmium	-	410	410	410
Chromium (III) - trivalent	-	8,600	8,600	8,600
Chromium (VI) - hexavalent	-	49	49	49
Copper	-	68,000	68,000	68,000
Lead	-	2,320	2,320	2,320
Elemental Mercury (Hg ⁰)	0.056	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg ²⁺)	-	1,120	1,120	1,120
Methyl Mercury (Hg ⁴⁺)	100	290 (73)	310	320
Nickel	-	980	980	980
Selenium	-	12,000	12,000	12,000
Zinc	-	740,000	740,000	740,000
Cyanide	-	1,800	1,800	1,800
Volatile Organic Compounds				
Benzene	140	27	50	98
Toluene	590	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	180	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	200	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	170	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	200	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	200	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	48000	67,000 (20,400)	101,000 (33,100)	165,000 (62,700)
Trichloroethene	36	1	3	6
Tetrachloroethene	230	20	40	90
1,1,1-Trichloroethane	1300	700	1,300	3,000
1,1,1,2-Tetrachloroethane	1100	110	250	560
1,1,2,2-Tetrachloroethane	1100	270	550	1,130
Carbon Tetrachloride	5.7	2.9	6.3	14.2
1,2-Dichloroethane	6.1	0.67	0.97	1.65
Vinyl Chloride	0.41	0.06	0.08	0.12
1,2,4-Trimethylbenzene	57	330	640	1,040
1,3,5-Trimethylbenzene	38	NR	NR	NR
Semi-Volatile Organic Compounds				
Acenaphthene	3.2	110,000 (57)	110,000 (141)	110,000
Acenaphthylene	16	110,000 (86)	110,000 (212)	110,000
Anthracene	0.021	520,000	540,000	540,000
Benzo(a)anthracene	0.0038	170	170	180
Benzo(b)fluoranthene	0.002	44	45	45
Benzo(g,h,i)perylene	0.00026	3,900	3,900	4,000
Benzo(k)fluoranthene	0.0008	1,200	1,200	1,200
Chrysene	0.002	350	350	350
Dibenzo(a,h)anthracene	0.0006	3.5	3.6	3.6
Fluoranthene	0.23	23,000	23,000	23,000
Fluorene	1.9	63,000 (31)	68,000	71,000
Indeno(1,2,3-cd)pyrene	0.0002	500	510	510
Phenanthrene	0.53	22,000	22,000	23,000
Pyrene	0.13	54,000	54,000	54,000
Benzo(a)pyrene	0.0038	77	77	77
Naphthalene	19	1,800 (76)	3,900 (183)	7,800 (432)
Phenol	-	440*	690*	1,300*
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons EC ₅ -EC ₈	36	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC ₈ -EC ₈	5.4	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC ₈ -EC ₁₀	0.43	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂	0.034	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆	0.00076	59,000 (24)	82,000 (59)	90,000 (142)
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	-	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	-	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC ₈ -EC ₉ (styrene)	65	14,000 (626)	18,000 (1,440)	20,000 (3,350)
Aromatic hydrocarbons >EC ₉ -EC ₁₀	65	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	25	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆	5.8	36,000 (169)	37,000	38,000
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	-	28,000	28,000	28,000

Notes:

* - Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.

NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)

** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.

1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, polycyclic aromatic hydrocarbons, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS) The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

(VALUE IN BRACKETS) For consistency where the GrAC exceeds the solubility limit, GrAC has been set at the solubility limit. The GrAC is conservative since concentrations of the chemical are very unlikely to be at sufficient concentration to result in an exceedance of the health criteria value at the point of exposure (i.e. indoor air) provided free-phase product is absent.

APPENDIX K

GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

APPENDIX D

GENERIC ASSESSMENT CRITERIA FOR PHYTOTOXIC EFFECTS

Several compounds can inhibit plant growth; hence it is important to have generic assessment criteria (GAC) to promote healthy plant growth. In the absence of other published GAC, the GAC have been obtained from legislation (UK and European) and guidance related to the use of sewage sludge on agricultural fields.

The Council of European Communities Sewage Sludge Directive (86/278/EEC) dated 1986, has been transposed into UK law by Statutory Instrument No. 1263, The Sludge (use in Agriculture) Regulations 1989 (Public Health England, Wales and Scotland), as amended in 1990 and The Sludge (use in Agriculture) Regulations (Northern Ireland) SR No, 245, 1990. In addition the Department of Environment (DoE) produced a Code of Practice (CoP) (Updated 2nd Edition) in 2006 which provided guidance on the application of sewage sludge on agricultural land (however the status of this document is unclear as it is on the archive section of the Defra website).

The directive seeks to encourage the use of sewage sludge in agriculture and to regulate its use in such a way as to “**prevent harmful effects on soil, vegetation, animals and man**”. To this end, it prohibits the use of untreated sludge on agricultural land unless it is injected or incorporated into the soil. Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use". To provide protection against potential health risks from residual pathogens, sludge must not be applied to soil in which fruit and vegetable crops are growing, or less than ten months before fruit and vegetable crops are to be harvested. Grazing animals must not be allowed access to grassland or forage land less than three weeks after the application of sludge.

The specified limits of concentrations of selected elements in soil are presented in Table 4 of the updated 2nd Edition of the DoE Code of Practice and are designed to protect plant growth. It is noted that these values are more stringent than the values set in current UK regulations. However since they were amended following recommendations from the Independent Scientific Committee in 1993. (MAFF/DOE 1993). The GAC are presented in Table 1.

Table 1: Generic assessment criteria

Determinant	Generic assessment criteria (mg/kg)			
	pH 5.0 < 5.5	pH 5.5 < 6.0	pH 6.0 < 7.0	pH >7.0
Zinc	200	200	200	300
Copper	80	100	135	200
Nickel	50	60	75	110
Lead	300	300	300	300
Cadmium	3	3	3	3
Mercury	1	1	1	1
Note: Only compounds with assessment criteria documented within the Directive 86/278/EEC have been included, although criteria for 5 additional compounds have been presented within the 2006 CoP.				

APPENDIX L

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

The water environment in the United Kingdom is protected under a number of regulatory regimes. The relevant environmental regulator is consulted where there may be a risk that pollution of 'controlled waters' may occur or may have occurred in the past. Controlled waters are coastal waters, inland freshwaters and groundwater. The EU Water Framework Directive (WFD) (2000/60/EC) is implemented via domestic regulations and guidance, covering aspects of groundwater, surface water and drinking water supply policy. Domestic legislation and guidance will vary across the United Kingdom. Therefore, the relevant legislation for England, Wales, Northern Ireland and Scotland should be reviewed, alongside guidance provided by the Environment Agency (EA), Natural Resource Wales (NRW), the Scottish Environmental Protection Agency (SEPA) or the Northern Ireland Environment Agency (NIEA), as appropriate.

The main objectives of the protection and remediation of groundwater under threat from land contamination are set out in the Environment Agency's Groundwater Protection: Principles and Practice (GP3) document⁽¹⁾. When assessing risks to groundwater the following need to be taken into consideration:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to
 - *prevent the input of hazardous substances into groundwater (see description of hazardous substances below)*
 - *limit the entry of other (non-hazardous) pollutants into groundwater so as to avoid pollution, and to avoid deterioration of the status of groundwater bodies or sustained, upward trends in pollutant concentration.*
- Where hazardous substances or non-hazardous pollutants have already entered groundwater, the priority is to
 - *minimise further entry of hazardous substances and non-hazardous pollutants into groundwater*
 - *take necessary and reasonable measures to limit the pollution of groundwater or impact on the status of the groundwater body from the future expansion of a contaminant 'plume', if necessary by actively reducing its extent if the economic, social and environmental benefits of doing so outweigh the costs.*

DEFINITIONS

Hazardous substances are defined in the Water Framework Directive 2000/60/EC as 'substances or groups of substances that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.' All List 1 substances under the old Groundwater Directive (80/68/EEC) are hazardous substances, all radioactive substances are hazardous substances.

Non-hazardous substances are defined as 'substances capable of causing pollution that have not been classified as hazardous substances'. The non-hazardous list of pollutants does not simply replace the old WFD List II but includes a wider range of pollutants.

For the current list of classified substances please visit the UKTAG website www.wfduk.org/jagdag/

When assessing the risks to surface waters, various standards apply, including Environmental Quality Standards (EQS) which are protective of the water ecology.

The Water Supply (Water Quality) Regulations⁽²⁾ are the primary source for assessing water bodies that may be used for public water supplies. The Private Water Supplies Regulations⁽³⁾ may be applicable in some cases.

This appendix presents the generic assessment criteria (GAC) that RSK considers are suitable for assessing risks to controlled waters.

The RSK GAC for controlled waters are presented in Table 1. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The target concentration can be derived by several means with consideration to

- whether the substance is classified as hazardous or non-hazardous by the EU under the WFD (2000/60/EC) and Groundwater Daughter Directive (2006/118/EC) implemented through the Environmental Permitting Regulations 2010
- background concentrations in the aquifer
- published guidance such as EQS that are protective of ecology or The Water Supply (Water Quality) Regulations 2010 that are protective of drinking water
- minimum reporting values (MRV) (or method detection limits if MRV are not provided).

It is important to remember that the WFD and GP3⁽¹⁾ guidance allow a risk-based and a cost-benefit approach to be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is required either on a technical or cost-benefit basis. If pollutant concentrations at a site exceed target concentrations please speak to a member of the QRA group who will assist in making an appropriate assessment and recommendations.

Table 1: Target concentrations for controlled waters

Analytes in bold are hazardous, *analytes in italics are non-hazardous*, analytes in plain text are unclassified; according to JAGDAG Determination List June 2010 (revised June 2012).

Target concentrations shaded in

GREEN are statutory values usually for drinking water or a surface watercourse

ORANGE are non-statutory values

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Metals				
Arsenic	-	0.01 ⁽²⁾	0.05 ^(5a)	0.025 ^(5a)
Cadmium	0.0001 ⁽⁶⁾	0.005 ⁽²⁾	≤0.00008, 0.00008, 0.00009, 0.00015, 0.00025 ^(5b)	0.0002 ^(15c)
Chromium (total)	-	0.05 ⁽²⁾	Sum values for chromium III and VI	
Chromium (III)	-	Use value for total chromium	0.0047 ^(5a)	-
Chromium (VI)			0.0034 ^(5a)	0.0006 ^(5a)
Copper	-	2.0 ⁽²⁾	0.001 bioavailable ⁽⁷⁾	0.00376 dissolved, where DOC ≤1mg/l ⁽⁷⁾ 0.00376 + (0.002677 x ((DOC/2) – 0.0005)) µg/l dissolved, where DOC >1mg/l ⁽⁷⁾
Lead	-	0.025 (before 25/12/2013), 0.01 (after 25/12/2013) ⁽²⁾	0.0072 ^(5c)	0.0072 ^(5c)

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Mercury	0.00001 ⁽⁶⁾	0.001 ⁽²⁾	0.00005 ^(5c)	0.00005 ^(5c)
Nickel	-	0.02 ⁽²⁾	0.02 ^(5c)	0.02 ^(5c)
Selenium	-	0.01 ⁽²⁾	-	-
<i>Zinc</i>	-	3 ⁽⁴⁾	0.0109 bioavailable plus ambient background concentration (dissolved) ⁽⁷⁾	0.0068 dissolved plus ambient background concentration ⁽⁷⁾
Chlorinated solvents				
Trichloroethene	0.0001 ⁽⁶⁾	0.01 ⁽²⁾	0.01 ^(5c)	0.01 ^(5c)
Tetrachloroethene	0.0001 ⁽⁶⁾	0.01 ⁽²⁾	0.01 ^(5c)	0.01 ^(5c)
Tetrachloroethane	-	-	0.14 ⁽¹⁷⁾	-
1,1,1-Trichloroethane	0.0001 ⁽⁶⁾	-	0.1 ^(5c)	0.1 ^(5c)
1,1,2-Trichloroethane	0.0001 ⁽⁶⁾	-	0.4 ^(5c)	0.3 ^(5c)
Carbon tetrachloride (tetrachloromethane)	0.0001 ⁽⁶⁾	0.003 ⁽²⁾	0.012 ^(5c)	0.012 ^(5c)
1,2-Dichloroethane	0.001 ⁽⁶⁾	0.003 ⁽²⁾	0.01 ^(5c)	0.01 ^(5c)
Vinyl chloride (chloroethene)	-	0.0005 ⁽²⁾	-	-
Trihalomethanes	-	0.1 ^(2, 8)	-	-
Chloroform (trichloromethane) (one of the trihalomethanes included above)	0.0001 ⁽⁶⁾	0.1 ^(2, 8)	0.0025 ^(5c)	0.0025 ^(5c)

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Polycyclic aromatic hydrocarbons				
Acenaphthene	-	-	0.0058 ⁽⁹⁾	
Acenaphthylene	-	-	0.0058 ⁽⁹⁾	
Anthracene	-	-	0.0001 ^(5c)	0.0001 ^(15c)
Benzo(a)anthracene	-	-	0.000018 ⁽⁹⁾	
Benzo(b)fluoranthene	-	0.0001 ⁽²⁾	0.00003 ^(15f)	0.00003 ^(5f)
Benzo(k)fluoranthene	-		0.000002 ^(15g)	0.000002 ^(5g)
Benzo(g,h,i)perylene	-			
Indeno(1,2,3-cd)pyrene	-			
Chrysene	-	-	0.00001 ⁽⁹⁾	
Dibenzo(a,h)anthracene	-	-	0.00001 ⁽⁹⁾	
Fluoranthene	-	-	0.0001 ^(5c)	0.0001 ^(5c)
Fluorene	-	-	0.0021 ⁽⁹⁾	
Phenanthrene	-	-	0.003 ⁽⁹⁾	
Pyrene	-	-	0.00004 ⁽⁹⁾	
Benzo(a)pyrene	-	0.00001 ⁽²⁾	0.00005 ^(5c)	0.00005 ^(5c)
Naphthalene	-	-	0.0024 ^(5c)	0.0012 ^(15c)
Petroleum hydrocarbons				
Total petroleum hydrocarbons	-	0.01 ⁽¹¹⁾	0.01 ^(10,11)	
Benzene	0.001 ⁽⁶⁾	0.001 ⁽²⁾	0.01 ^(5c)	0.008 ^(5c)

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Toluene	0.004 ⁽⁶⁾	0.7 ⁽¹²⁾	0.074 ⁽⁷⁾	0.074 ⁽⁷⁾
Ethylbenzene	-	0.3 ⁽¹²⁾	0.02 ⁽¹⁴⁾	0.02 ⁽¹⁴⁾
Xylene	0.003 ⁽⁶⁾	0.5 ⁽¹²⁾	0.03 ^(5c)	0.03 ^(15c)
Methyl tertiary butyl ether (MTBE)	-	0.015 ⁽¹³⁾		
Pesticides and herbicides				
Aldrin	0.000003 ⁽⁶⁾	0.00003 ⁽²⁾	0.00001 ^(5d)	0.000005 ^(5d)
Dieldrin	0.003 ⁽⁶⁾	0.00003 ⁽²⁾		
Endrin	0.000003 ⁽⁶⁾	0.0006 ⁽¹²⁾		
Isodrin	0.000003 ⁽⁶⁾	-		
Heptachlor	-	0.00003 ⁽²⁾		
Heptachlor epoxide	-	0.00003 ⁽²⁾		
Other individual pesticides	-	0.0001 ⁽²⁾		
Total pesticides	-	0.0005 ⁽²⁾		
Total DDT	0.000006 ⁽⁶⁾	0.001 ⁽¹²⁾	0.000025 ^(5c)	0.000025 ^(15c)
Azinphos – methyl	0.000001 ⁽⁶⁾	-	0.00001 ⁽¹⁾	
Cyfluthrin	0.0001 ⁽⁶⁾	-	0.000001 ⁽¹⁴⁾	
Demetons	0.00005 ⁽⁶⁾	-	0.0005 ⁽¹⁴⁾	
Dichlorvos	-	-	0.000001 ^(5c)	0.00004 ^(5c)
Dimethoate	0.00001 ⁽⁶⁾	-	0.00048 ^(5a)	0.00048 ^(5a)
Endosulphan	0.000005 ⁽⁶⁾	-	0.000005 ^(5c)	0.0000005 ^(5c)

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Fenitrothion	0.000001 ⁽⁶⁾	-	0.00001 ^(5c)	0.00001 ^(5c)
Flucofuron	0.0001 ⁽⁶⁾	-	0.001 ⁽¹⁴⁾	
Malathion	0.000001 ⁽⁶⁾	-	0.00001 ^(5c)	0.00002 ^(5c)
Mevinphos	0.000005 ⁽⁶⁾	-	0.00002 ⁽¹⁴⁾	-
Omethoate	0.0001 ⁽⁶⁾	-	0.00001 ⁽¹⁴⁾	
PCSDs (cyfluthrin, sulcofuron, flucofuron and permethrin)	-	-	0.00005 ⁽¹⁴⁾	
Permethrin	0.000001 ⁽⁶⁾	-	0.00001 ^(5a)	0.00001 ⁽⁵⁾
Sulcofuron	0.0001 ⁽⁶⁾	-	0.025 ⁽¹⁴⁾	
Triazaphos	0.0001 ⁽⁶⁾	-	0.000005 ⁽¹⁵⁾	
Atrazine	0.00003 ⁽⁶⁾	-	0.0006 ^(5c)	0.0006 ^(5c)
Simazine	0.00003 ⁽⁶⁾	-	0.001 ^(5c)	0.001 ^(5c)
<i>Bentazone</i>	0.1 ⁽⁶⁾	-	0.5 ^(5c)	0.5 ^(5a)
Linuron	0.0001 ⁽⁶⁾	-	0.0005 ^(5a)	0.0005 ^(5a)
Mecoprop	0.00004 ⁽⁶⁾	-	0.018 ^(5a)	0.018 ^(5a)
Trifluralin	0.00001 ⁽⁶⁾	-	0.00003 ^(5c)	0.00003 ^(5c)
Miscellaneous				
Cyanide (Hydrogen cyanide)	-	0.05 ⁽²⁾	0.001 ^(5a)	0.001 ^(5a)
Phenol	0.0005 ⁽⁶⁾	-	0.0077 ^(5a)	0.0077 ^(5a)
Sodium	-	200 ⁽²⁾	-	

Determinant	Target concentrations (mg/l)			
	Minimum reporting value	UK drinking water standard or best equivalent	EQS or best equivalent	
			Freshwater	Transitional (estuaries) and coastal waters
Chloride	-	250 ⁽²⁾	250 ⁽¹⁴⁾	-
Total ammonia ^{\$} (ammonium (as NH ₄ ⁺) plus ammonia (NH ₃))	-	0.5 ⁽²⁾	0.3 ⁽¹⁶⁾	-
Ammonia un-ionised (NH ₃)	-	-	-	0.021 ⁽⁷⁾
Sulphate	-	250 ⁽²⁾	400 ⁽¹⁴⁾	-
Iron	-	0.20 ⁽²⁾	1 ^(5a)	1 ^(5a)
Manganese	-	0.05 ⁽²⁾	0.123 bioavailable ⁽⁷⁾	No EQS required
<i>Aluminium</i>	-	0.2 ⁽²⁾	-	-
Nitrate (as NO ₃)	-	50 ⁽²⁾	-	-
Nitrite (as NO ₂)	-	0.1 ⁽²⁾	0.01 ⁽¹⁷⁾	-

Analytes in bold are hazardous, *analytes in italics are non hazardous*, analytes in plain text are unclassified. According to JAGDAG Determination List June 2010

Note: ‘-’ A target concentration is not available.

^{\$}Please note that total ammonia (NH₄⁺ and NH₃) is equivalent to ammoniacal nitrogen in laboratory reports

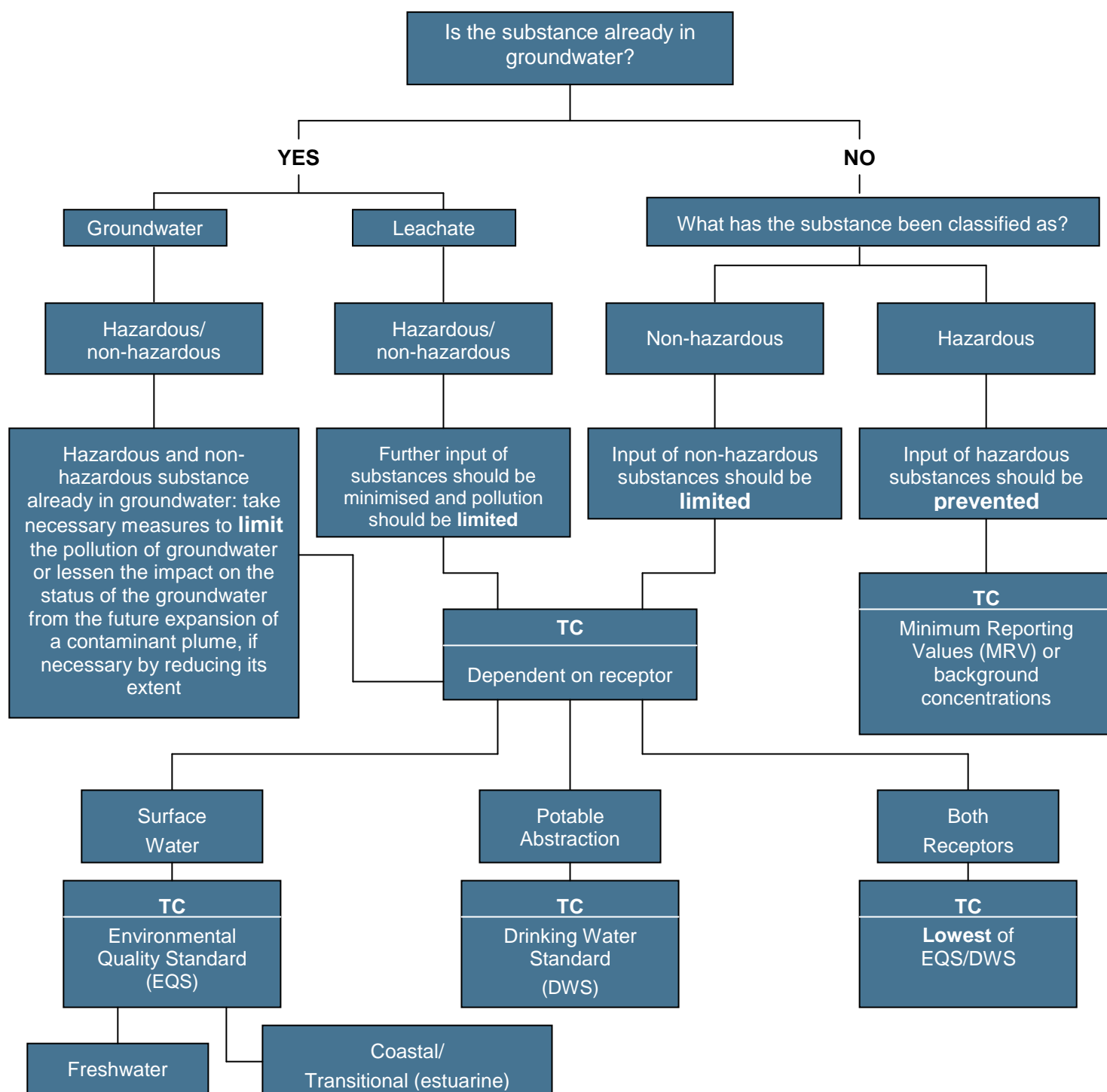
“Bioavailable” in relation to copper, zinc and manganese is the generic EQS_{bioavailable}⁷ derived from the Metal Bioavailability Assessment Tool (M-BAT) developed by the Water Framework Directive UK Technical Advisory Group (WFDTAG). Exceedance of this value should prompt a site-specific assessment using the M-BAT with pH, DOC and Ca to derive a site-specific EQS termed the PNEC_{dissolved}. <http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat>

Notes

1. Environment Agency (2013), 'Groundwater Protection: Principles and Policy (GP3) v1.1'.
2. The Water Supply (Water Quality) Regulations 2000 (SI 2000/3184), as amended by SI 2001/2885, SI 2002/2469, SI 2005/2035, SI 2007/2734 and SI 2010/991.
3. The Private Water Supplies Regulations 1991. SI 1991 / 2790.
4. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001.
5. The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010.
- 5a. Annual mean concentration (mg/l) for 'Good' standard
- 5b. Applies to hardness ranges of <40mg/l CaCO₃, 40–<50mg/l CaCO₃, 50–<100mg/l CaCO₃, 100–<200mg/l CaCO₃ and ≥200mg/l CaCO₃. The target concentrations included in Table 1 are listed in order of increasing calcium carbonate concentrations.
- 5c. Annual average EQS (surface waters)
- 5d. Sum of aldrin, dieldrin, endrin and isodrin
- 5e. Applies to hardness ranges of 0–50mg/l CaCO₃, 50–100mg/l CaCO₃, 100–250mg/l CaCO₃ and >250mg/l CaCO₃. The target concentrations included in Table 1 are listed in order of increasing calcium carbonate concentrations; applies to annual mean concentration (mg/l) of CaCO₃. Applies to annual mean concentration of metal (mg/l) for 'Good' standard.
- 5f. Sum of benzo(b)fluoranthene and benzo(k)fluoranthene
- 5g. Sum of benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene
6. Minimum reporting values listed in Annex (J) of Horizontal Guidance Note H1 (H1 Environmental Risk Assessment Framework, Environment Agency, April 2010 v2.0). Note target concentration for xylenes is 0.003mg/l each for o-xylene and m/p xylene.
7. DEFRA (2014). Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment. Table 5.2a: Proposed standards for 29 specific pollutants – long-term mean value. Additional information on the Metal Bioavailability Assessment Tool (M-BAT) is available at <http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat>.
8. The Water Supply (Water Quality) Regulations 2000. (SI 2000 / 3184) – sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane.
9. WRc plc (2002), R&D Technical Report P45. Where predicted no-effect concentration is below the laboratory method detection limit (LMDL) for chrysene, dibenzo(a,h)anthracene and fluoranthene, the target concentration has been set at the LMDL of 0.00001mg/l.
10. Please note this is a very conservative value. If necessary please refer to EA (2009). *Petroleum hydrocarbons in Groundwater Supplementary Guidance for Hydrogeological Risk Assessment*, which provides advice on risk rankings of TPH CWG fractions. It may be possible to eliminate low risk fractions and/or those not detected above LMDL from concern.
11. Environment Agency (2009), 'Petroleum hydrocarbons in groundwater: supplementary guidance for hydrogeological risk assessment'.
12. WHO (2004), *Guidelines for drinking-water quality*, 3rd edn.

13. Drinking Water Inspectorate (London, UK). Environmental Information Request on MTBE in drinking water. Ref. DWI 1/10/18; dated 28 November 2006. Value is based on the odour threshold for MTBE, which is lower than a health-based guideline value.
14. Council Directive on Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment of the Community (Dangerous Substances Directive) - List II Substances (76/464/EEC).
15. The Water Framework Directive (200/60/EC). Freshwater Environmental Quality Standards.
16. UK TAG January 2008. Proposals for Environmental Quality standards for Annex VIII Substances. Long term 90%ile for upland low alkalinity water. The value for lowland high alkalinity waters is 0.6mg/l. (UKTAG recommends the adoption of the total ammonia standard from the UK Environmental Standards and Conditions (Phase 1) report dated August 2006. UKTAG believes that this approach will provide an effective level of protection for both total and unionised ammonia in freshwaters).
17. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)

FLOW CHART TO ASSIST WITH SELECTION OF TARGET CONCENTRATIONS



TC = Target concentration

When leachate is being assessed the 'compliance point' is the groundwater body. Therefore dilution within the groundwater body may be applied with caution before comparing with the TC.

When directly assessing a receptor, e.g., a river, the appropriate TC should be selected.

APPENDIX M

GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75m below finished ground levels, sample results from depths between 0.5m and 1.5m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be

used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table A3: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	PE	PVC
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	<ul style="list-style-type: none"> BTEX + MTBE 	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C ₅ –C ₁₀) (Not including compounds within group 2e and 2f)	2	1.4
2e	<ul style="list-style-type: none"> Phenols 	2	0.4
2f	<ul style="list-style-type: none"> Cresols and chlorinated phenols 	2	0.04
3	Mineral oil C ₁₁ –C ₂₀	10	Suitable
4	Mineral oil C ₂₁ –C ₄₀	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX N

COMPARISON OF SOIL ANALYSIS TO HUMAN HEALTH CRITERIA

All GACs calculated by BSK or taken from EIC/AGS/CI AIRE Generic Assessment Criteria; and LQM/CI/EH Generic Assessment Criteria

Prof 2
It's

All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and

APPENDIX O

COMPARISON OF WATER LABORATORY DATA TO CONTROLLED WATERS GAC

313582. - M1 Junction 15; Supplementary Investigation - Controlled Waters Risk Assessment Groundwater^{1 of 1}

Results Summary Table and Direct Comparison

Sample Identity		Tier 2 Target Concentration (LTC2)				BHA2	BHA3	BHA4	BHA5	BHA9	WSA14	WSA18
Depth						10.39	10.05	2.15	4.40	6.80	2.25	1.70
		Environmental Quality Standard or Best Equivalent										
Strata		Freshwater EQS	Saltwater EQS	UK/EC DWS	WHO DWS	Glaciofluvial Deposits	Whitby Mudstone Formation	Glaciofluvial Deposits	Glaciofluvial Deposits	Glaciofluvial Deposits	Glaciofluvial Deposits	Oadby Member
Determinants	Units											
pH	pH	6 to 9	7 to 9	6.5-9.5		6.6	6.85	6.86	6.83	6.88	6.84	6.99
Hardness	mg/l Ca CO3					724	2690	485	1760	350	492	491
DOC	mg/l					3.1	3.4	4.6	1.7	2.8	1.8	7.2
Metals												
Arsenic (dissolved)	µg/l	50	25	10		<1	<1	2	6	<1	<1	1
Boron (dissolved)	µg/l	2000	700	1000		267	3310	102	161	66	50	92
Cadmium (dissolved)	µg/l	0.25	0.2	5		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Calcium	mg/l					244	546	171	528	116	188	136
Copper (dissolved)	µg/l	12.99*		2000		<1	1	<1	<1	1	<1	3
Chromium (dissolved) (III + VI)	µg/l	8.1	8.1	50		6	3	<1	<1	6	3	6
Chromium (dissolved) (VI)	mg/l	0.0034	0.0006	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (dissolved)	µg/l	4.22*	1.3	10		<1	<1	<1	<1	<1	<1	<1
Mercury (dissolved)	µg/l	0.07	0.07	1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (dissolved)	µg/l	20.81*	8.6	20		1	50	5	5	22	2	3
Selenium (dissolved)	µg/l			10		<1	1	<1	2	<1	<1	40.00
Zinc (dissolved)	µg/l	23.03*	6.8	3000		8	22	<1	5	5	2	4
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)												
BTEX - Benzene	µg/l	10	8	1		<1	<1	<1	<1	<1	<1	<1
BTEX - Ethyl Benzene	µg/l				300	<1	<1	<1	<1	<1	<1	<1
BTEX - Toluene	µg/l	74	74		700	<1	<1	<1	<1	<1	<1	<1
BTEX - m & p Xylene	µg/l					<1	<1	<1	<1	<1	<1	<1
BTEX - o Xylene	µg/l					<1	<1	<1	<1	<1	<1	<1
Sum of xylenes	µg/l	30			500	<1	<1	<1	<1	<1	<1	<1
MTBE	µg/l			15		<1	<1	<1	<1	<1	<1	<1
Ali >C5-C6	µg/l				15000	<1	<1	<1	<1	<1	<1	<1
Ali >C6-C8	µg/l				15000	<1	<1	<1	<1	<1	<1	<1
Ali >C8-C10	µg/l				300	<1	<1	<1	<1	<1	<1	<1
Ali >C10-C12	µg/l				300	<5	<5	<5	<5	<5	<5	<5
Ali >C12-C16	µg/l				300	<5	<5	<5	<5	<5	<5	<5
Ali >C16-C21	µg/l					<5	<5	<5	<5	<5	<5	<5
Ali >C21-C35	µg/l					<5	<5	<5	<5	<5	<5	<5
Total Aliphatics	µg/l					<5	<5	<5	<5	<5	<5	<5
Aro >C5-C7	µg/l				10	<1	<1	<1	<1	<1	<1	<1
Aro >C7-C8	µg/l				700	<1	<1	<1	<1	<1	<1	<1
Aro >C8-C9	µg/l					<1	<1	<1	<1	<1	<1	<1
Aro >C9-C10	µg/l				300	<1	<1	<1	<1	<1	<1	<1
Aro >C10-C12	µg/l				90	<5	<5	<5	<5	<5	<5	<5
Aro >C12-C16	µg/l				90	<5	<5	<5	<5	<5	<5	<5
Aro >C16-C21	µg/l				90	<5	<5	<5	<5	<5	<5	<5
Aro >C21-C35	µg/l				90	<5	<5	<5	<5	<5	<5	<5
Total Aromatics	µg/l					<5	<5	<5	<5	<5	<5	<5
TPH (Ali & Aro)	µg/l					<5	<5	<5	<5	<5	<5	<5
PAHs (Polycyclic Aromatic Hydrocarbons)												
Acenaphthene	µg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	µg/l	5.8	5.8			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/l	0.1	0.1			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/l	0.00017	0.00017	0.01		<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Benzo(b)fluoranthene	µg/l			Sum		<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Benzo(ghi)perylene	µg/l			Sum		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	µg/l			Sum		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	µg/l					<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Dibenzo(ah)anthracene	µg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	µg/l	0.0063	0.0063			<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Fluorene	µg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(123-cd)pyrene	µg/l			Sum		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Naphthalene	µg/l	2	2			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	µg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/l					0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Total PAH (sum of Benzo(b), benzo(k), benzo(ghi) and indeno (1,2,3-cd))	µg/l			0.1*		0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01

= exceedance of Tier 2 target concentrations

Below the laboratories limit of detection

* = Total PAH EQS (0.1) assessed via comparison of guideline value to 4 compounds (benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene and indeno(1,2,3-cd)perylene)

** = assessed using the guidance value for benzene

APPENDIX P

CERTIFICATES OF GEOTECHNICAL ANALYSIS

TESTING VERIFICATION CERTIFICATE



1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **02/11/2017 16:55:31**.

Testing reported after this date is not covered by this Verification Certificate.

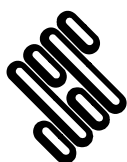
Approved Signatory
Mark Athorne (Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Job No:

782813





STRUCTURAL SOILS LTD

TEST REPORT



Report No. 782813 R1

1774

Date 02-November-2017 Contract M1 Junction 15 Main Site

Client RSK Environment Ltd
Address Spring Lodge
172 Chester Road
Helsby
Cheshire WA6 0AR

For the Attention of Michael Lawson

Samples submitted by client	29/09/2017	Client Reference	313582
Testing Started	02/10/2017	Client Order No.	
Testing Completed	02/11/2017	Instruction Type	Written

Ukas Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded)**
Liquid Limit (one point method) BS1377:Part 2:1990,clause 4.4
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4
Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
Dry density/moisture content relationship 4.5kg rammer method BS1377:Part 4:1990
clause 3.5/3.6
Moisture condition value natural moisture content BS1377:Part4:1990,clause 5.4
Hand Vane

Non Ukas Accredited Tests Undertaken

Particle Size Distribution sedimentation hydrometer method BS1377:Part 2:
1990,clause 9.5
California Bearing Ratio BS1377:Part 4:1990,clause 7.4
One-dimensional consolidation BS1377:Part 5:1990,clause 3.5
Undrained shear strength triaxial compression without pore pressure measurement
(definitive method) 100mm diameter specimens BS1377:Part 7:1990,clause 8.4
Undrained shear strength triaxial compression without pore pressure measurement
(multistage loading) BS1377:Part 7:1990,clause 8.5

Test Undertaken at an External Laboratory

One-dimensional consolidation BS1377:Part 5:1990,clause 3.5
Undrained shear strength triaxial compression without pore pressure measurement
(definitive method) 100mm diameter specimens BS1377:Part 7:1990,clause 8.4
Undrained shear strength triaxial compression without pore pressure measurement
(multistage loading) BS1377:Part 7:1990,clause 8.5
Permeability (triaxial cell method) BS1377:Part 6:1990,clause 6

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.

Test were undertaken on samples 'as received' unless otherwise stated.

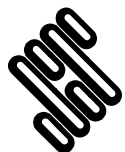
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail mark.athorne@soils.co.uk

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BHA1	1	D	1.20	11					Brown slightly clayey SAND
BHA1	3	D	2.00	11					Brown slightly clayey SAND
BHA1	4	D	3.00	20	59	22	37	99	Dark grey slightly gravelly CLAY
BHA1	5	D	4.00	25					Brown slightly clayey SAND
BHA1	7	D	6.00	20					Grey slightly sandy CLAY
BHA1	8	D	7.00	19					Grey slightly sandy CLAY
BHA1	9	B	8.00	31					Brown slightly sandy CLAY
BHA2	1	D	1.20	19	66	23	43	100	Dark grey brown slightly sandy CLAY



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Contract Ref:

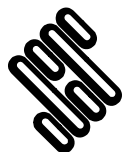
782813



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BHA2	2	D	2.00	12					Brown sandy CLAY
BHA2	4	D	3.00	13					Brown sandy CLAY
BHA2	5	D	4.00	13					Brown slightly sandy CLAY
BHA2	6	D	5.00	5.1					Brown slightly sandy CLAY
BHA2	7	D	6.00	18					Light brown SAND
BHA2	8	D	7.00	18					Brown slightly clayey SAND
BHA2	9	D	8.00	22					Grey slightly sandy CLAY
BHA2	10	D	9.00	19					Brown slightly clayey SAND



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Contract Ref:

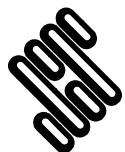
782813



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BHA2	11	D	10.00	17					Brown slightly gravelly SAND
BHA3	1	U	2.50	26					Grey CLAY
BHA6	1	B	0.60	23	34	16	18	83	Brown sandy slightly gravelly CLAY
BHA6	2	B	2.50	25	43	16	27	100	Dark grey slightly sandy CLAY
BHA6	3	U	4.50	18					Grey silty CLAY
BHA6	4	U	10.50	18					Grey CLAY
BHA7	4	U	8.50	21					Grey CLAY
BHA8	1	B	0.50	25	50	19	31	92	Brown sandy gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Contract Ref:

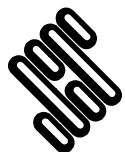
782813



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BHA8	2	U	2.50	17	36	18	18	84	Dark brown slightly sandy slightly gravelly CLAY with some chalk
BHA8	2	U	2.50	17					Dark brown slightly sandy slightly gravelly CLAY
BHA10	1	B	0.50	24	53	19	34	91	Brown sandy gravelly CLAY
BHA10	2	B	1.00	15					Grey slightly sandy CLAY
BHA10	4	B	3.50	24	40	20	20	100	Dark grey slightly sandy CLAY
BHA10	6	B	5.50	24	55	20	35	100	Dark grey slightly sandy CLAY
BHA10	10	U	9.50	25	68	25	43	100	Dark brown grey CLAY
BHA12	1	U	2.50	19	44	18	26	77	Dark brown slightly sandy slightly gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Contract Ref:

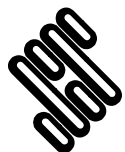
782813



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
BHA12	2	U	6.50	25					Grey CLAY
BHA13	1	U	2.50	27	62	27	35	87	Dark brown grey slightly gravelly CLAY
BHA13	3	U	6.50	22					Grey CLAY
BHA14	3	U	6.50	21	54	20	34	98	Grey slightly gravelly CLAY/soft MUDSTONE
TPA1	1	B	0.80	25	48	20	28	96	Brown sandy gravelly CLAY
TPA2	1	B	1.50	20	41	18	23	94	Brown slightly sandy slightly gravelly CLAY
TPA2	2	B	2.50	19	38	18	20	94	Brown slightly sandy slightly gravelly CLAY
TPA3	1	B	1.00	20	34	16	18	85	Brown sandy gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

Contract Ref:

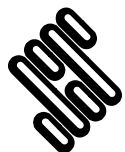
782813



SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425um	Description of Sample
WSA12	1	B	1.00	18	41	17	24	65	Brown sandy gravelly CLAY
WSA12	2	B	3.00	24	46	20	26	92	Brown sandy slightly gravelly CLAY
WSA13	1	B	1.00	21	48	17	31	72	Light brown sandy gravelly CLAY
WSA15	1	B	2.00	22	27	18	9	89	Brown sandy gravelly CLAY
WSA16	1	D	1.00	16					Light brown sandy gravelly CLAY



**STRUCTURAL
SOILS LTD**

Contract:

M1 Junction 15 Main Site

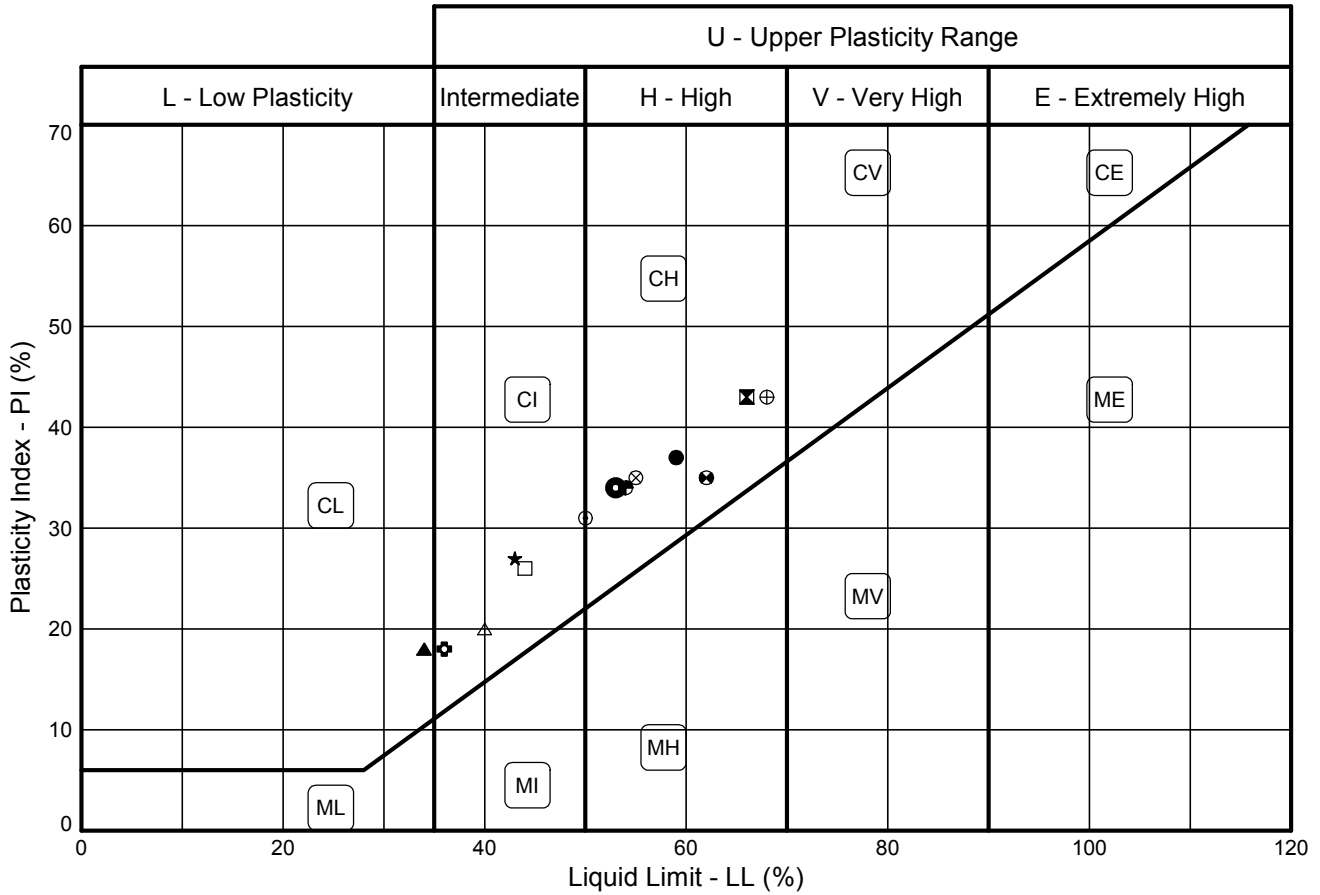
Contract Ref:

782813



PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	Lab location
Exploratory Position ID	Sample	Depth (m)									
●	BHA1	4D	3.00	3.2/4.4/5.3/5.4	4.2.4	20	59	22	37	99	C
⊠	BHA2	1D	1.20	3.2/4.4/5.3/5.4	4.2.3	19	66	23	43	100	C
▲	BHA6	1B	0.60	3.2/4.4/5.3/5.4	4.2.4	23	34	16	18	83	C
★	BHA6	2B	2.50	3.2/4.4/5.3/5.4	4.2.3	25	43	16	27	100	C
⊙	BHA8	1B	0.50	3.2/4.4/5.3/5.4	4.2.4	25	50	19	31	92	C
⊕	BHA8	2U	2.50	3.2/4.4/5.3/5.4	4.2.4	17	36	18	18	84	C
⊙	BHA10	1B	0.50	3.2/4.4/5.3/5.4	4.2.4	24	53	19	34	91	C
△	BHA10	4B	3.50	3.2/4.4/5.3/5.4	4.2.3	24	40	20	20	100	C
⊗	BHA10	6B	5.50	3.2/4.4/5.3/5.4	4.2.3	24	55	20	35	100	C
⊕	BHA10	10U	9.50	3.2/4.4/5.3/5.4	4.2.3	25	68	25	43	100	C
□	BHA12	1U	2.50	3.2/4.4/5.3/5.4	4.2.4	19	44	18	26	77	C
⊗	BHA13	1U	2.50	3.2/4.4/5.3/5.4	4.2.4	27	62	27	35	87	C
⊕	BHA14	3U	6.50	3.2/4.4/5.3/5.4	4.2.4	21	54	20	34	98	C

Tested in accordance with the following clauses of BS1377-2:1990.

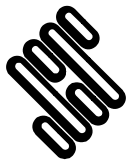
3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

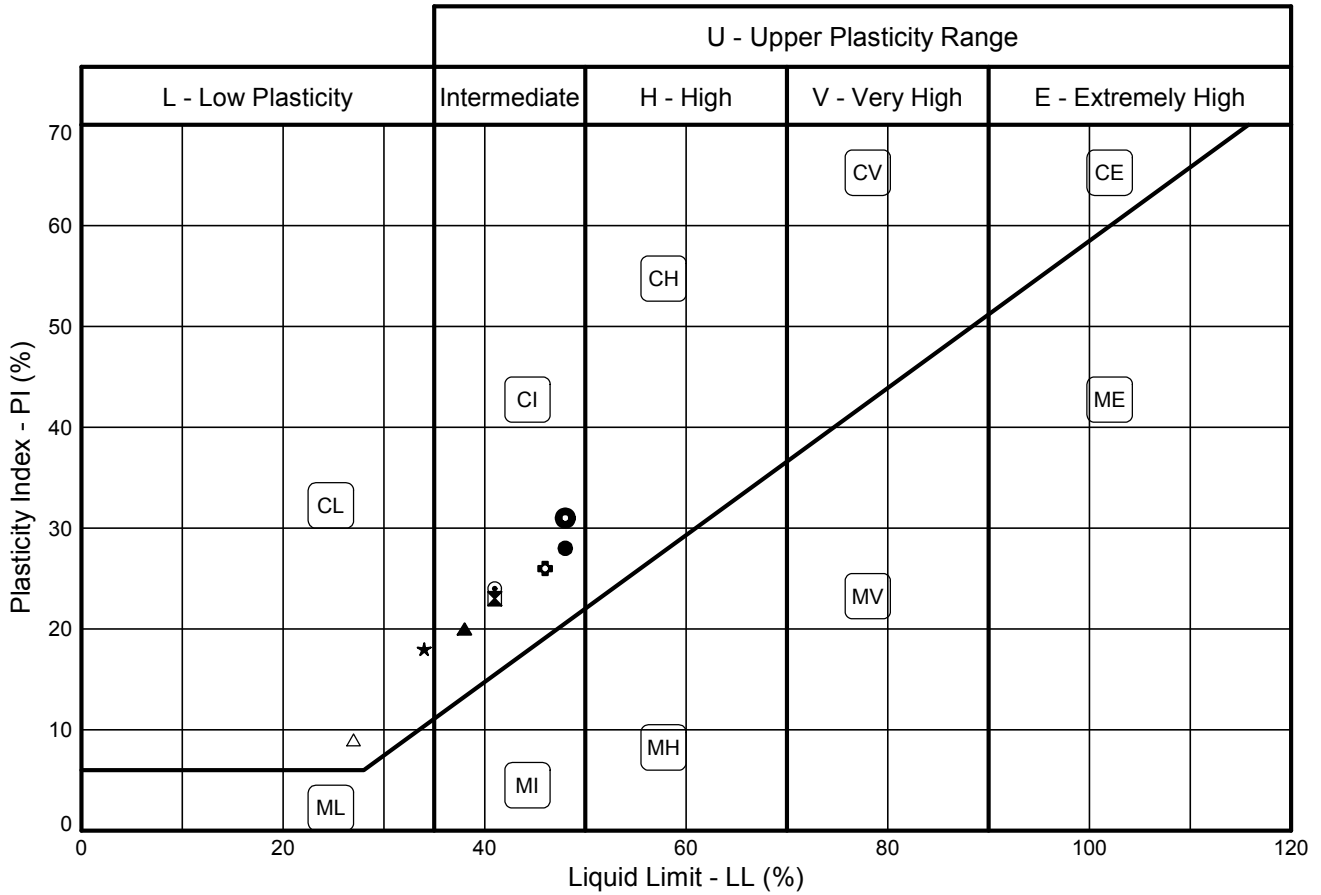
Contract Ref:

782813



PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	Lab location
Exploratory Position ID	Sample	Depth (m)									
●	TPA1	1B	0.80	3.2/4.4/5.3/5.4	4.2.4	25	48	20	28	96	C
⊠	TPA2	1B	1.50	3.2/4.4/5.3/5.4	4.2.4	20	41	18	23	94	C
▲	TPA2	2B	2.50	3.2/4.4/5.3/5.4	4.2.4	19	38	18	20	94	C
★	TPA3	1B	1.00	3.2/4.4/5.3/5.4	4.2.4	20	34	16	18	85	C
⊙	WSA12	1B	1.00	3.2/4.4/5.3/5.4	4.2.4	18	41	17	24	65	C
⊕	WSA12	2B	3.00	3.2/4.4/5.3/5.4	4.2.4	24	46	20	26	92	C
⦿	WSA13	1B	1.00	3.2/4.4/5.3/5.4	4.2.4	21	48	17	31	72	C
△	WSA15	1B	2.00	3.2/4.4/5.3/5.4	4.2.4	22	27	18	9	89	C

Tested in accordance with the following clauses of BS1377-2:1990.

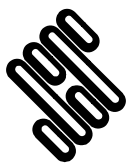
3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

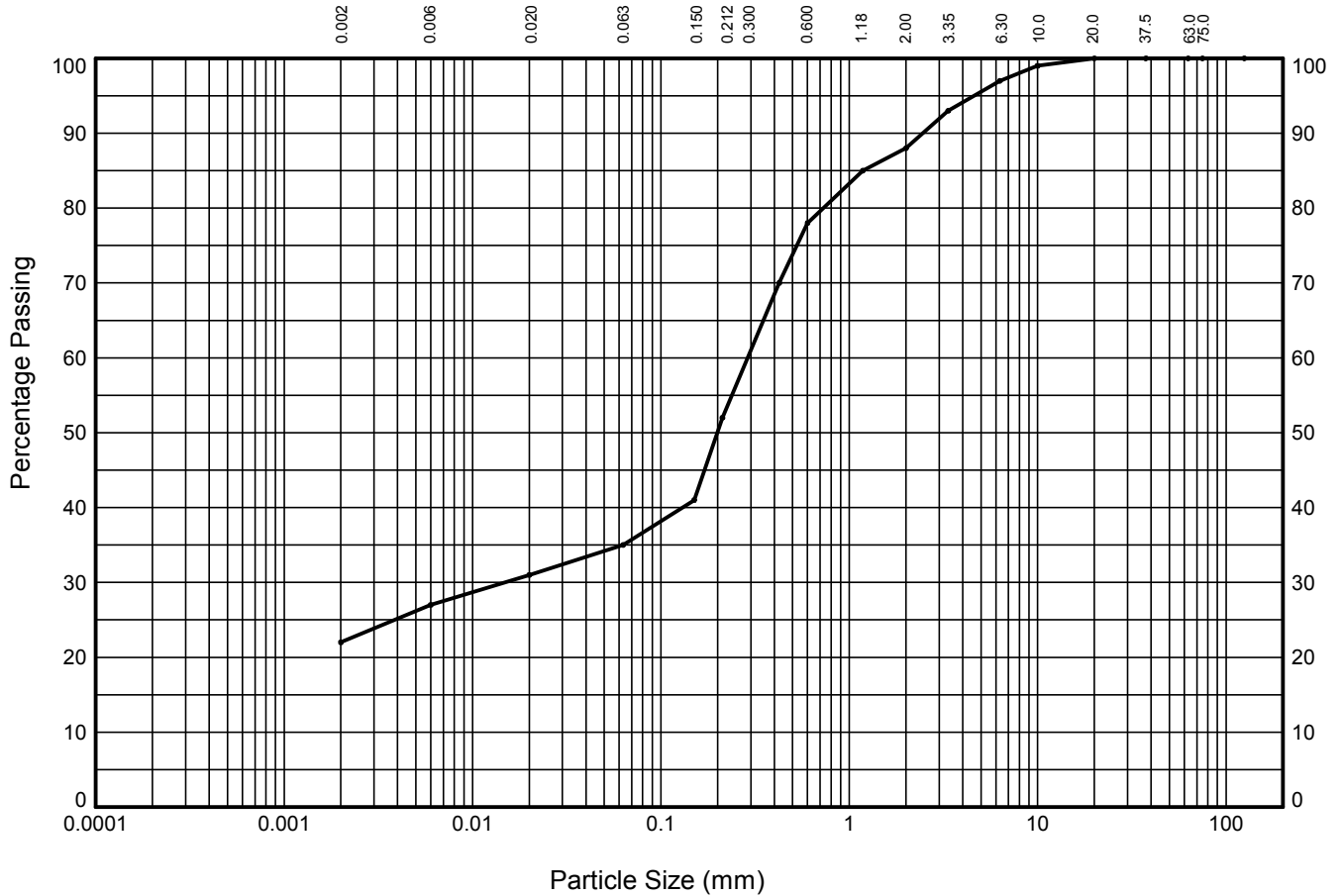
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA1**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **1.70**



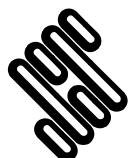
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	99
6.30	97
3.35	93
2.00	88
1.18	85
0.600	78
0.425	70
0.212	52
0.150	41
0.063	35

Particle Diameter (mm)	Percent Passing (%)
0.02	31
0.006	27
0.002	22
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	12
SAND	53
SILT	13
CLAY	22

Soil Description:
Light brown very clayey gravelly SAND



STRUCTURAL SOILS
 The Potteries
 Pottery Street
 Castleford
 W. Yorkshire WF10 1NJ

Compiled By		Date
<i>C Cole</i>		02/11/17
Contract		Contract Ref:
M1 Junction 15 Main Site		782813



PARTICLE SIZE DISTRIBUTION TEST

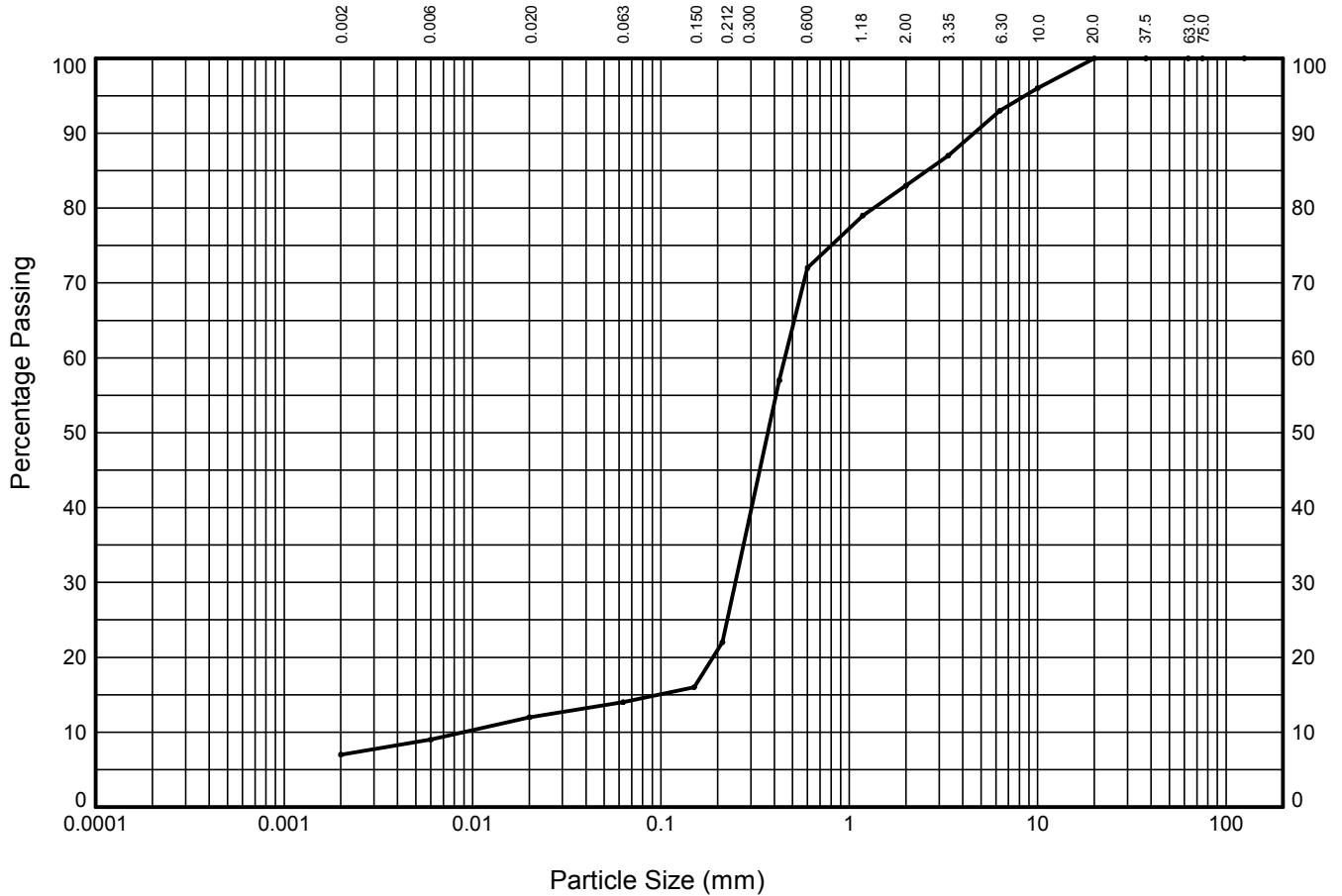
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA2**

Sample Ref: **3**

Sample Type: **B**

Depth (m): **3.00**



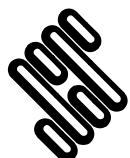
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	96
6.30	93
3.35	87
2.00	83
1.18	79
0.600	72
0.425	57
0.212	22
0.150	16
0.063	14

Particle Diameter (mm)	Percent Passing (%)
0.02	12
0.006	9
0.002	7
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	17
SAND	69
SILT	7
CLAY	7

Soil Description:
Brown clayey gravelly SAND



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

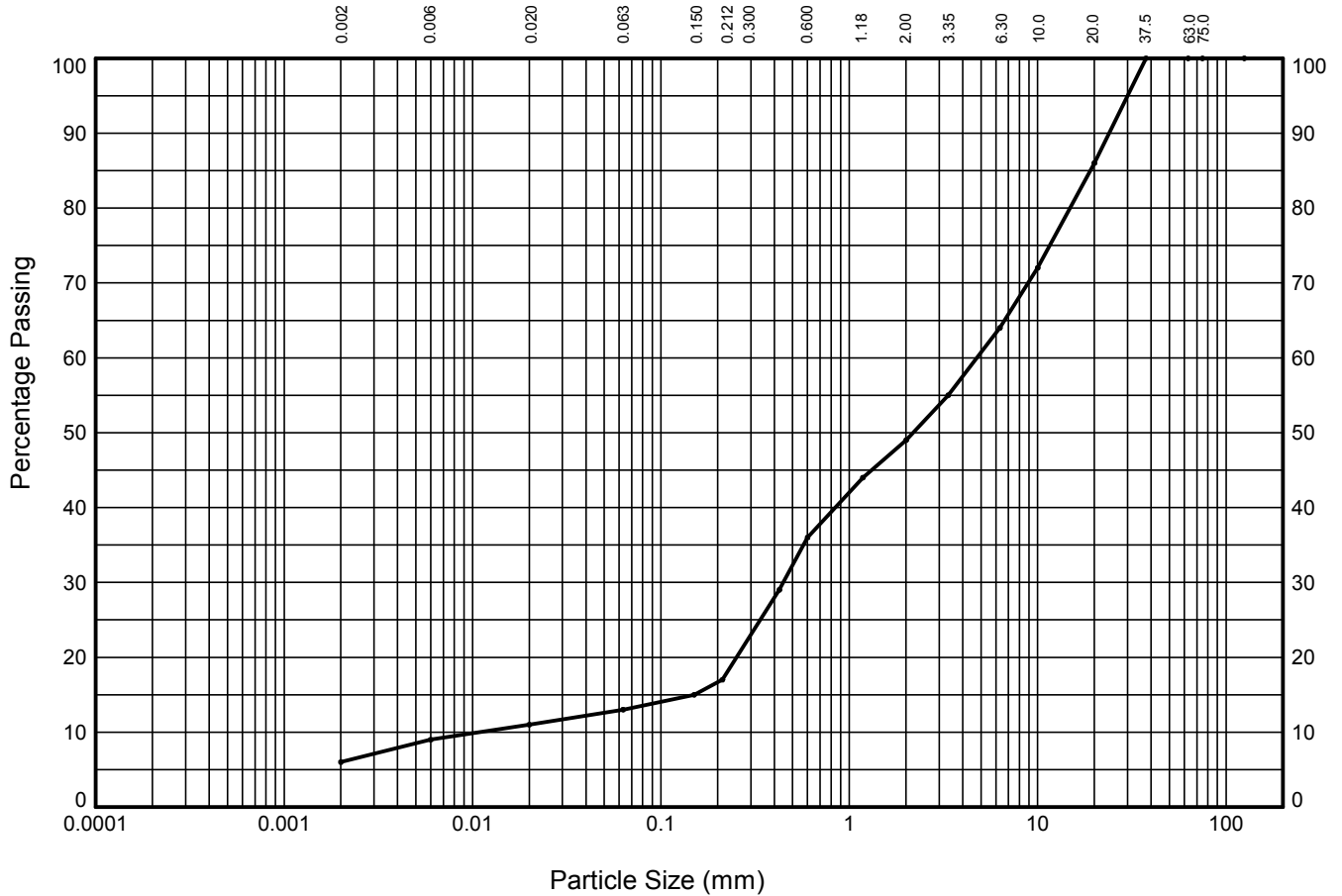
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA4**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **2.00**



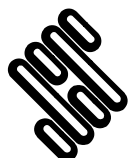
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	86
10.0	72
6.30	64
3.35	55
2.00	49
1.18	44
0.600	36
0.425	29
0.212	17
0.150	15
0.063	13

Particle Diameter (mm)	Percent Passing (%)
0.02	11
0.006	9
0.002	6
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	51
SAND	36
SILT	7
CLAY	6

Soil Description:
Brown clayey very sandy GRAVEL



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

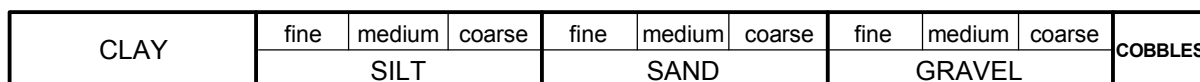
Contract Ref:

782813



In accordance with clauses 9.2 of BS1377:Part 2:1990

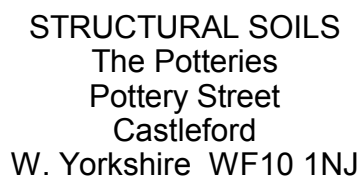
Depth (m): **4.00**



Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	58
SAND	39
SILT/CLAY	3

Brown slightly clayey very sandy GRAVEL



PARTICLE SIZE DISTRIBUTION TEST

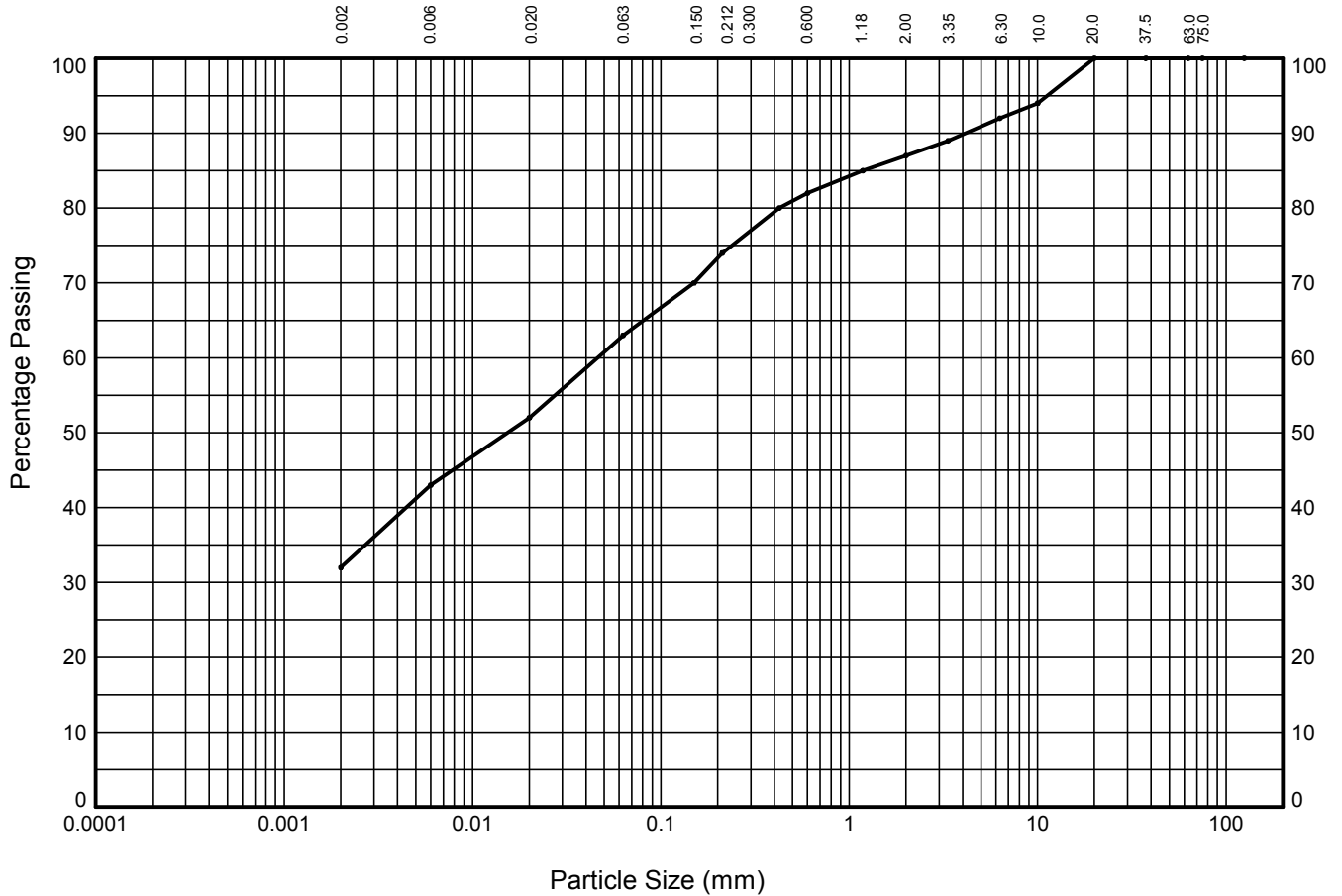
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA5**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

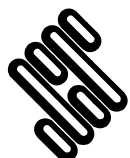
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	94
6.30	92
3.35	89
2.00	87
1.18	85
0.600	82
0.425	80
0.212	74
0.150	70
0.063	63

Particle Diameter (mm)	Percent Passing (%)
0.02	52
0.006	43
0.002	32
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	13
SAND	24
SILT	31
CLAY	32

Soil Description:

Dark grey slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

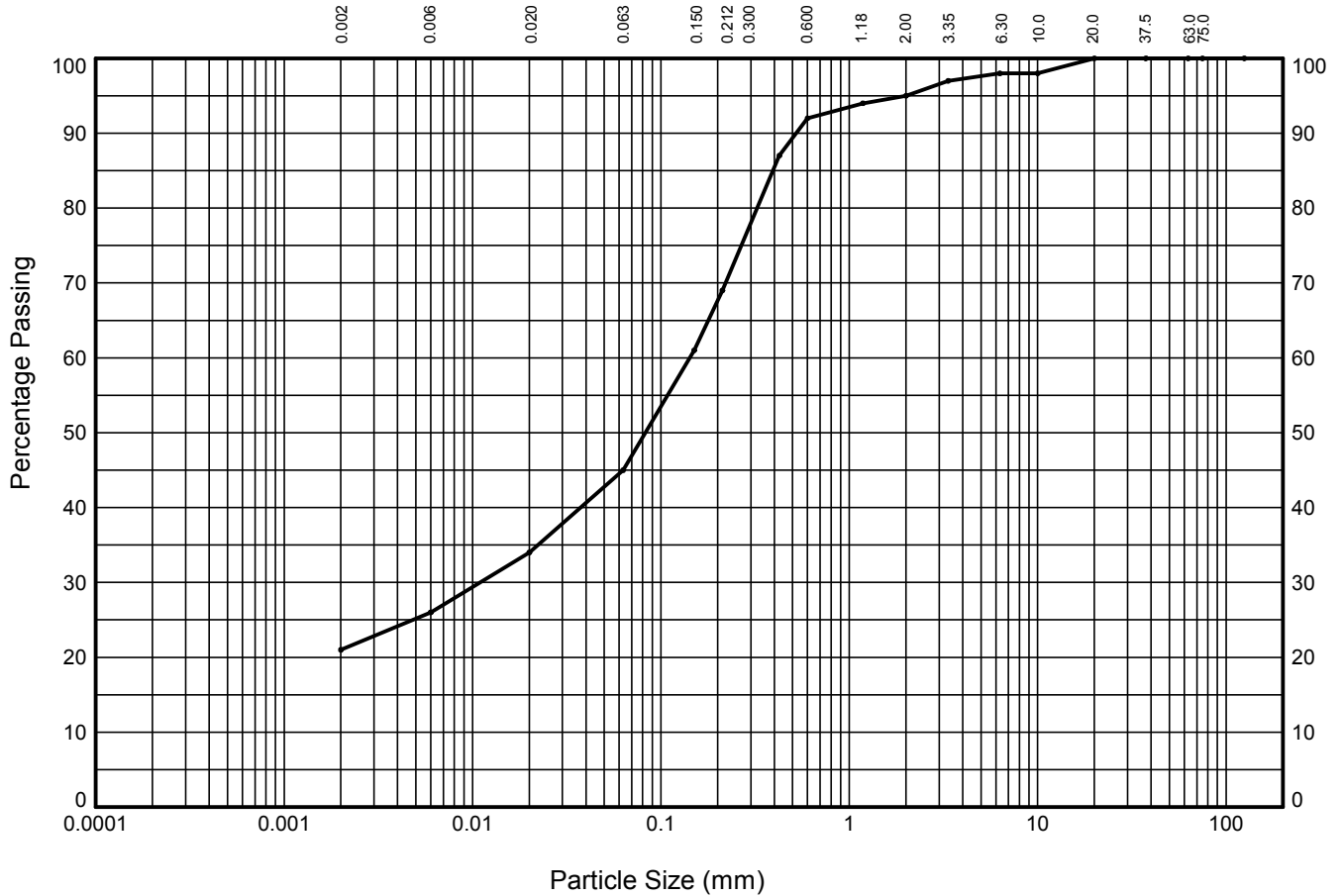
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA6**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **0.60**



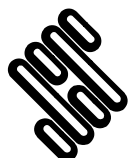
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	98
3.35	97
2.00	95
1.18	94
0.600	92
0.425	87
0.212	69
0.150	61
0.063	45

Particle Diameter (mm)	Percent Passing (%)
0.02	34
0.006	26
0.002	21
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	5
SAND	50
SILT	24
CLAY	21

Soil Description:
Brown sandy slightly gravelly CLAY



STRUCTURAL SOILS
 The Potteries
 Pottery Street
 Castleford
 W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

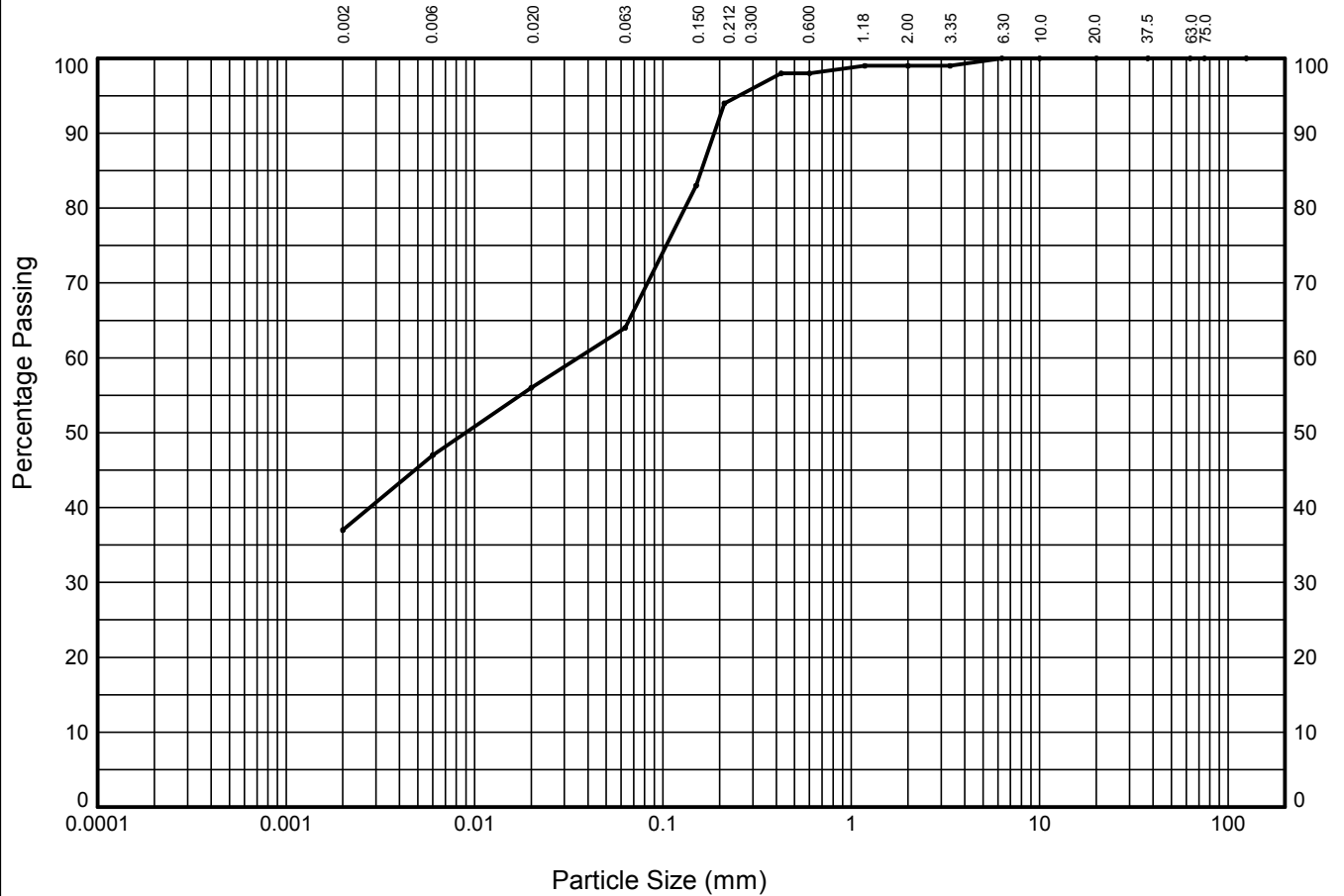
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA6**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

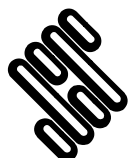
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	100
3.35	99
2.00	99
1.18	99
0.600	98
0.425	98
0.212	94
0.150	83
0.063	64

Particle Diameter (mm)	Percent Passing (%)
0.02	56
0.006	47
0.002	37
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	1
SAND	35
SILT	27
CLAY	37

Soil Description:

Dark grey sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

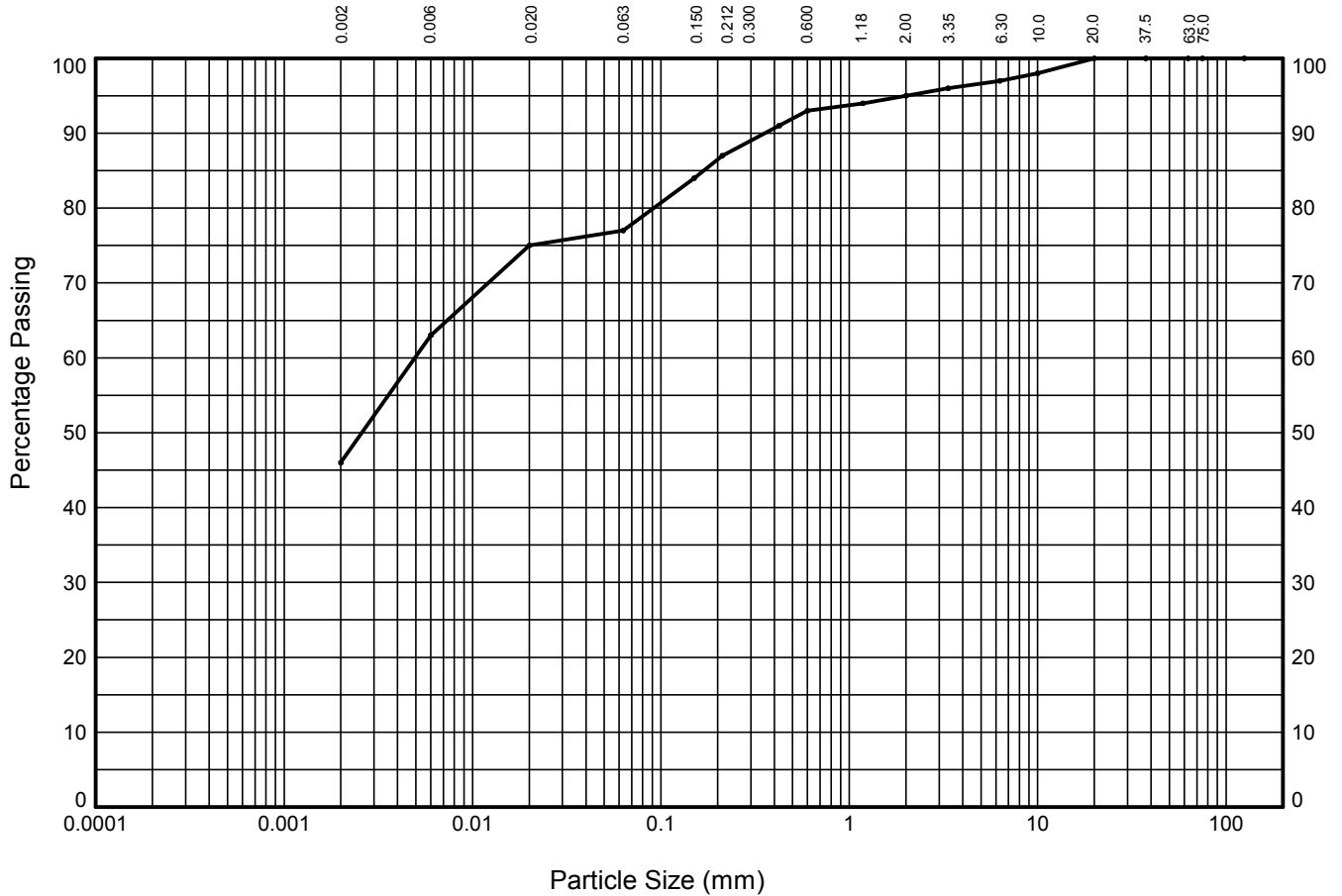
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA8**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **0.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

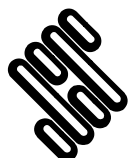
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	97
3.35	96
2.00	95
1.18	94
0.600	93
0.425	91
0.212	87
0.150	84
0.063	77

Particle Diameter (mm)	Percent Passing (%)
0.02	75
0.006	63
0.002	46
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	5
SAND	18
SILT	31
CLAY	46

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

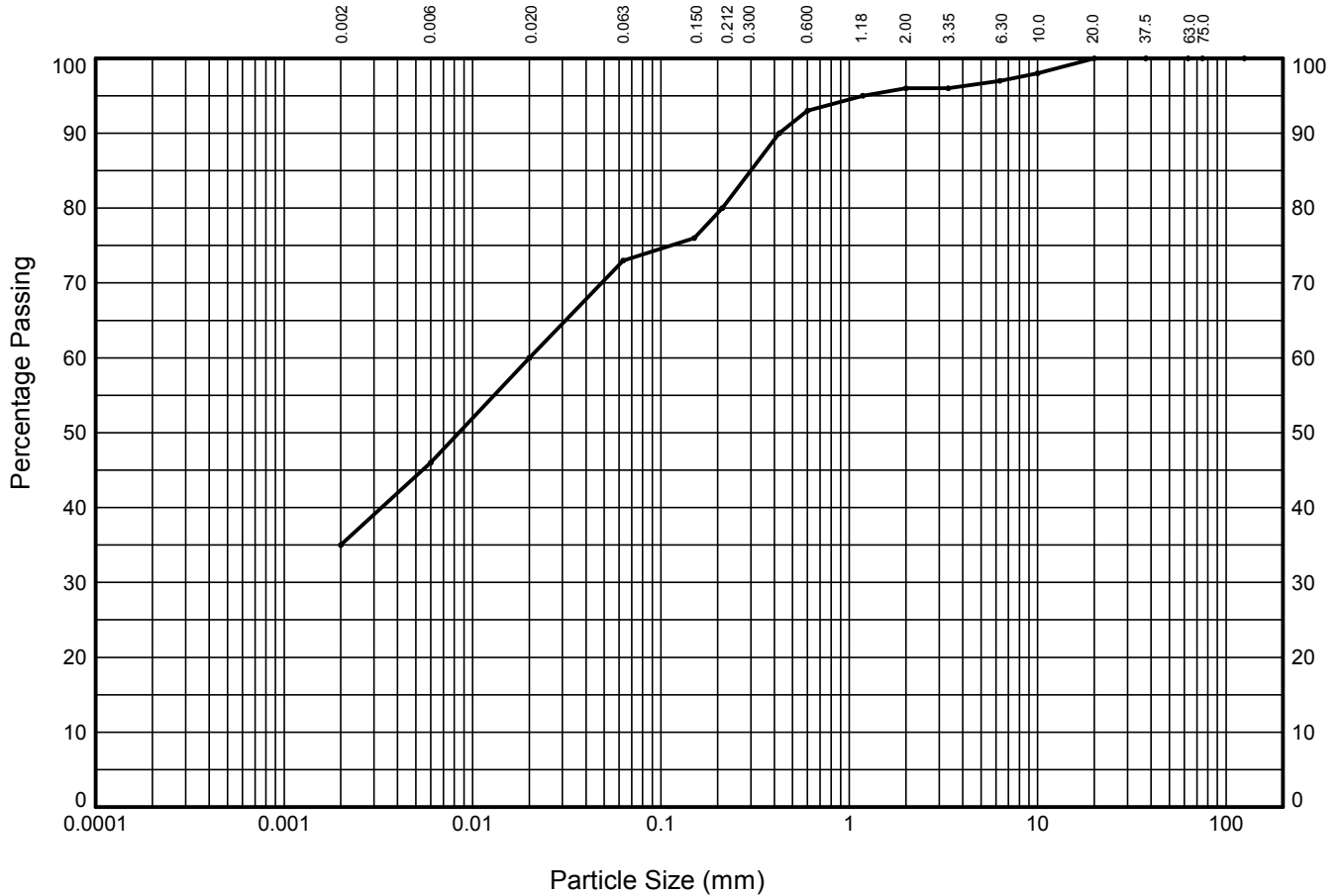
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA10**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **0.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

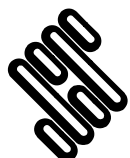
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	97
3.35	96
2.00	96
1.18	95
0.600	93
0.425	90
0.212	80
0.150	76
0.063	73

Particle Diameter (mm)	Percent Passing (%)
0.02	60
0.006	46
0.002	35
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	4
SAND	23
SILT	38
CLAY	35

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

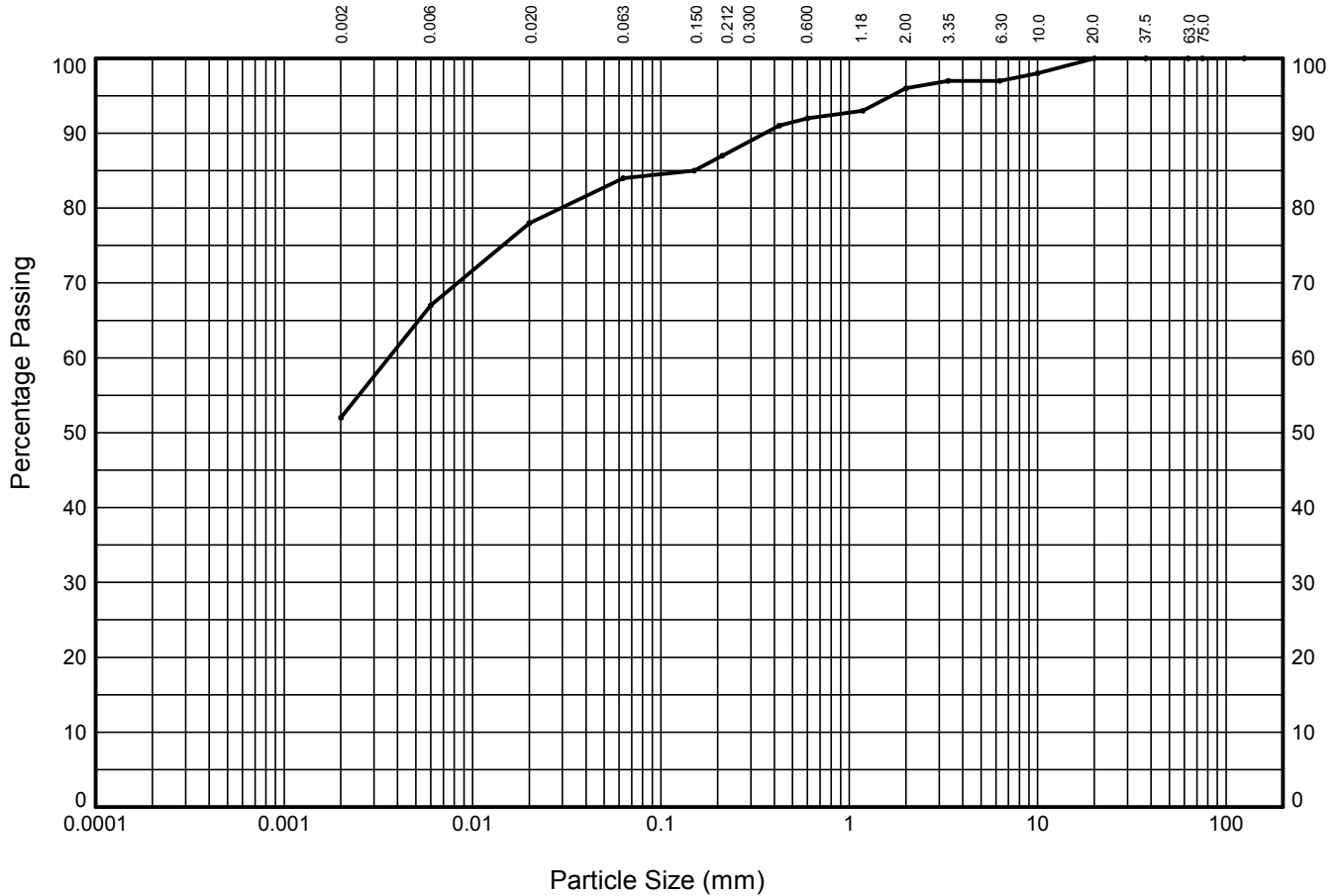
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA10**

Sample Ref: **3**

Sample Type: **B**

Depth (m): **2.00**



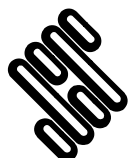
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	97
3.35	97
2.00	96
1.18	93
0.600	92
0.425	91
0.212	87
0.150	85
0.063	84

Particle Diameter (mm)	Percent Passing (%)
0.02	78
0.006	67
0.002	52
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	4
SAND	12
SILT	32
CLAY	52

Soil Description:
Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
 The Potteries
 Pottery Street
 Castleford
 W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

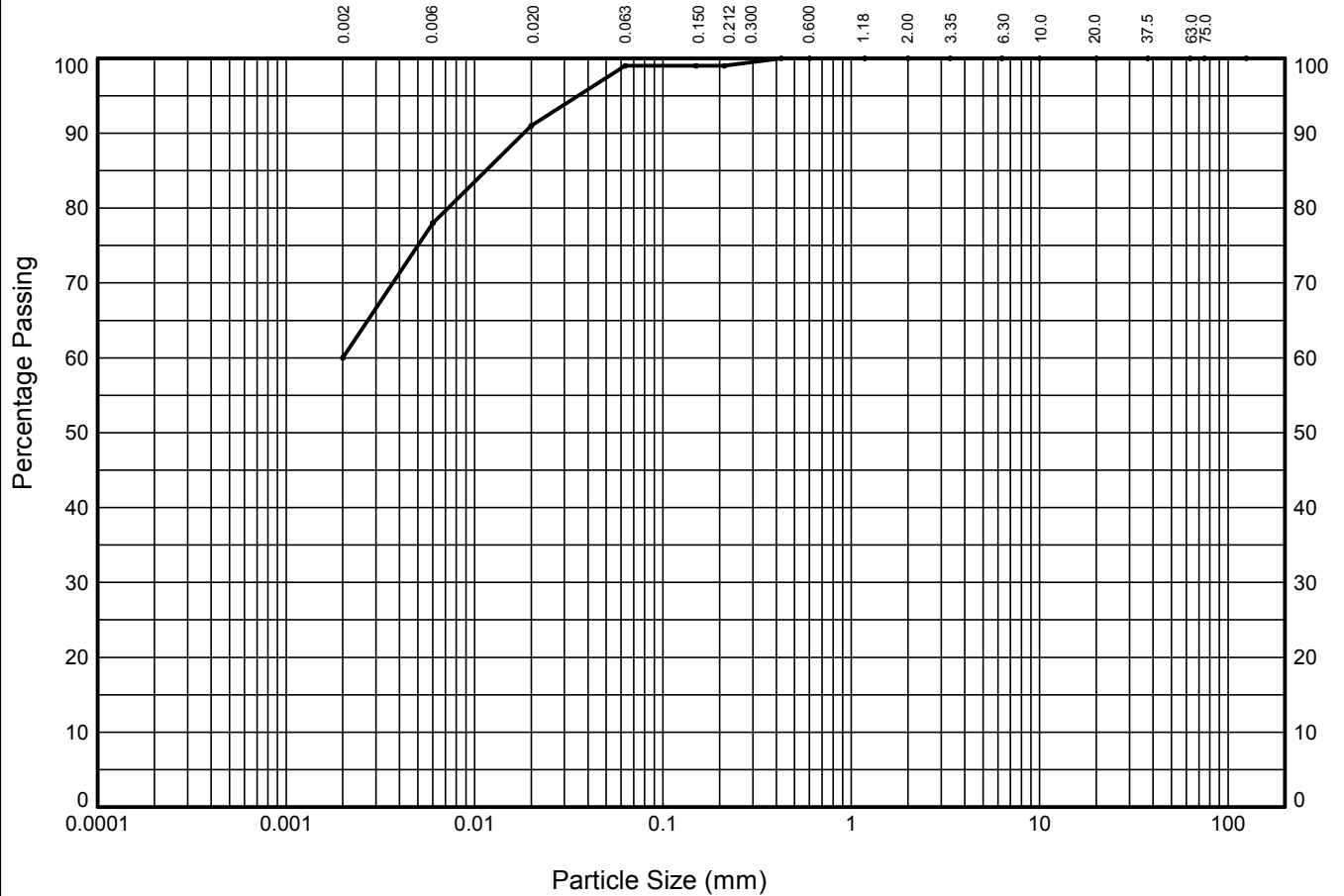
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA10**

Sample Ref: **4**

Sample Type: **B**

Depth (m): **3.50**



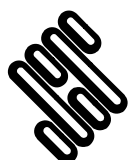
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.212	99
0.150	99
0.063	99

Particle Diameter (mm)	Percent Passing (%)
0.02	91
0.006	78
0.002	60
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	0
SAND	1
SILT	39
CLAY	60

Soil Description:
Dark grey slightly sandy CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

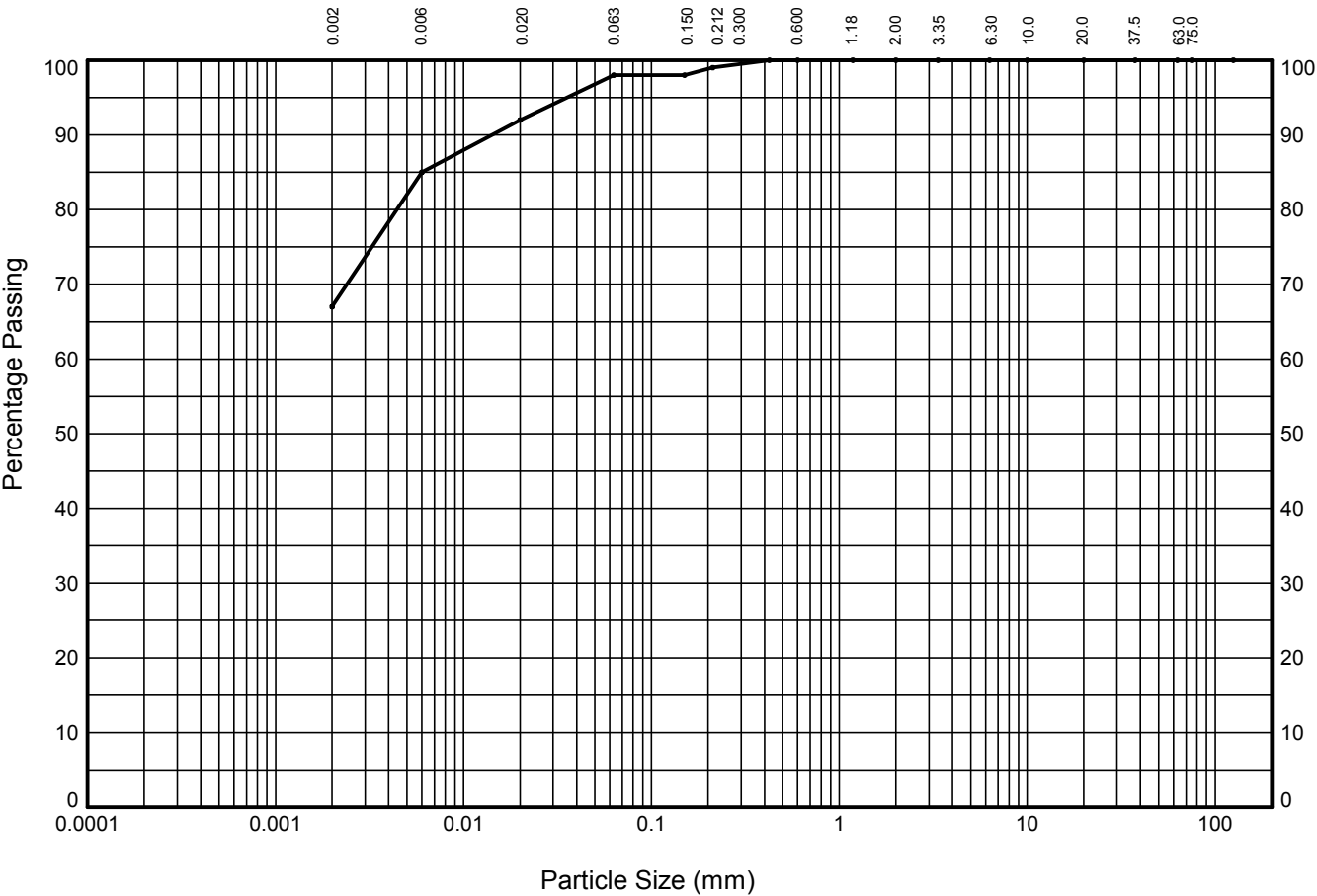
782813



PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA10** Sample Ref: **7** Sample Type: **B** Depth (m): **6.00**

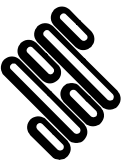


CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES					
	SILT			SAND			GRAVEL								
Test Sieve (mm)	Percent Passing (%)			Particle Diameter (mm)	Percent Passing (%)			Soil Fraction	Sieve Percentage (%)						
125.0	100			0.02	92			GRAVEL	0						
75.0	100							SAND	2						
63.0	100			0.006	85			SILT	31						
37.5	100							CLAY	67						
20.0	100			0.002	67			Sedimentation sample was not pre-treated							
10.0	100														
6.30	100														
3.35	100														
2.00	100														
1.18	100														
0.600	100														
0.425	100														
0.212	99														
0.150	98														
0.063	98														

Soil Description:

Dark grey slightly sandy CLAY

Soil Description:
Dark grey slightly sandy CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

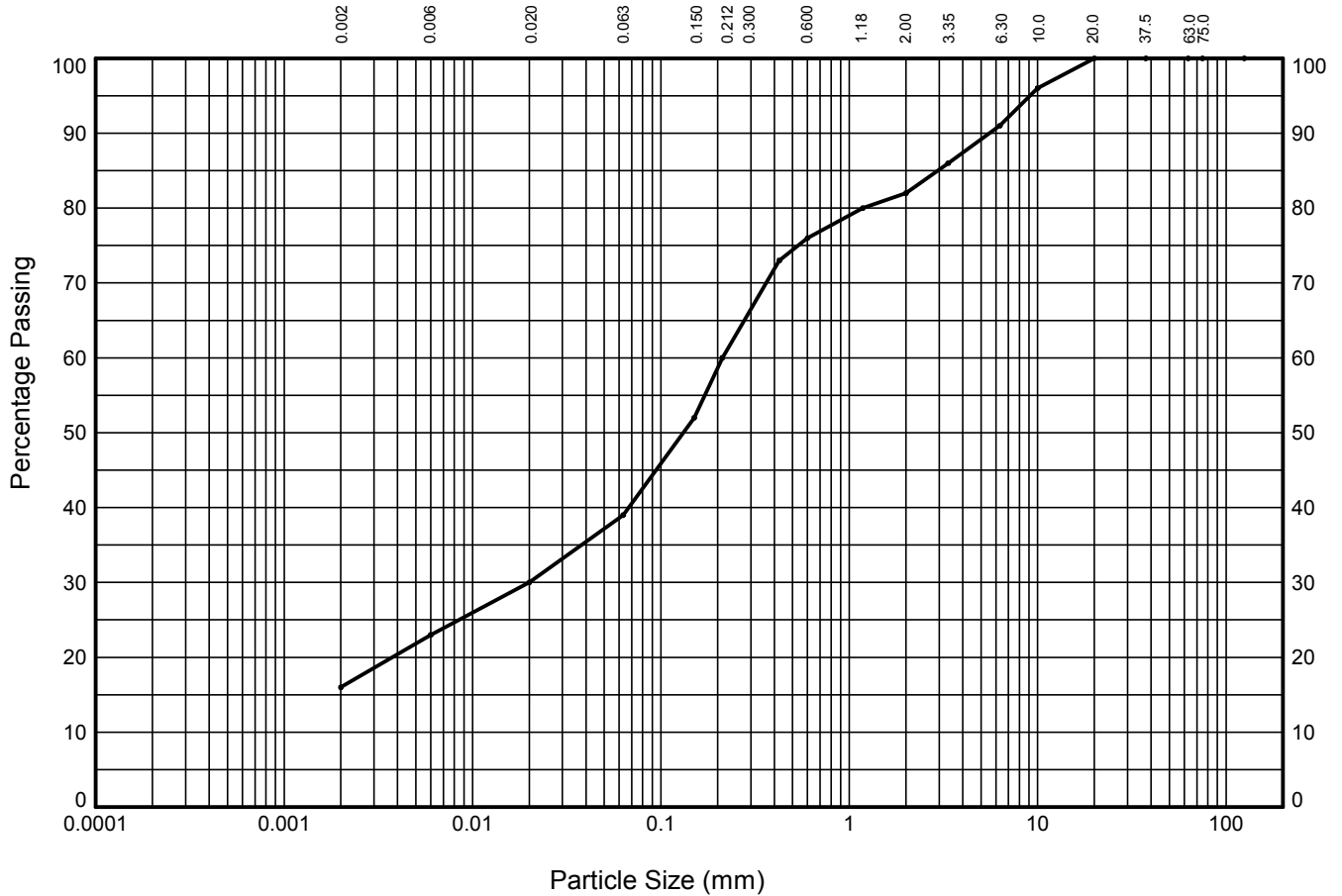
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Borehole: **BHA10**

Sample Ref: **11**

Sample Type: **B**

Depth (m): **11.50**



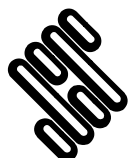
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	96
6.30	91
3.35	86
2.00	82
1.18	80
0.600	76
0.425	73
0.212	60
0.150	52
0.063	39

Particle Diameter (mm)	Percent Passing (%)
0.02	30
0.006	23
0.002	16
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	18
SAND	43
SILT	23
CLAY	16

Soil Description:
Brown sandy slightly gravelly CLAY



STRUCTURAL SOILS
 The Potteries
 Pottery Street
 Castleford
 W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

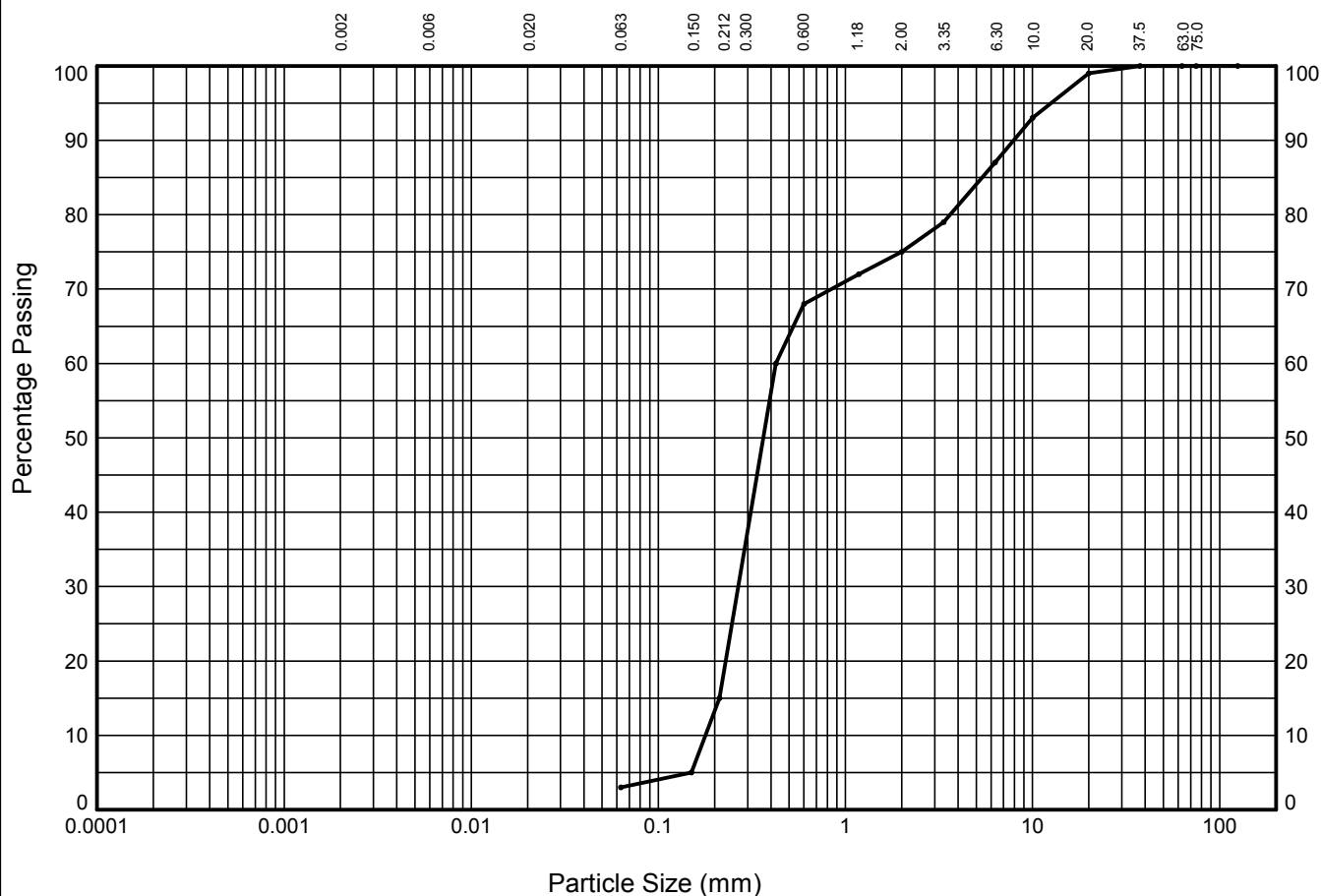
Contract Ref:

782813



In accordance with clauses 9.2 of BS1377:Part 2:1990

Depth (m): **14.00**



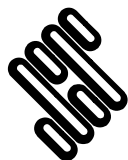
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	99
10.0	93
6.30	87
3.35	79
2.00	75
1.18	72
0.600	68
0.425	60
0.212	15
0.150	5
0.063	3

Particle Diameter (mm)	Percent Passing (%)
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	25
SAND	72
SILT/CLAY	3

Dark brown grey gravelly SAND



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Date _____

C. Cole

CATHERINE COLE

03/11/17

Contract Ref:

M1 Junction 15 Main Site

782813



PARTICLE SIZE DISTRIBUTION TEST

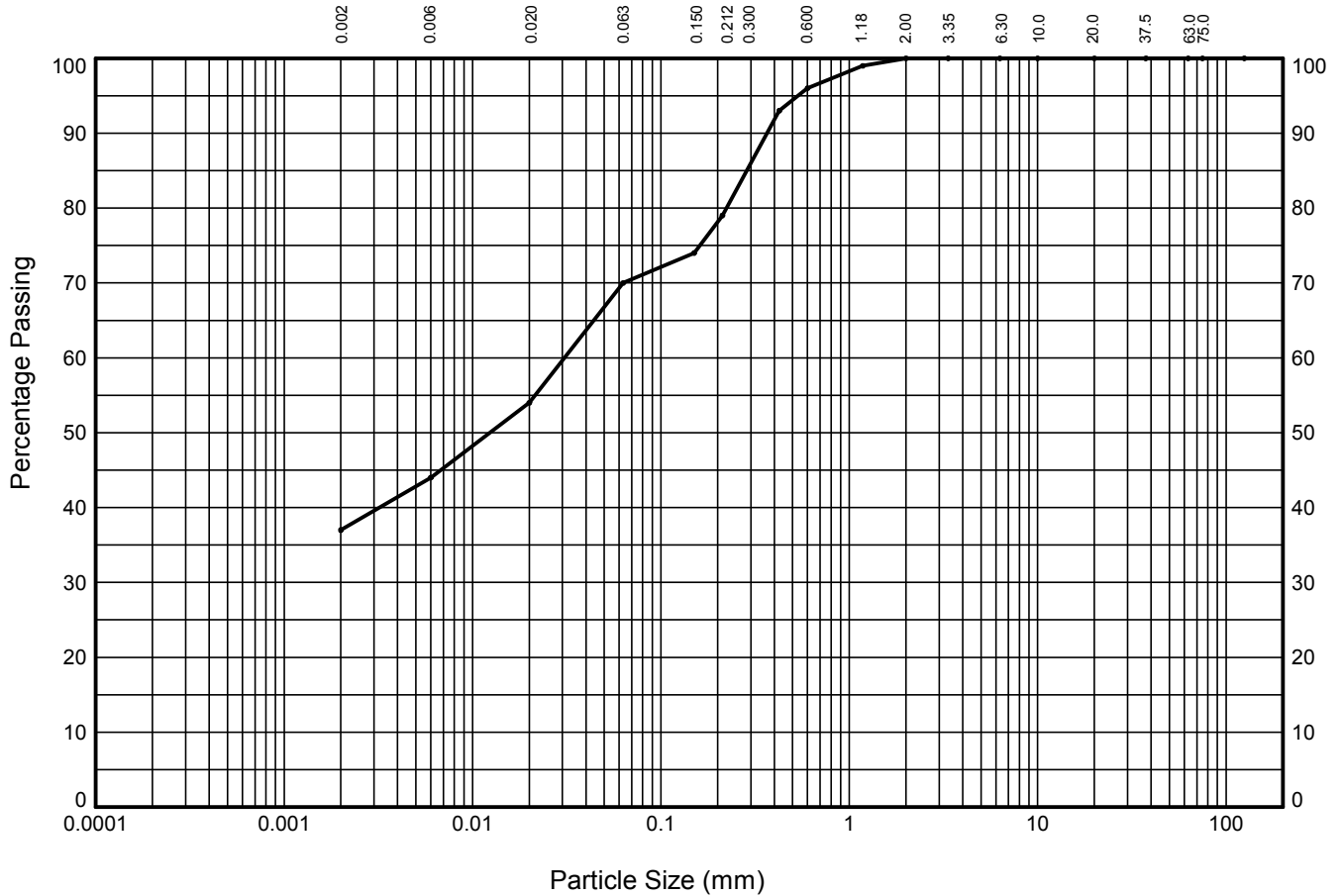
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TPA1**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **0.80**



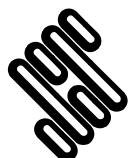
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	100
3.35	100
2.00	100
1.18	99
0.600	96
0.425	93
0.212	79
0.150	74
0.063	70

Particle Diameter (mm)	Percent Passing (%)
0.02	54
0.006	44
0.002	37
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	0
SAND	30
SILT	33
CLAY	37

Soil Description:
Brown slightly sandy CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

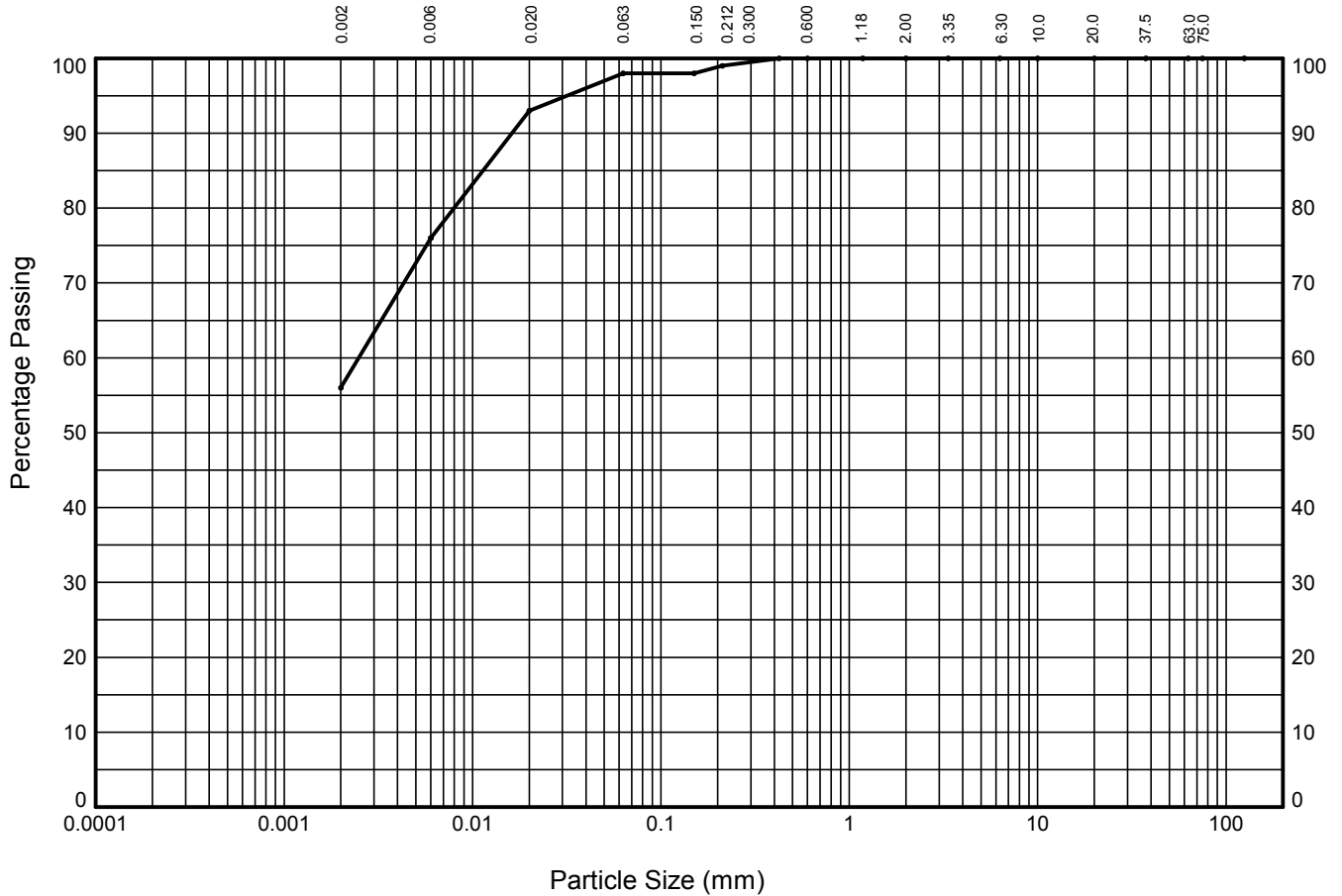
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TPA1**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **1.80**



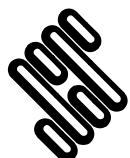
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.212	99
0.150	98
0.063	98

Particle Diameter (mm)	Percent Passing (%)
0.02	93
0.006	76
0.002	56
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	0
SAND	2
SILT	42
CLAY	56

Soil Description:
Dark grey slightly sandy CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

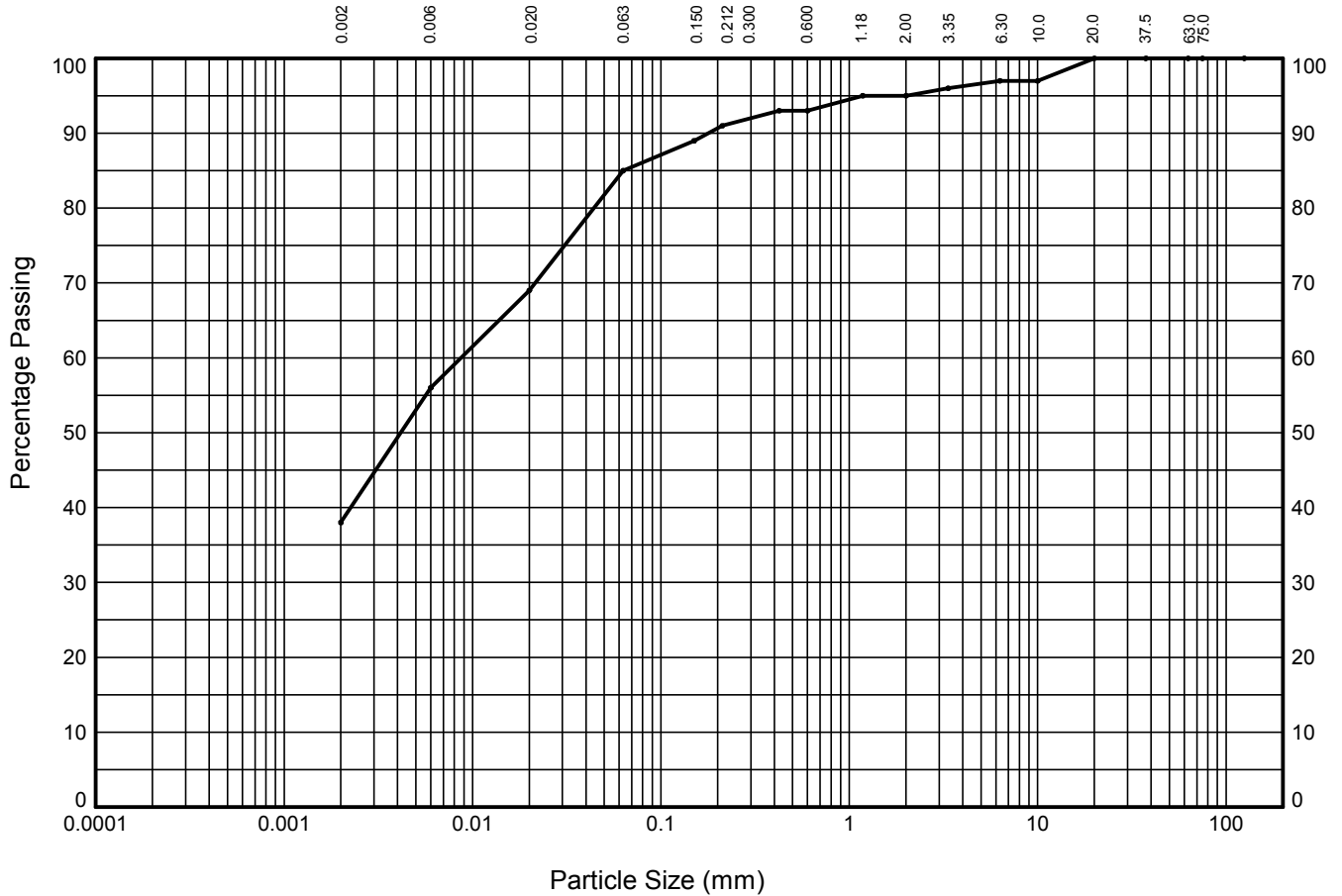
782813



PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TPA2** Sample Ref: **1** Sample Type: **B** Depth (m): **1.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

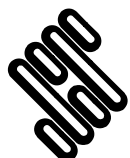
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	97
6.30	97
3.35	96
2.00	95
1.18	95
0.600	93
0.425	93
0.212	91
0.150	89
0.063	85

Particle Diameter (mm)	Percent Passing (%)
0.02	69
0.006	56
0.002	38
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	5
SAND	10
SILT	47
CLAY	38

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

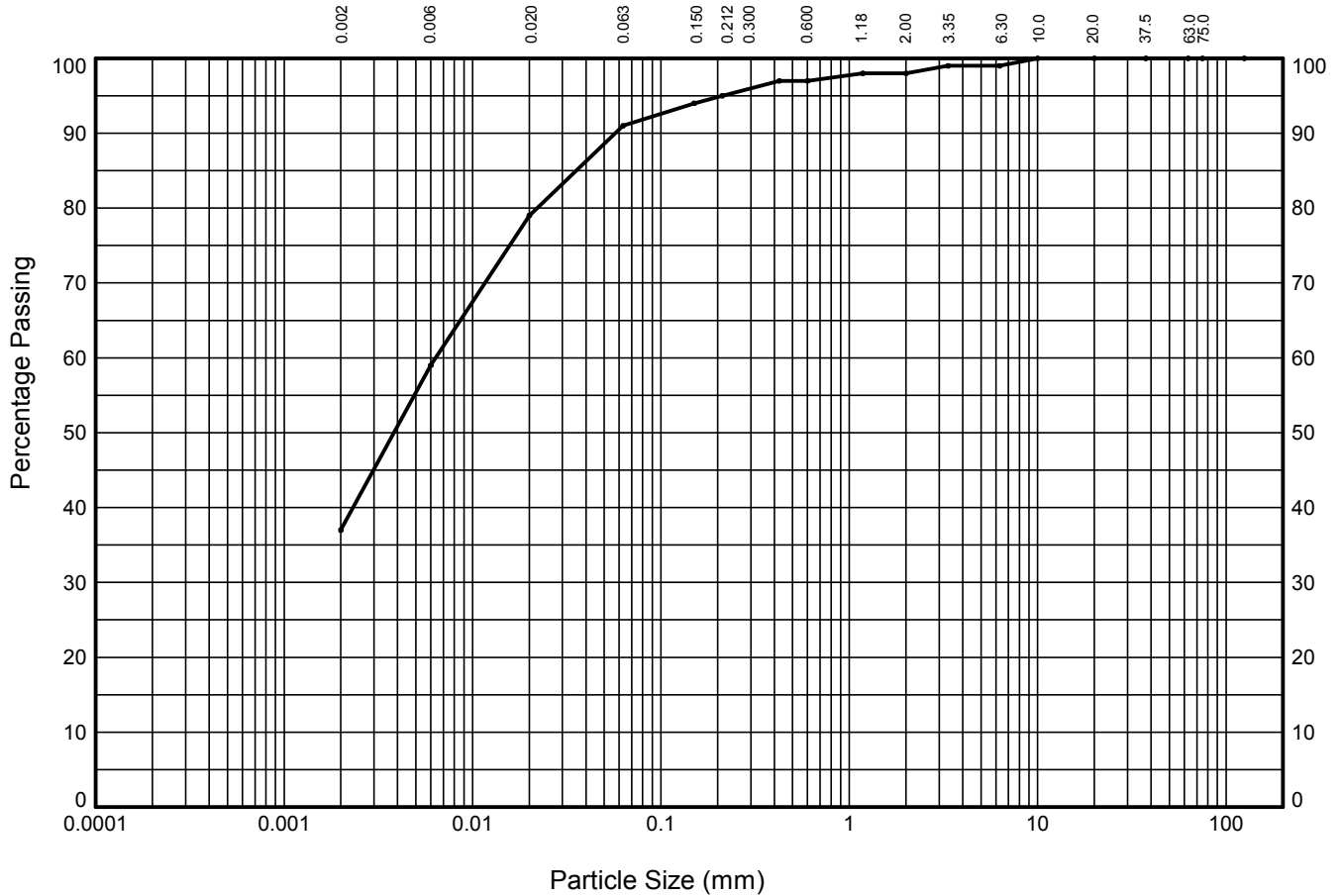
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TPA2**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

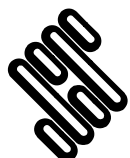
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	100
6.30	99
3.35	99
2.00	98
1.18	98
0.600	97
0.425	97
0.212	95
0.150	94
0.063	91

Particle Diameter (mm)	Percent Passing (%)
0.02	79
0.006	59
0.002	37
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	2
SAND	7
SILT	54
CLAY	37

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

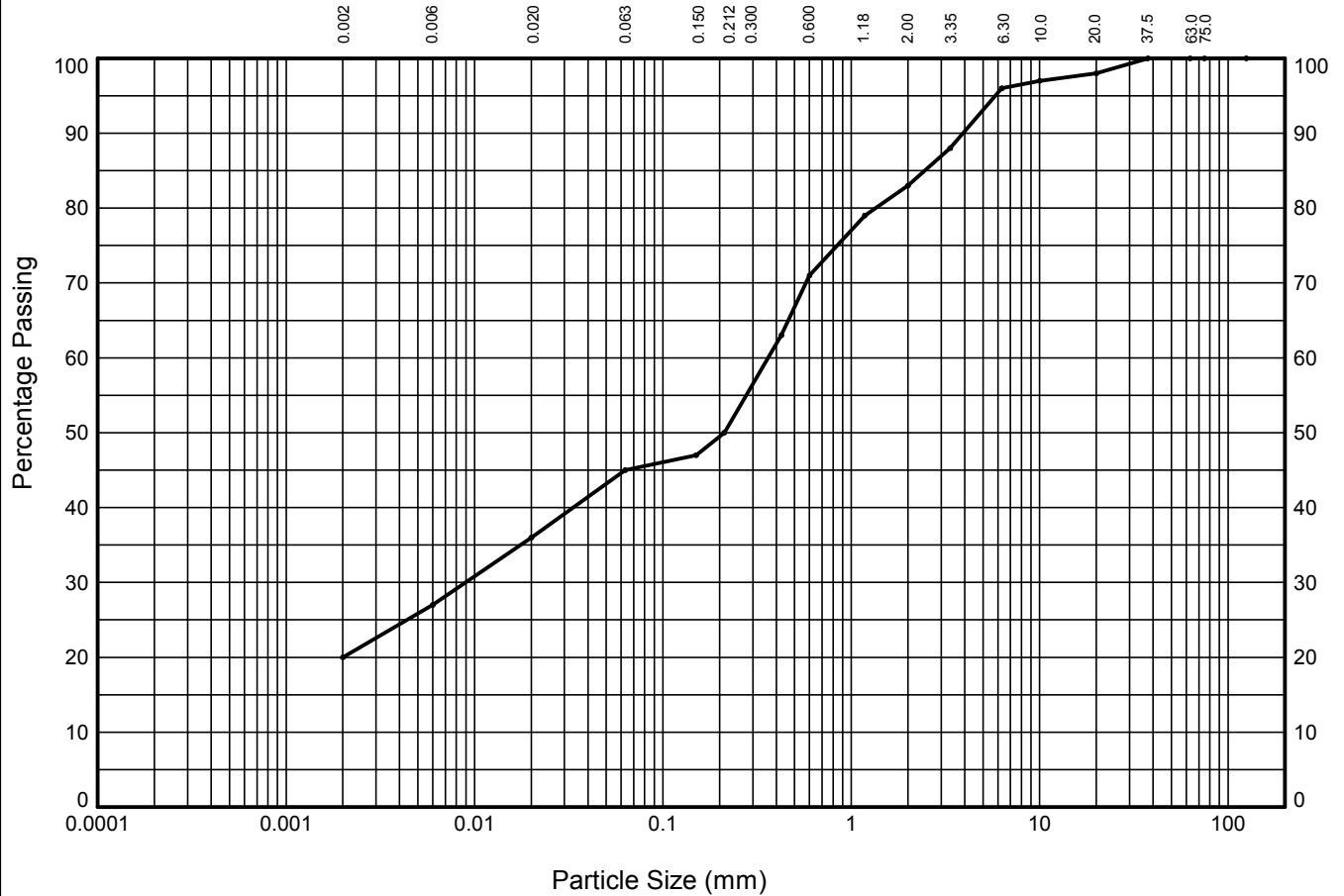
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TPA3**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **1.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

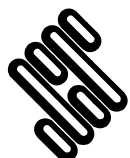
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	98
10.0	97
6.30	96
3.35	88
2.00	83
1.18	79
0.600	71
0.425	63
0.212	50
0.150	47
0.063	45

Particle Diameter (mm)	Percent Passing (%)
0.02	36
0.006	27
0.002	20
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	17
SAND	38
SILT	25
CLAY	20

Soil Description:

Brown sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

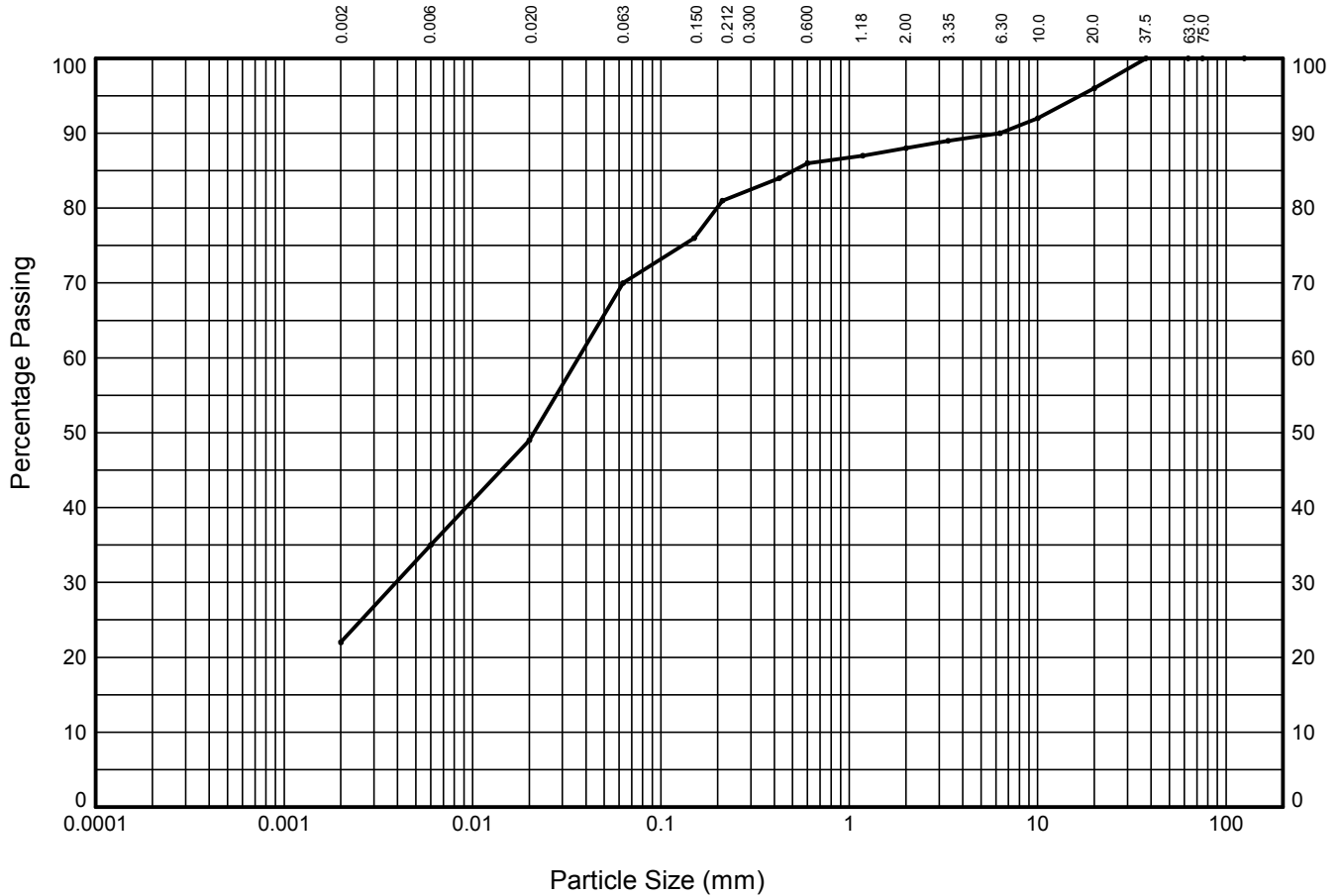
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Window Sample: **WSA13**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

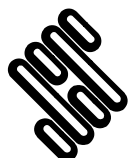
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	96
10.0	92
6.30	90
3.35	89
2.00	88
1.18	87
0.600	86
0.425	84
0.212	81
0.150	76
0.063	70

Particle Diameter (mm)	Percent Passing (%)
0.02	49
0.006	35
0.002	22
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	12
SAND	18
SILT	48
CLAY	22

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

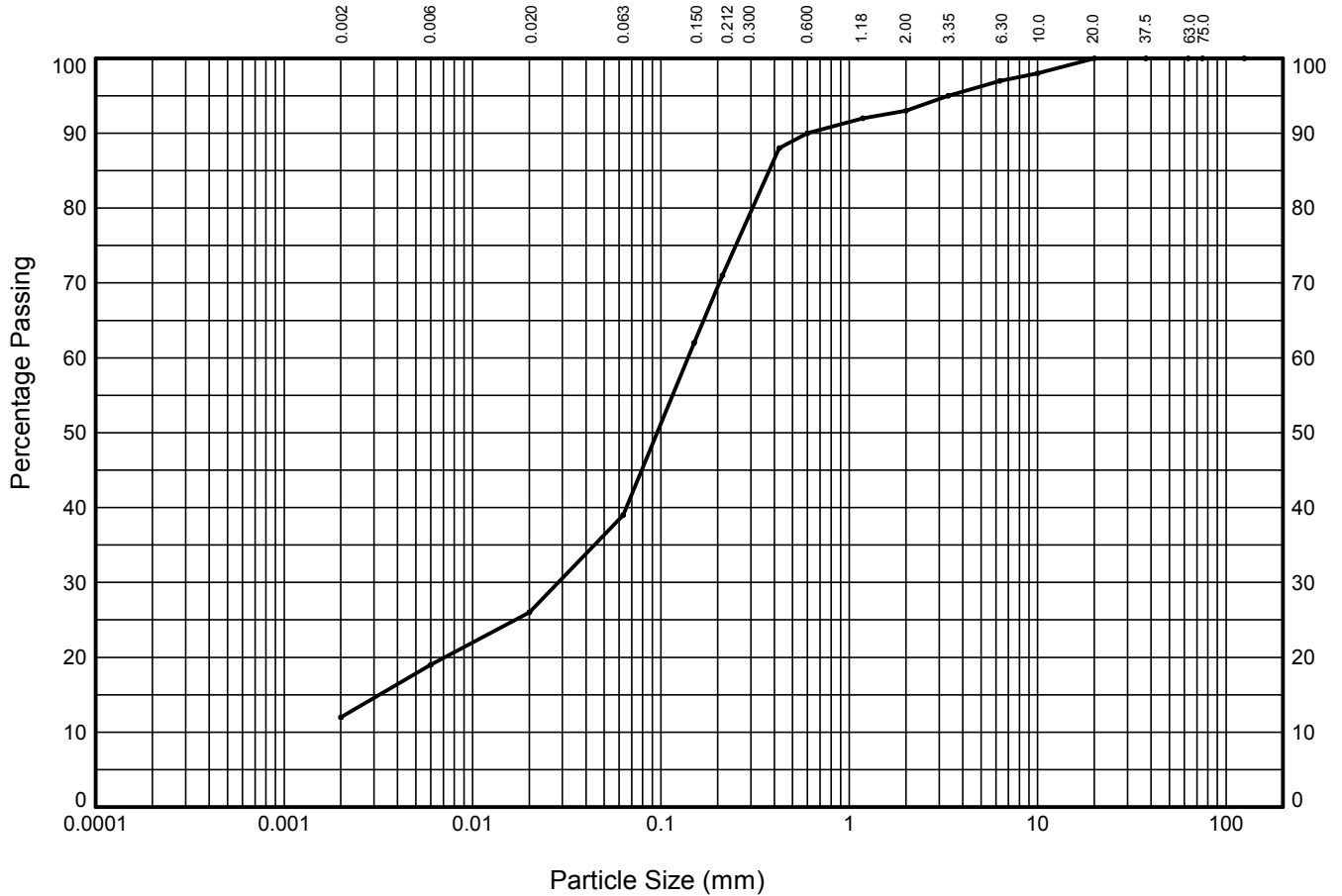
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Window Sample: **WSA14**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.00**



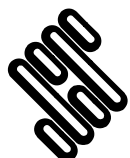
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	98
6.30	97
3.35	95
2.00	93
1.18	92
0.600	90
0.425	88
0.212	71
0.150	62
0.063	39

Particle Diameter (mm)	Percent Passing (%)
0.02	26
0.006	19
0.002	12
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	7
SAND	54
SILT	27
CLAY	12

Soil Description:
Brown very clayey gravelly SAND



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

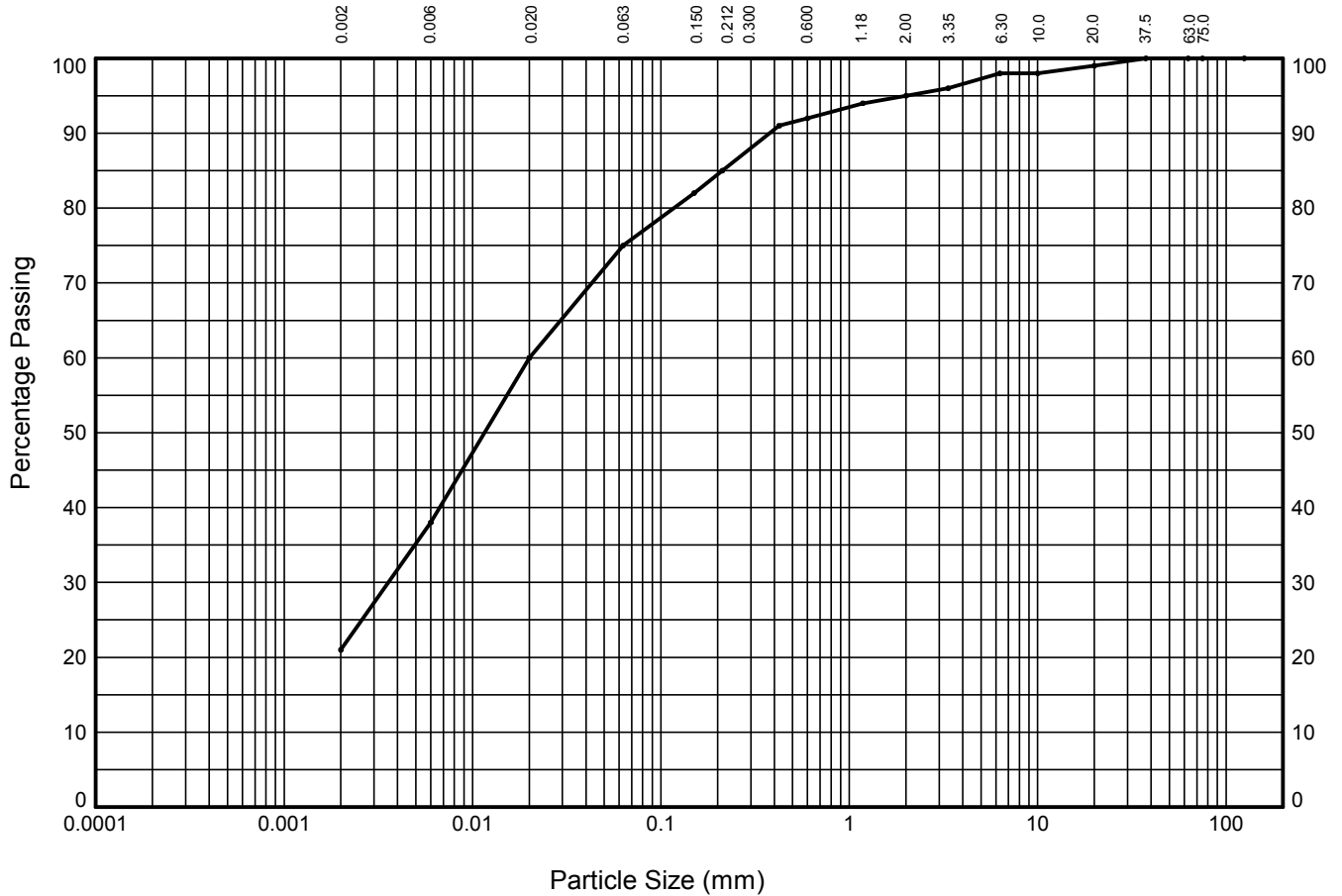
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Window Sample: **WSA15**

Sample Ref: **1**

Sample Type: **B**

Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

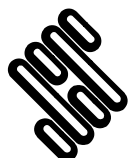
Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	99
10.0	98
6.30	98
3.35	96
2.00	95
1.18	94
0.600	92
0.425	91
0.212	85
0.150	82
0.063	75

Particle Diameter (mm)	Percent Passing (%)
0.02	60
0.006	38
0.002	21
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	5
SAND	20
SILT	54
CLAY	21

Soil Description:

Brown slightly sandy slightly gravelly CLAY



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



PARTICLE SIZE DISTRIBUTION TEST

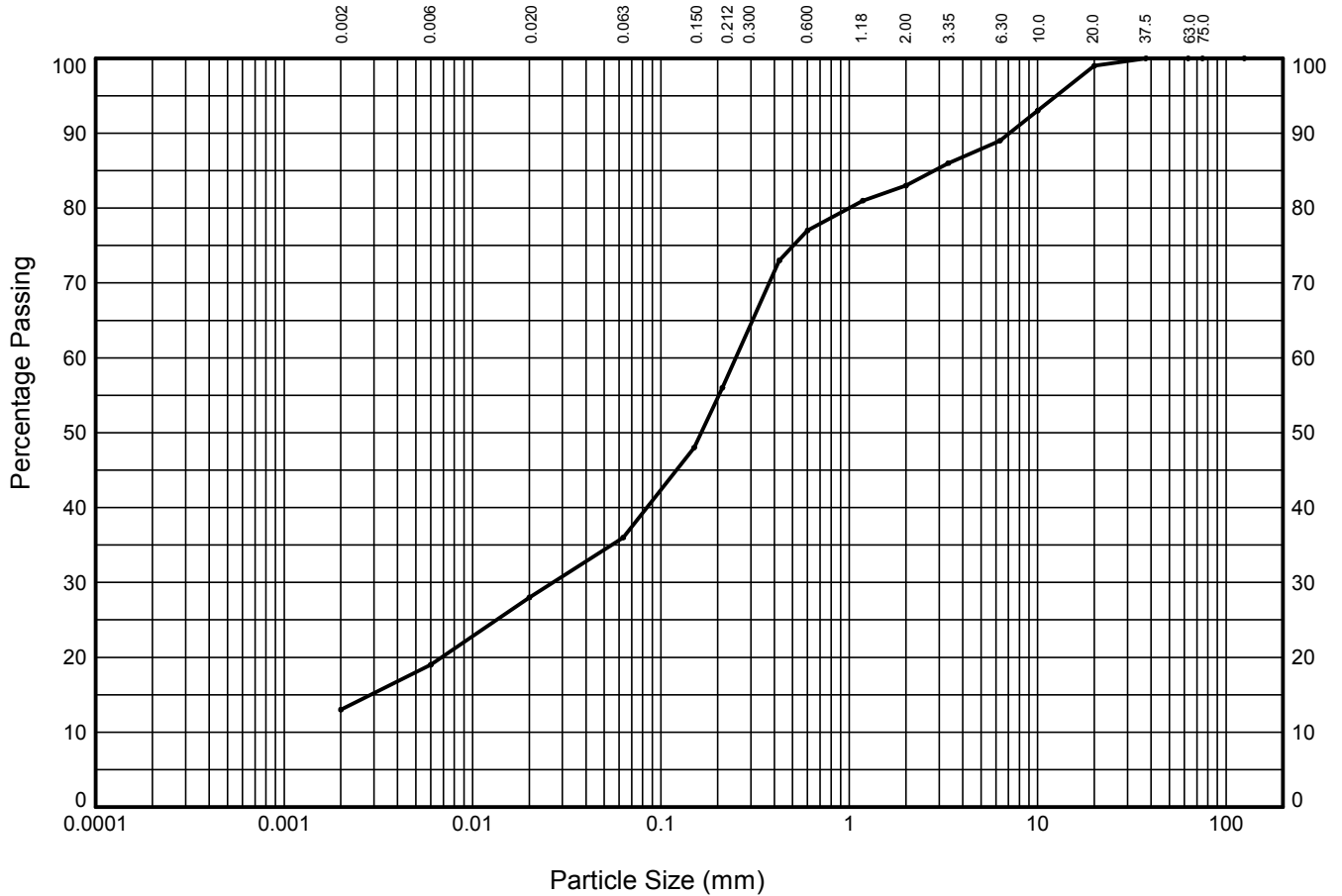
In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Window Sample: **WSA16**

Sample Ref: **2**

Sample Type: **B**

Depth (m): **2.00**



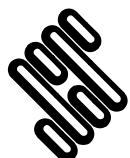
CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	100
75.0	100
63.0	100
37.5	100
20.0	99
10.0	93
6.30	89
3.35	86
2.00	83
1.18	81
0.600	77
0.425	73
0.212	56
0.150	48
0.063	36

Particle Diameter (mm)	Percent Passing (%)
0.02	28
0.006	19
0.002	13
Sedimentation sample was not pre-treated	

Soil Fraction	Sieve Percentage (%)
GRAVEL	17
SAND	47
SILT	23
CLAY	13

Soil Description:
Brown sandy slightly gravelly CLAY



STRUCTURAL SOILS
 The Potteries
 Pottery Street
 Castleford
 W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

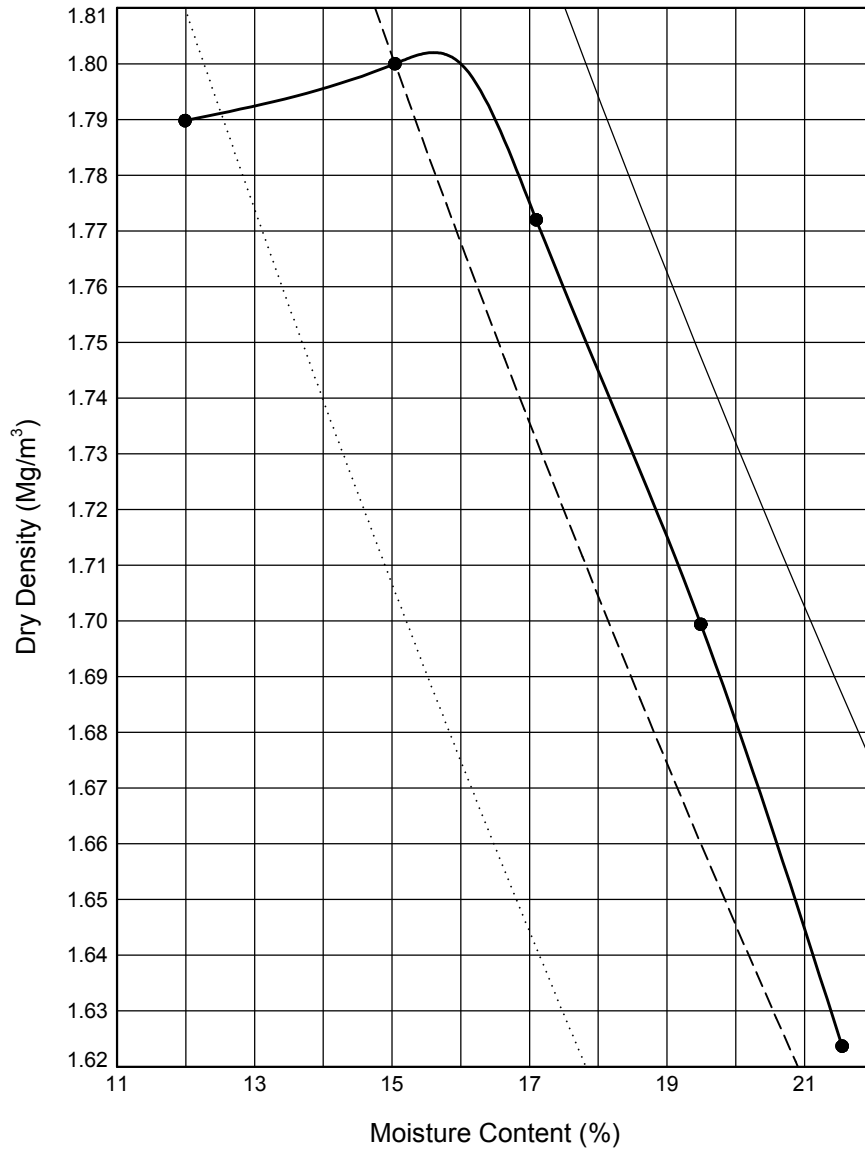
782813



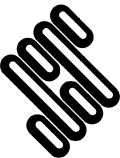
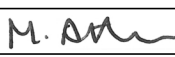
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TPA2** Sample Ref: **2** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: 19	Compaction Type	: Heavy	Maximum Dry Density (Mg/m³)	: 1.80
% Retained on 37.5mm BS Sieve	: 0	Mass of Rammer (kg):	4.5	Optimum Moisture Content (%)	: 16
% Retained on 20.0mm BS Sieve	: 0	Type of Mould	: Proctor	Method Used:	Clause 3.5
Particle Density - assumed (Mg/m³)	: 2.65	Remarks:			
Size of Soil Pieces	: <20mm				
Sample Description			Key to Air Voids Lines		
Brown slightly sandy slightly gravelly CLAY			———— 0%	----- 5% 10%

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date
			02/11/17
	Contract M1 Junction 15 Main Site		Contract Ref: 782813

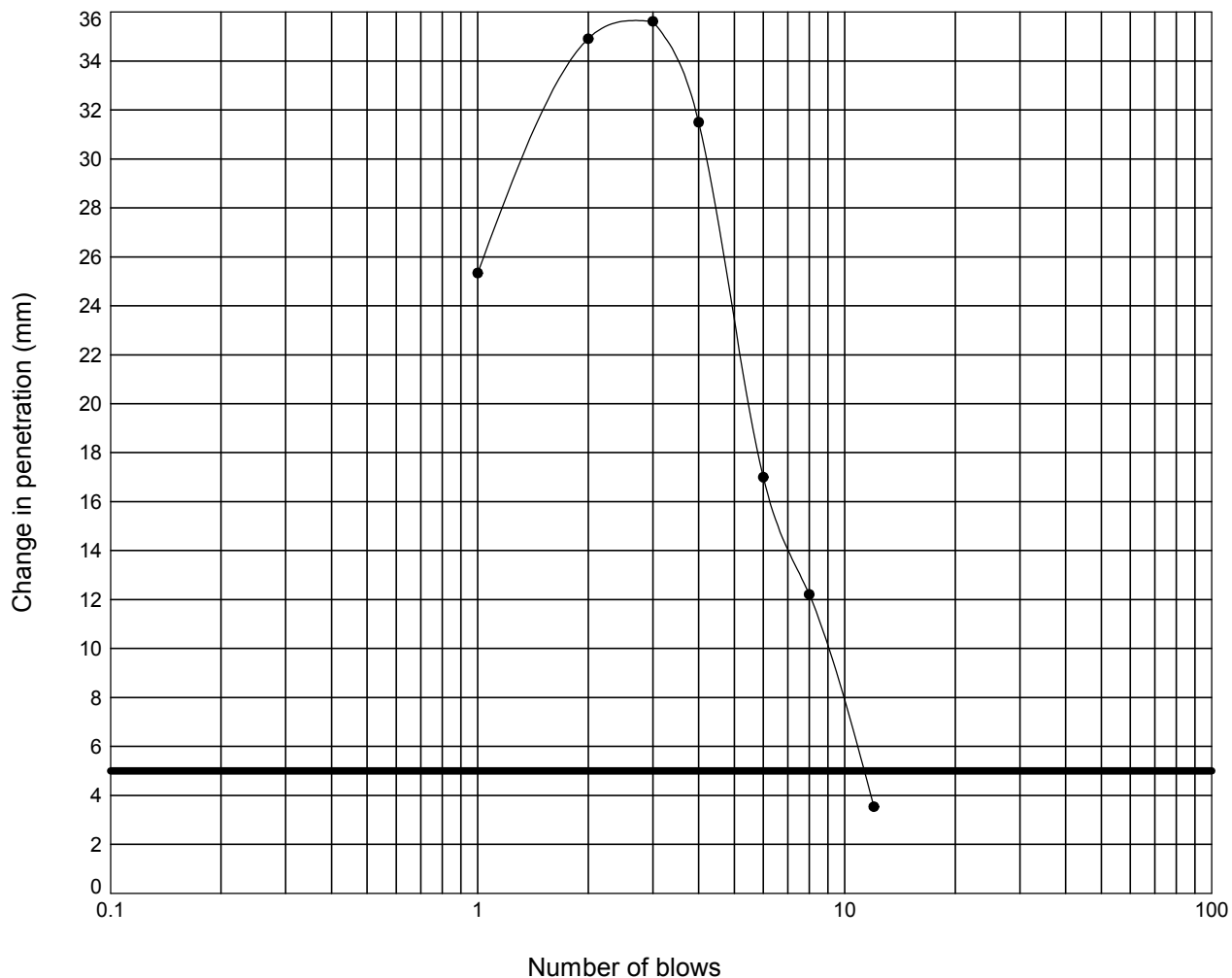


MOISTURE CONDITION VALUE

In accordance with clause 5 of BS1377:Part 4:1990

Borehole: **BHA10** Sample Ref: **3** Sample Type: **B** Depth (m): **2.00**

Description : **Brown slightly sandy slightly gravelly CLAY**



Moisture Content :	= 25	%
Percentage retained on 20 mm sieve :	= 0	%
Moisture Condition Value :	= 9.2	
Interpretation of curve:	= Steepest straight line - Fig 9	



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

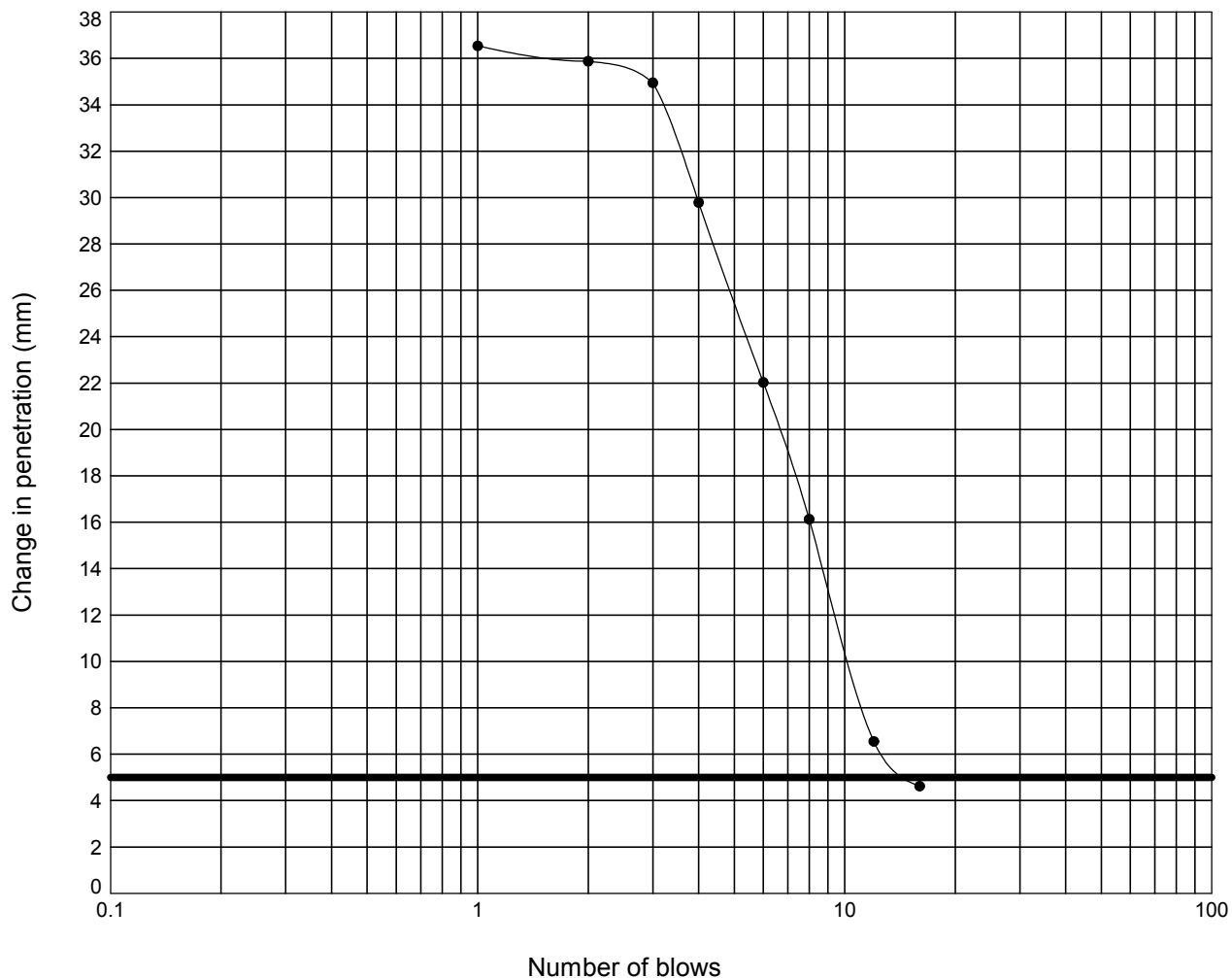
782813

MOISTURE CONDITION VALUE

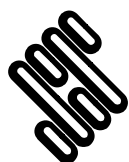
In accordance with clause 5 of BS1377:Part 4:1990

Borehole: **BHA10** Sample Ref: **6** Sample Type: **B** Depth (m): **5.50**

Description : **Dark grey slightly sandy CLAY**



Moisture Content :	= 22	%
Percentage retained on 20 mm sieve :	= 0	%
Moisture Condition Value :	= 11.1	
Interpretation of curve:	= Steepest straight line - Fig 9	



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

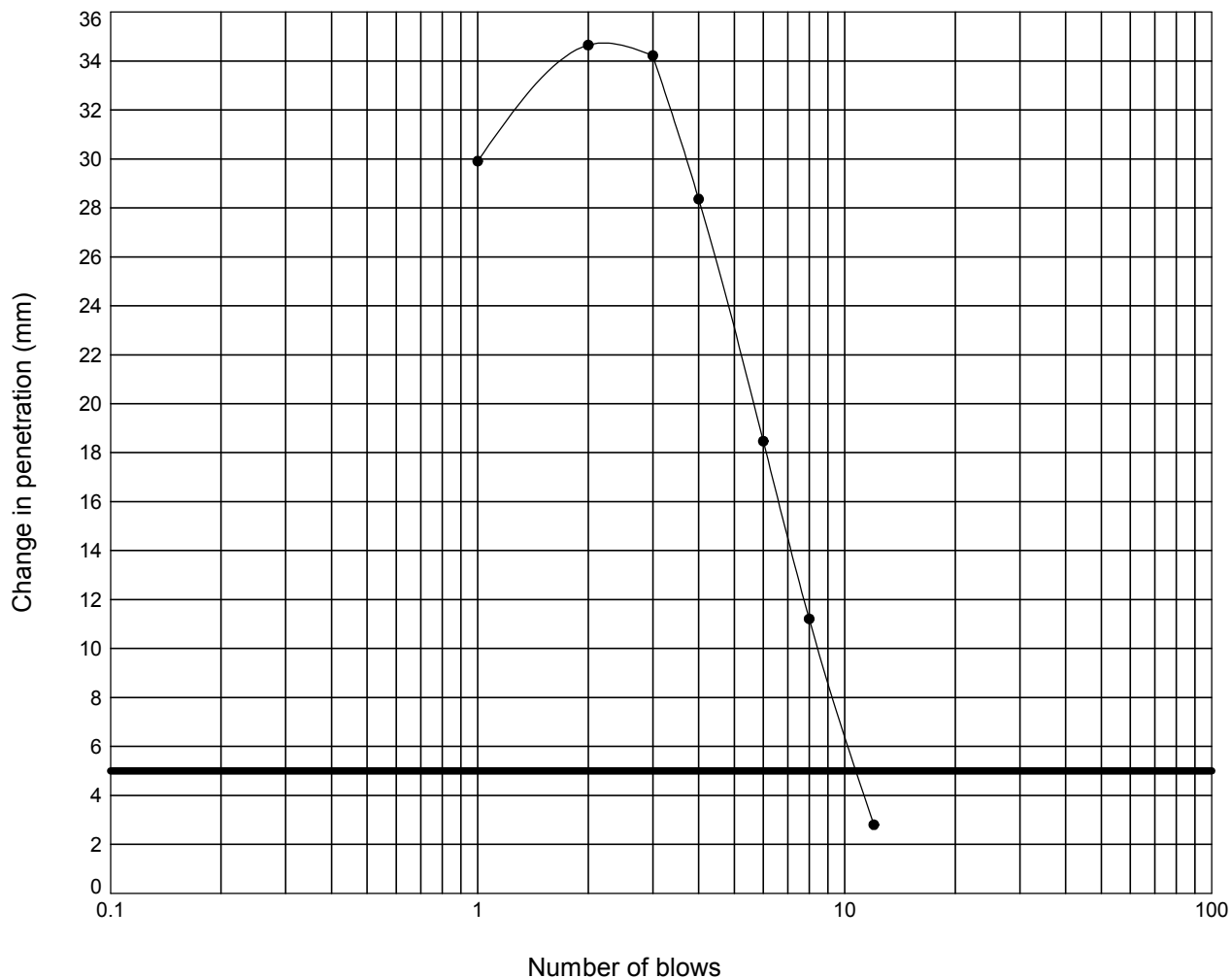
782813

MOISTURE CONDITION VALUE

In accordance with clause 5 of BS1377:Part 4:1990

Borehole: **BHA10** Sample Ref: **8** Sample Type: **B** Depth (m): **7.00**

Description : **Grey slightly gravelly CLAY**



Moisture Content :	=	31	%
Percentage retained on 20 mm sieve :	=	0	%
Moisture Condition Value :	=	10.1	
Interpretation of curve:	=	Steepest straight line - Fig 9	



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

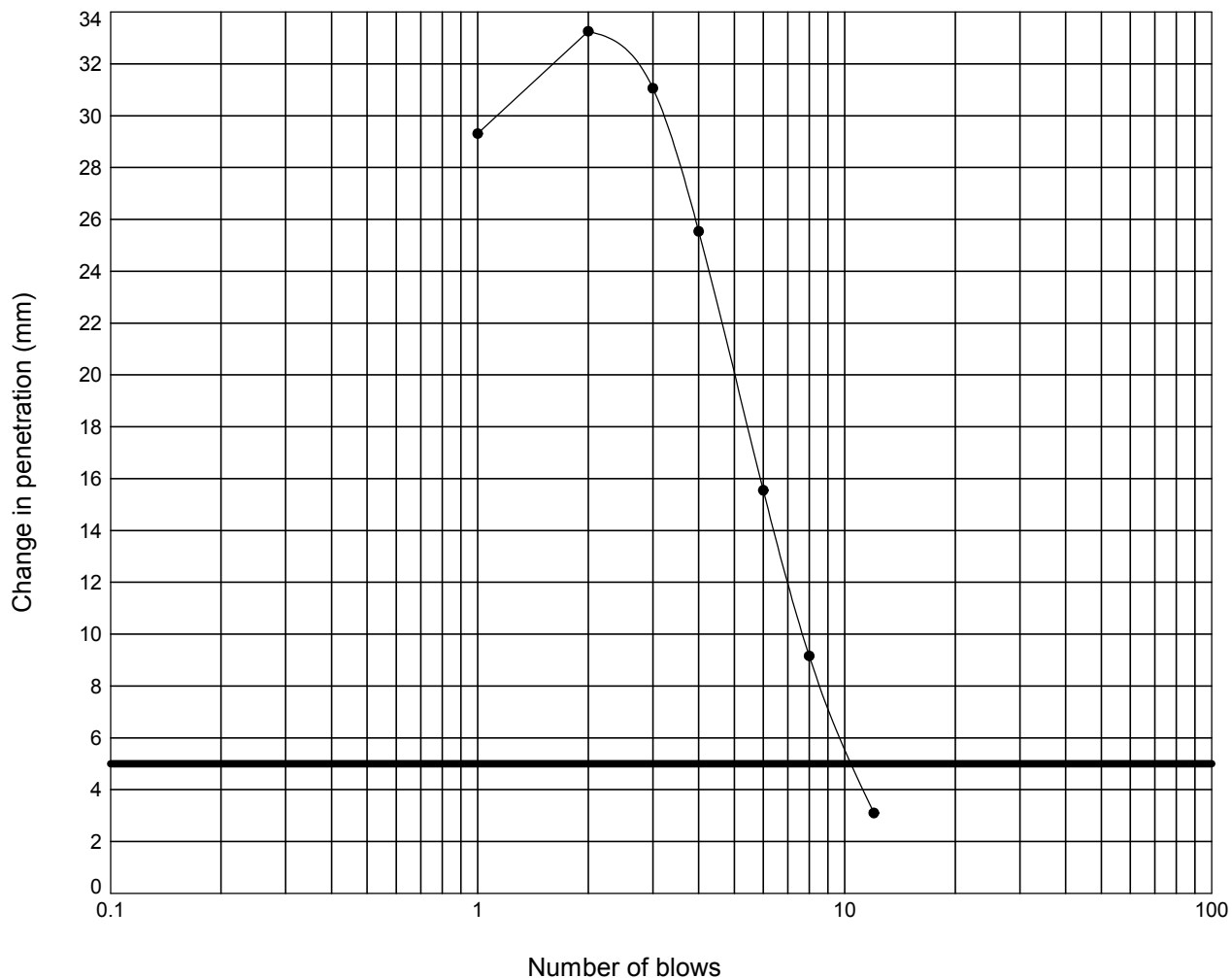
782813

MOISTURE CONDITION VALUE

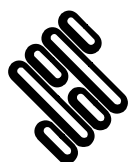
In accordance with clause 5 of BS1377:Part 4:1990

Borehole: **BHA10** Sample Ref: **9** Sample Type: **B** Depth (m): **8.00**

Description : **Grey slightly gravelly CLAY**



Moisture Content :	= 29	%
Percentage retained on 20 mm sieve :	= 0	%
Moisture Condition Value :	= 9.6	
Interpretation of curve:	= Steepest straight line - Fig 9	



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

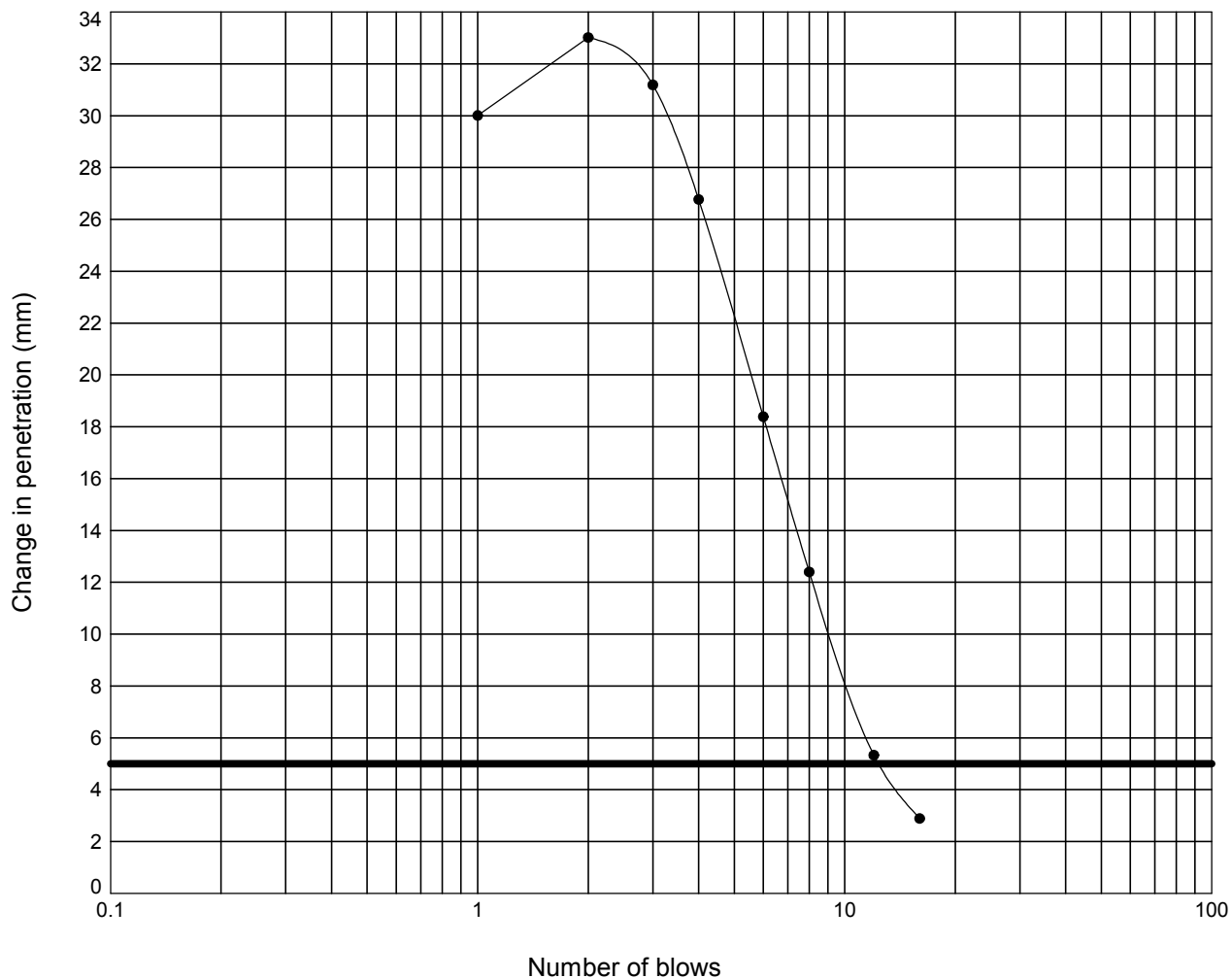
782813

MOISTURE CONDITION VALUE

In accordance with clause 5 of BS1377:Part 4:1990

Trial Pit: **TPA2** Sample Ref: **2** Sample Type: **B** Depth (m): **2.50**

Description : **Brown slightly sandy slightly gravelly CLAY**



Moisture Content :	= 20	%
Percentage retained on 20 mm sieve :	= 0	%
Moisture Condition Value :	= 10.6	
Interpretation of curve:	= Steepest straight line - Fig 9	



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

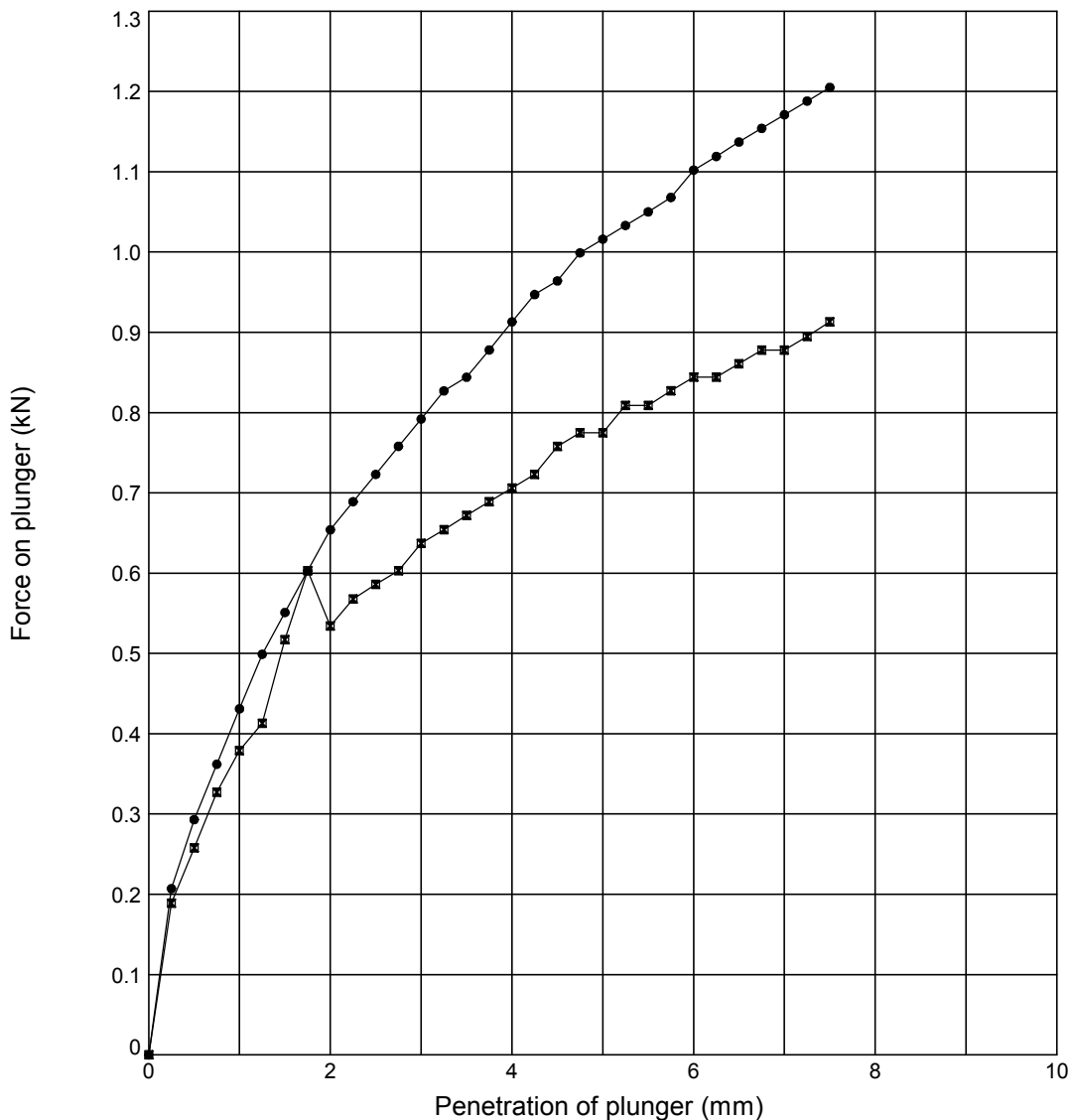
Contract Ref:

782813

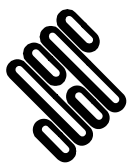
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Borehole: **BHA10** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions		Test Details		Test Results	Top	Base
Initial Moisture Content (%)	: 15	Compaction Type	: 4.5 kg Dynamic	Moisture Content (%)	15	16
Initial Bulk Density (Mg/m ³)	: 2.05	Surcharge (kg)	: 4.0	CBR value (%)	5.5	4.4
Initial Dry Density (Mg/m ³)	: 1.79	Soaking Time (hrs)	: -	Remarks: None		
% retained on 20mm sieve	: 0	Swelling (mm)	: -			
Sample Description				Key		
Grey slightly sandy CLAY				● Top ⊠ Base		



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

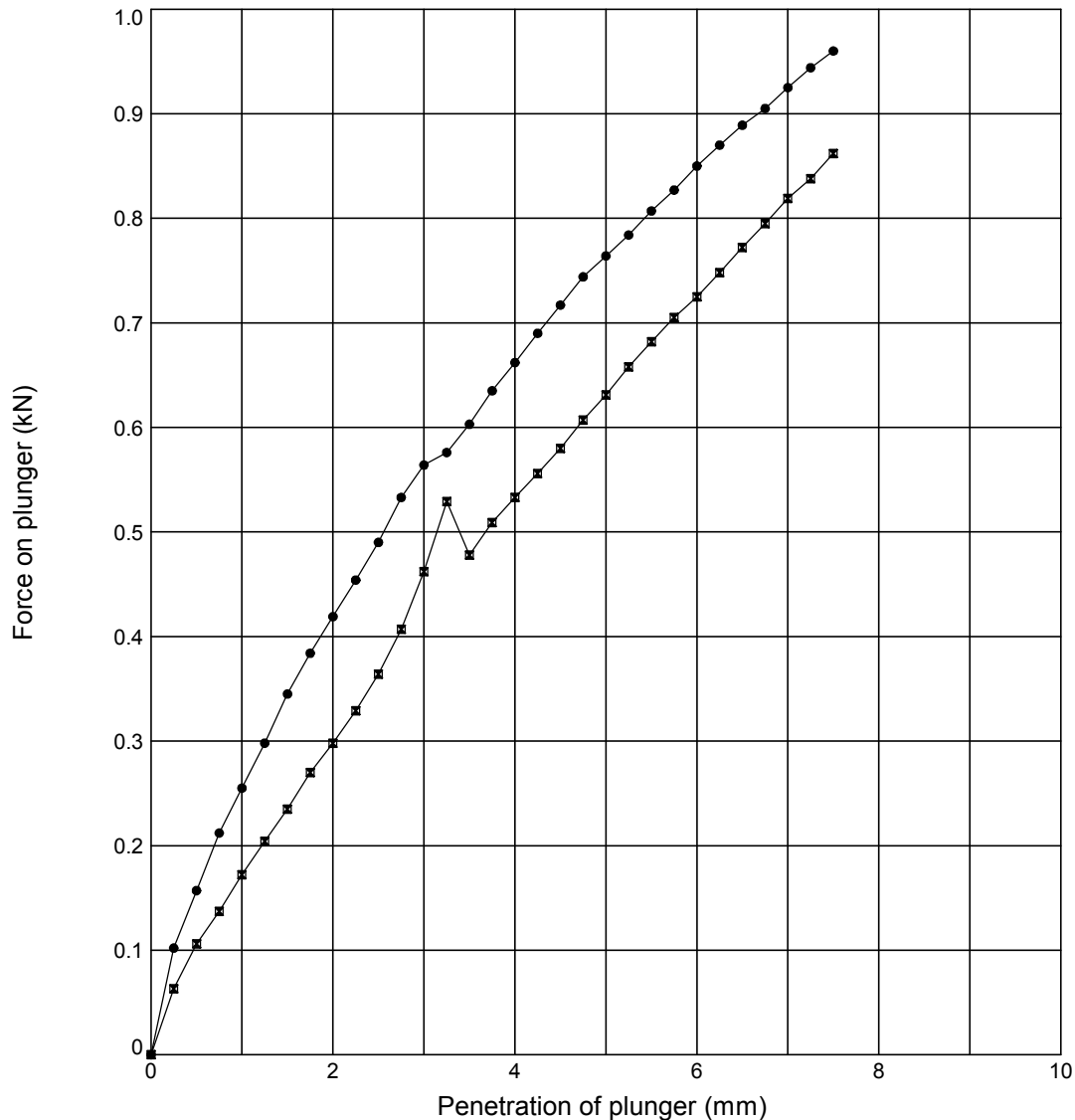
782813



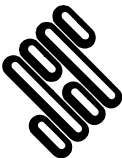

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990

Trial Pit: **TPA2** Sample Ref: **2** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions		Test Details		Test Results	Top	Base
Initial Moisture Content (%)	: 20	Compaction Type	: 4.5 kg Dynamic	Moisture Content (%)	20	20
Initial Bulk Density (Mg/m ³)	: 2.08	Surcharge (kg)	: 4.0	CBR value (%)	3.8	3.2
Initial Dry Density (Mg/m ³)	: 1.73	Soaking Time (hrs)	: -	Remarks: None		
% retained on 20mm sieve	: 0	Swelling (mm)	: -			
Sample Description				Key		
Brown slightly sandy slightly gravelly CLAY				● Top ⊠ Base		

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date
	<i>M. Fisher</i>		MAUREEN FISHER
	Contract		Contract Ref:
M1 Junction 15 Main Site		782813	
			

ONE DIMENSIONAL CONSOLIDATION TEST

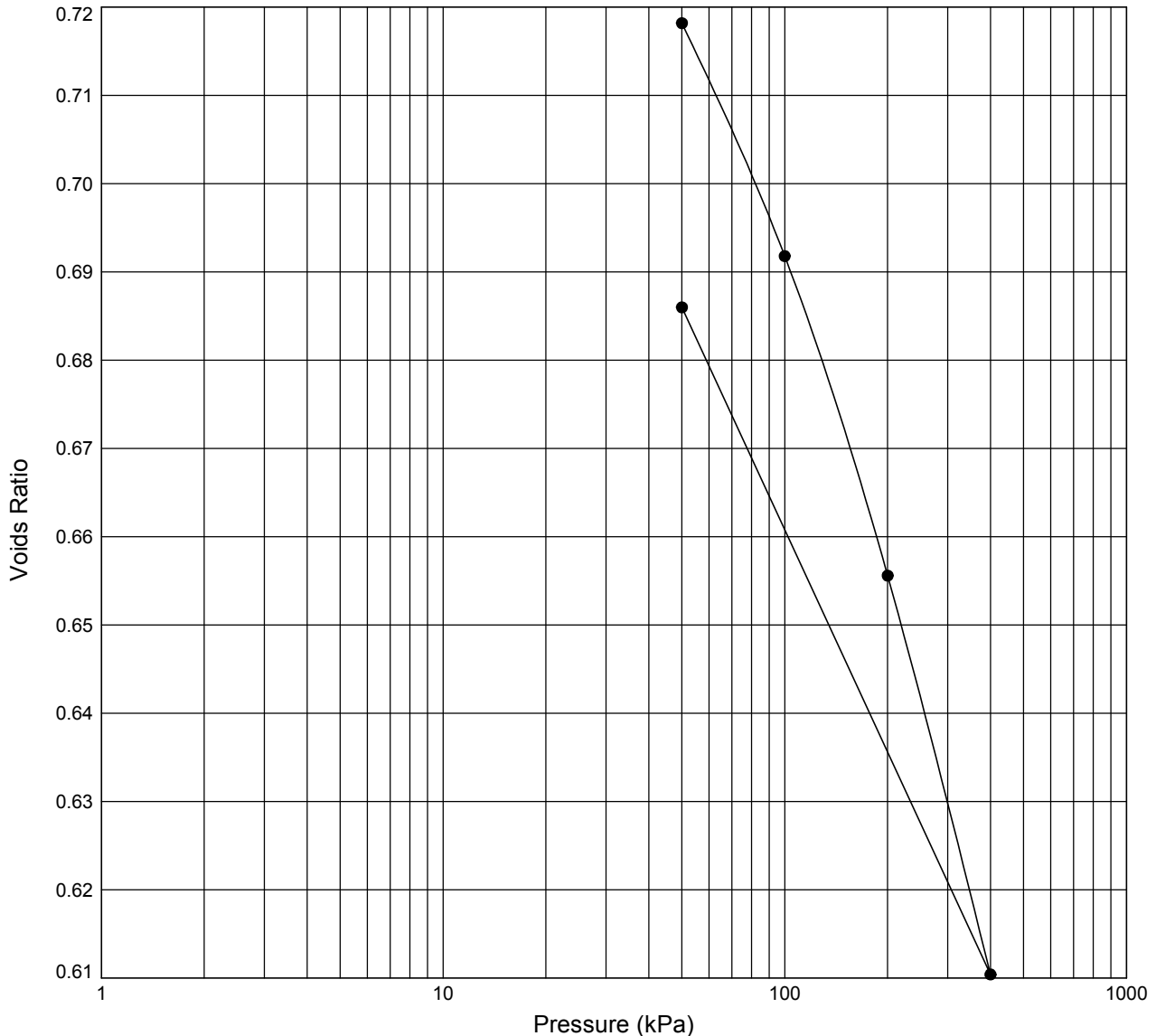
In accordance with BS1377:Part 5:1990

Borehole: **BHA3**

Sample Ref: **1**

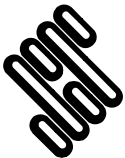

Sample Type: **U**

Depth (m): **2.50**



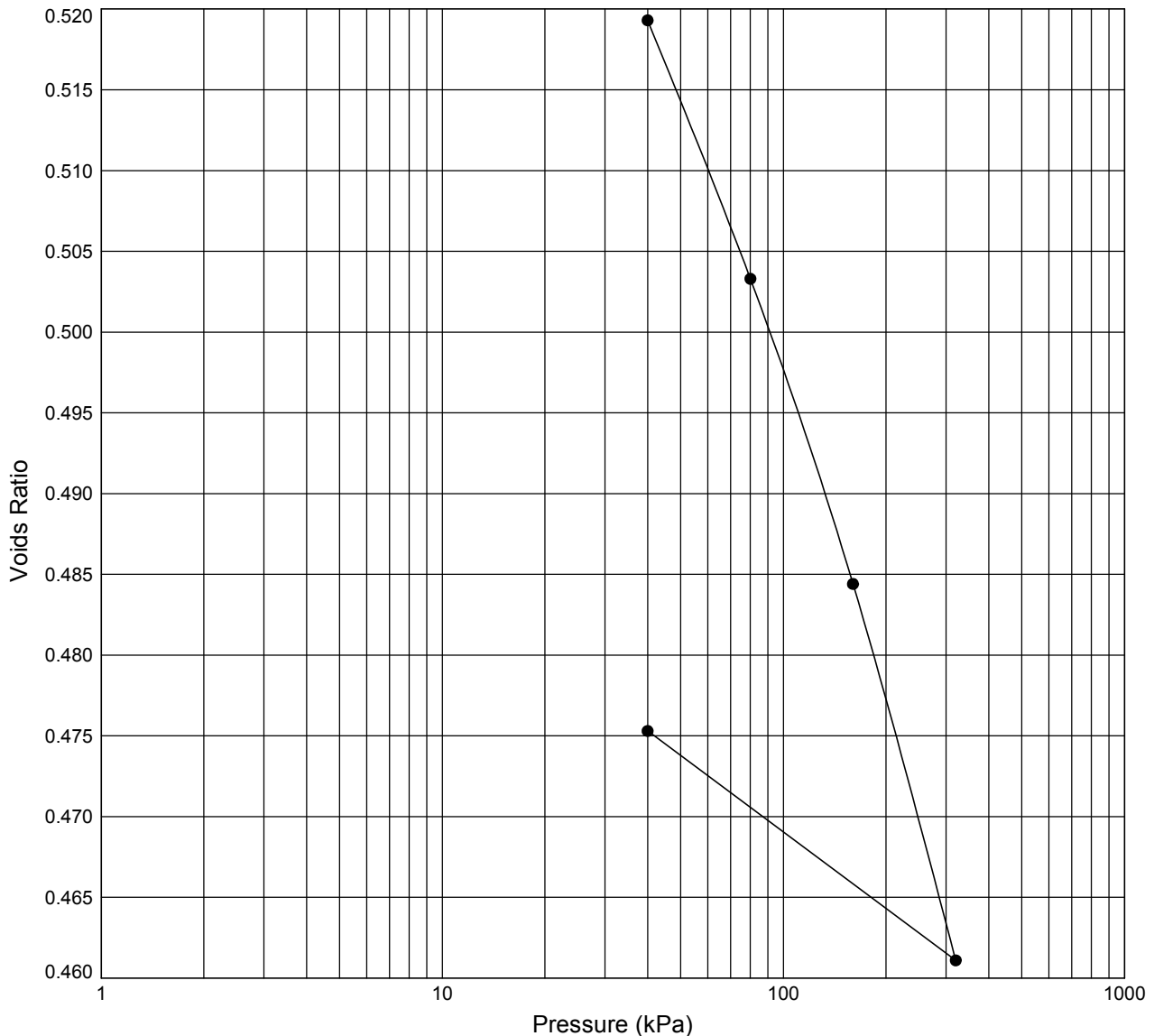
Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 25	Moisture Content (%)	: 25	Pressure Range (kPa)	Mv (m ² /MN)	Cv (m ² /yr)	Voids Ratio
Bulk Density (Mg/m ³)	: 1.91	Bulk Density (Mg/m ³)	: 1.97	0 - 50	0.094	10.0	0.7182
Dry Density (Mg/m ³)	: 1.54	Dry Density (Mg/m ³)	: 1.57	50 - 100	0.31	9.8	0.6918
Void Ratio	: 0.7263	Void Ratio	: 0.6860	100 - 200	0.21	1.2	0.6556
Specimen Details				200 - 400	0.14	0.93	0.6104
Description Darl brown/grey slightly gravelly CLAY	Height (mm)		: 19.00	400 - 50	NA	NA	0.6860
	Diameter (mm)		: 64.00				
	Particle Density (Mg/m ³) (assumed)		: 2.65				
	Swelling Pressure (kPa)		: NA				

Notes: Method of time-setting used: **T90**.

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date
	<i>M. Fisher</i>		MAUREEN FISHER
	Contract		Contract Ref:
M1 Junction 15 Main Site		782813	
			

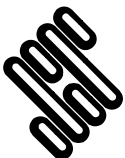
In accordance with BS1377:Part 5:1990

Depth (m): **2.50**



Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 19	Moisture Content (%)	: 20	Pressure Range (kPa)	Mv (m ² /MN)	Cv (m ² /yr)	Voids Ratio
Bulk Density (Mg/m ³)	: 2.04	Bulk Density (Mg/m ³)	: 2.15	0 - 40	0.38	12	0.5193
Dry Density (Mg/m ³)	: 1.72	Dry Density (Mg/m ³)	: 1.80	40 - 80	0.26	7.9	0.5033
Void Ratio	: 0.5426	Void Ratio	: 0.4753	80 - 160	0.16	12	0.4844
Specimen Details				160 - 320	0.098	19	0.4611
Description	Dark brown slightly sandy slightly gravelly CLAY	Height (mm)	: 19.00	320 - 40	NA	NA	0.4753
		Diameter (mm)	: 64.00				
		Particle Density (Mg/m ³)	: 2.65				
		(assumed)					
		Swelling Pressure (kPa)	: NA				

Notes: Method of time-setting used: **T90**.



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

Date _____

M. Fisher

MAUREEN FISHER

02/11/17

Contract

Contract Ref:

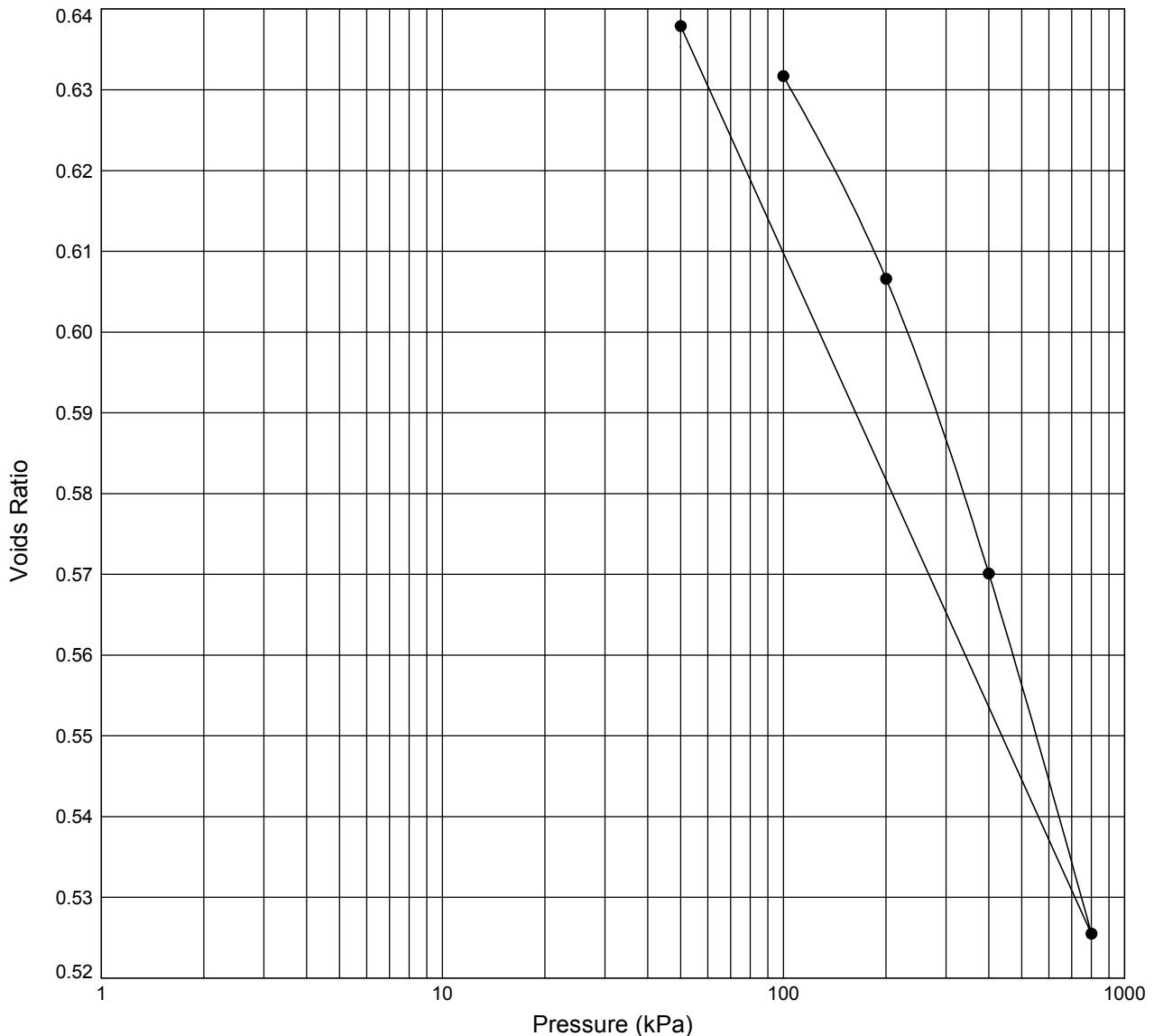
M1 Junction 15 Main Site

782813



In accordance with BS1377:Part 5:1990

Depth (m): **9.50**



Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 24	Moisture Content (%)	: 26	Pressure Range (kPa)	Mv (m ² /MN)	Cv (m ² /yr)	Voids Ratio
Bulk Density (Mg/m ³)	: 1.98	Bulk Density (Mg/m ³)	: 2.04	0 - 50	Swelling	Stage	0.6353
Dry Density (Mg/m ³)	: 1.61	Dry Density (Mg/m ³)	: 1.62	50 - 100	0.044	2.6	0.6317
Void Ratio	: 0.6505	Void Ratio	: 0.6379	100 - 200	0.15	2.4	0.6066
Specimen Details				200 - 400	0.11	0.70	0.5701
Description		Height (mm)	: 19.00	400 - 800	0.071	0.72	0.5255
Dark brown grey CLAY		Diameter (mm)	: 64.00	800 - 50	NA	NA	0.6379
		Particle Density (Mg/m ³)	: 2.65 (assumed)				
		Swelling Pressure (kPa)	: NA				

Notes: Method of time-setting used: **T90**.



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

Date

M. Fisher .

MAUREEN FISHER

02/11/17

Contract

Contract Ref:

M1 Junction 15 Main Site

782813



ONE DIMENSIONAL CONSOLIDATION TEST

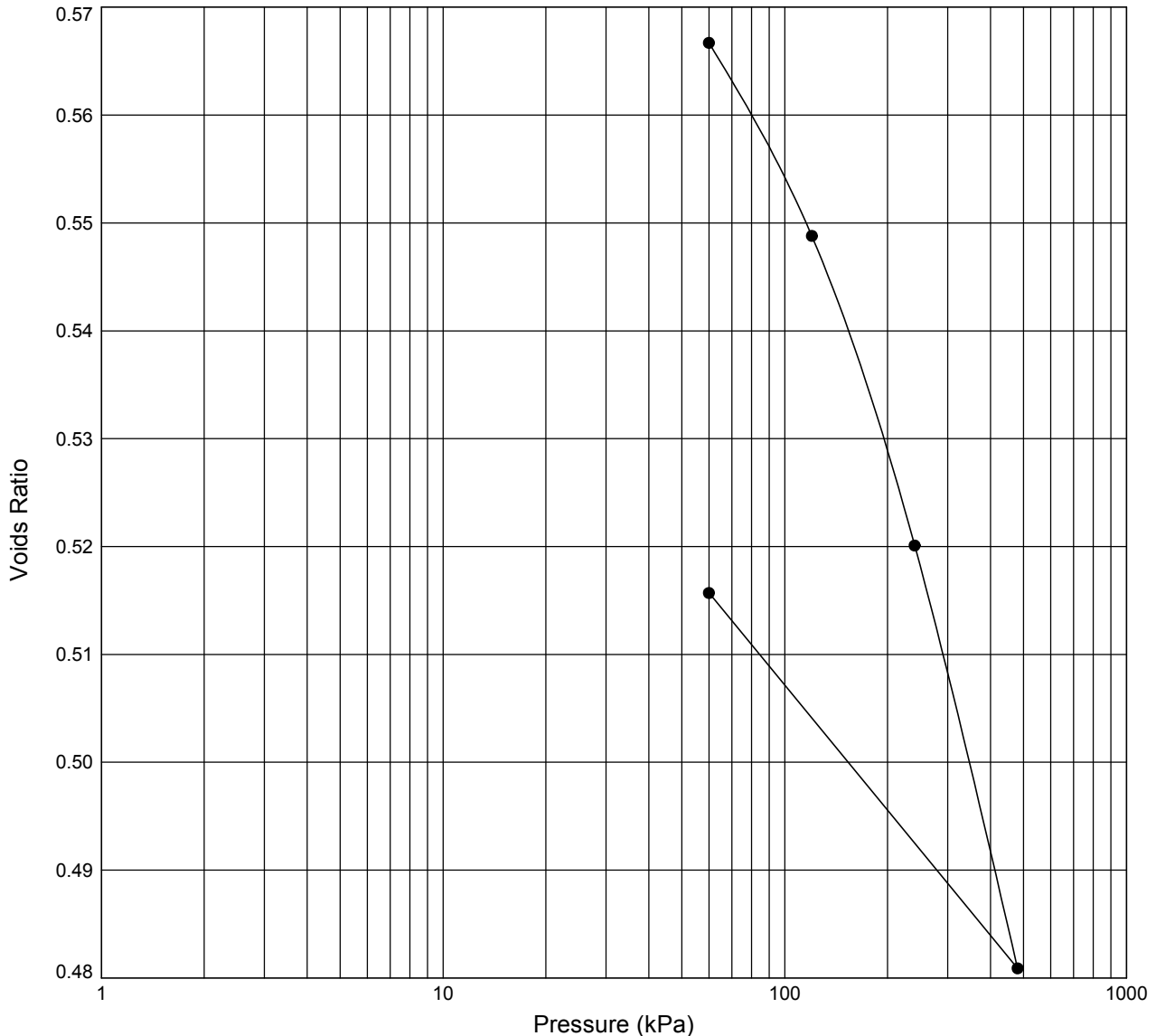
In accordance with BS1377:Part 5:1990

Borehole: **BHA12**

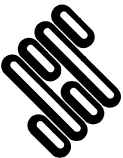

Sample Ref: **1**

Sample Type: **U**

Depth (m): **2.50**



Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 19	Moisture Content (%)	: 20	Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Voids Ratio
Bulk Density (Mg/m³)	: 2.00	Bulk Density (Mg/m³)	: 2.09				
Dry Density (Mg/m³)	: 1.68	Dry Density (Mg/m³)	: 1.74				
Void Ratio	: 0.5767	Void Ratio	: 0.5157				
Specimen Details							
Description		Height (mm)	: 19.00	0 - 60	0.11	20	0.5667
Dark brown slightly sandy slightly gravelly CLAY		Diameter (mm)	: 64.00	60 - 120	0.19	9.8	0.5488
		Particle Density (Mg/m³) (assumed)	: 2.65	120 - 240	0.15	4.8	0.5201
				240 - 480	0.11	3.3	0.4809
				480 - 60	NA	NA	0.5157
		Swelling Pressure (kPa)	: NA				
Notes: Method of time-setting used: T90.							

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date
	<i>M. Fisher</i>		02/11/17
	Contract	Contract Ref:	
M1 Junction 15 Main Site		782813	

ONE DIMENSIONAL CONSOLIDATION TEST

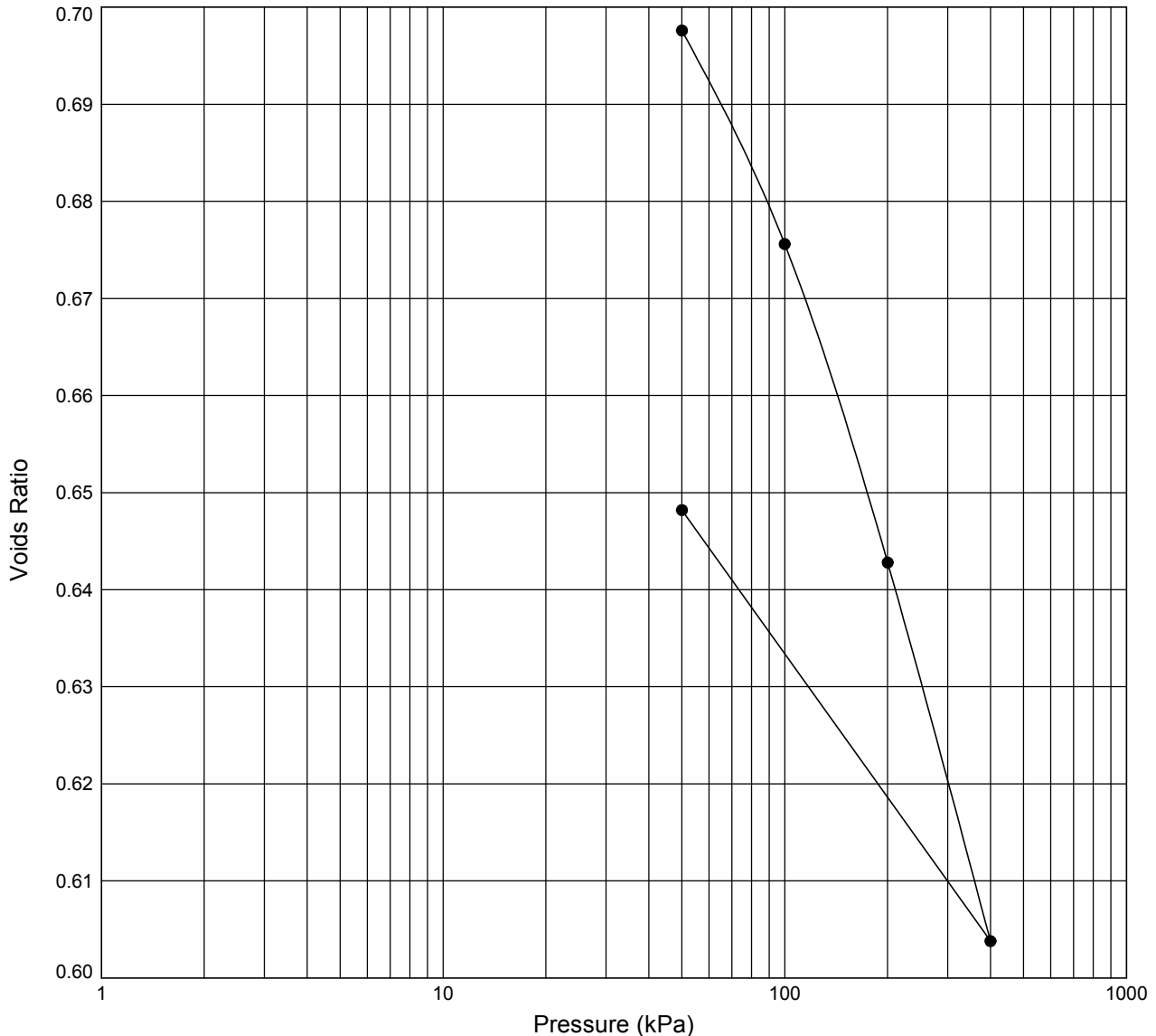
In accordance with BS1377:Part 5:1990

Borehole: **BHA13**

Sample Ref: **1**

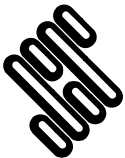

Sample Type: **U**

Depth (m): **2.50**



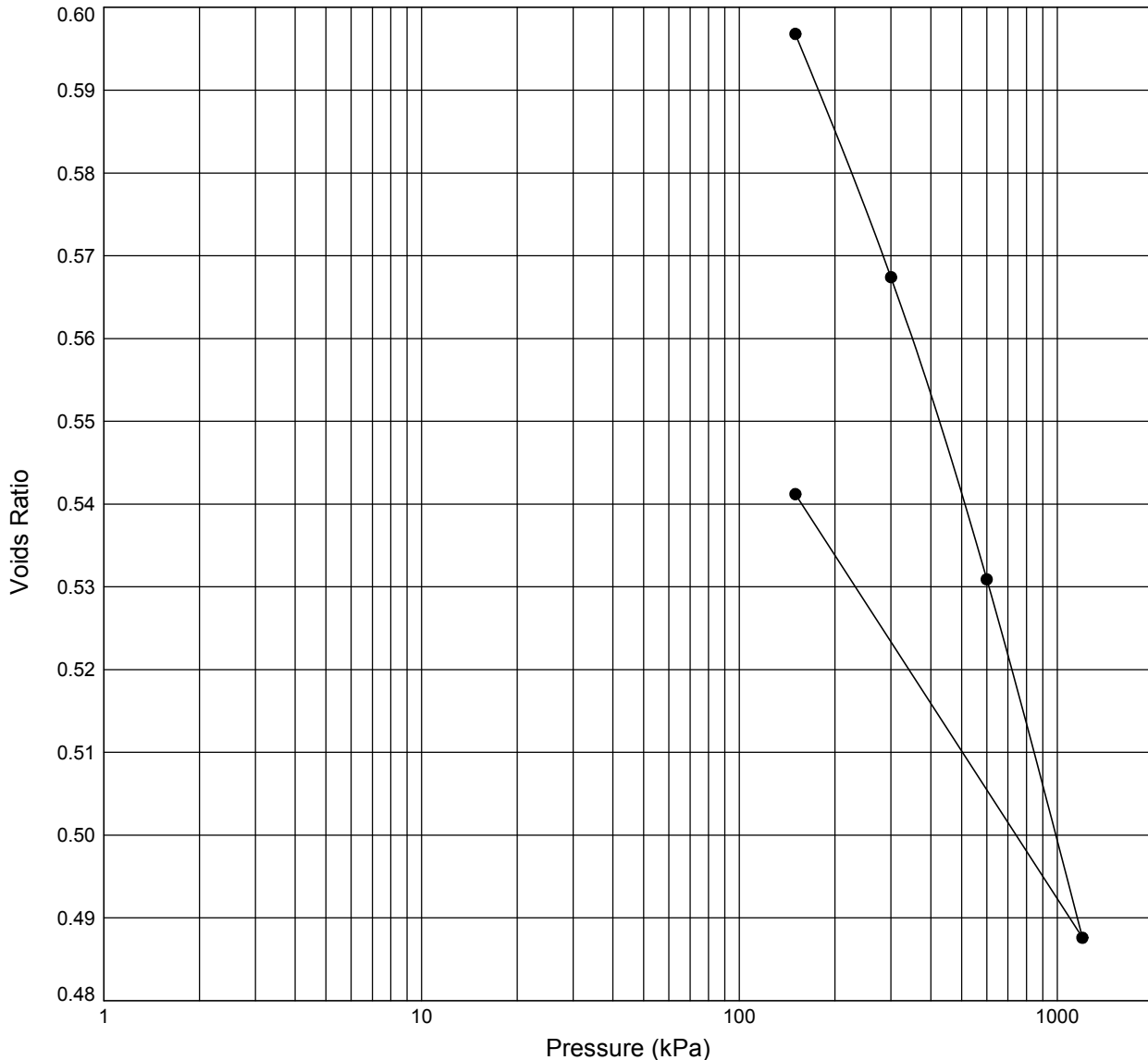
Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 28	Moisture Content (%)	: 30	Pressure Range (kPa)	Mv (m ² /MN)	Cv (m ² /yr)	Voids Ratio
Bulk Density (Mg/m ³)	: 1.97	Bulk Density (Mg/m ³)	: 2.08	0 - 50	0.36	7.5	0.6976
Dry Density (Mg/m ³)	: 1.53	Dry Density (Mg/m ³)	: 1.60	50 - 100	0.26	4.0	0.6756
Void Ratio	: 0.7287	Void Ratio	: 0.6482	100 - 200	0.20	4.4	0.6428
Specimen Details				200 - 400	0.12	3.9	0.6038
Description Dark brown grey slightly sandy slightly gravelly CLAY	Height (mm)		: 19.00	400 - 50	NA	NA	0.6482
	Diameter (mm)		: 64.00				
	Particle Density (Mg/m ³) (assumed)		: 2.65				
	Swelling Pressure (kPa)		: NA				

Notes: Method of time-setting used: **T90**.

 STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ	Compiled By		Date
	<i>M. Fisher</i>		MAUREEN FISHER
	Contract		Contract Ref:
M1 Junction 15 Main Site		782813	
			

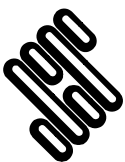
In accordance with BS1377:Part 5:1990

Depth (m): **6.50**



Initial Specimen Condition		Final Specimen Condition		Test Results			
Moisture Content (%)	: 21	Moisture Content (%)	: 22	Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Voids Ratio
Bulk Density (Mg/m³)	: 1.99	Bulk Density (Mg/m³)	: 2.10	0 - 150	0.080	14	0.5968
Dry Density (Mg/m³)	: 1.64	Dry Density (Mg/m³)	: 1.72	150 - 300	0.12	3.1	0.5674
Void Ratio	: 0.6162	Void Ratio	: 0.5412	300 - 600	0.078	2.3	0.5309
Specimen Details				600 - 1200	0.047	2.3	0.4876
Description		Height (mm)	: 19.00	1200 - 150	NA	NA	0.5412
Grey slightly gravely CLAY/soft MUDSTONE		Diameter (mm)	: 64.00				
		Particle Density (Mg/m³)	: 2.65				
		(assumed)					
		Swelling Pressure (kPa)	: NA				

Notes: Method of time-setting used: **T90**.



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

Date

M. Fisher

MAUREEN FISHER

02/11/17

Contract

Contract Ref:

M1 Junction 15 Main Site

782813



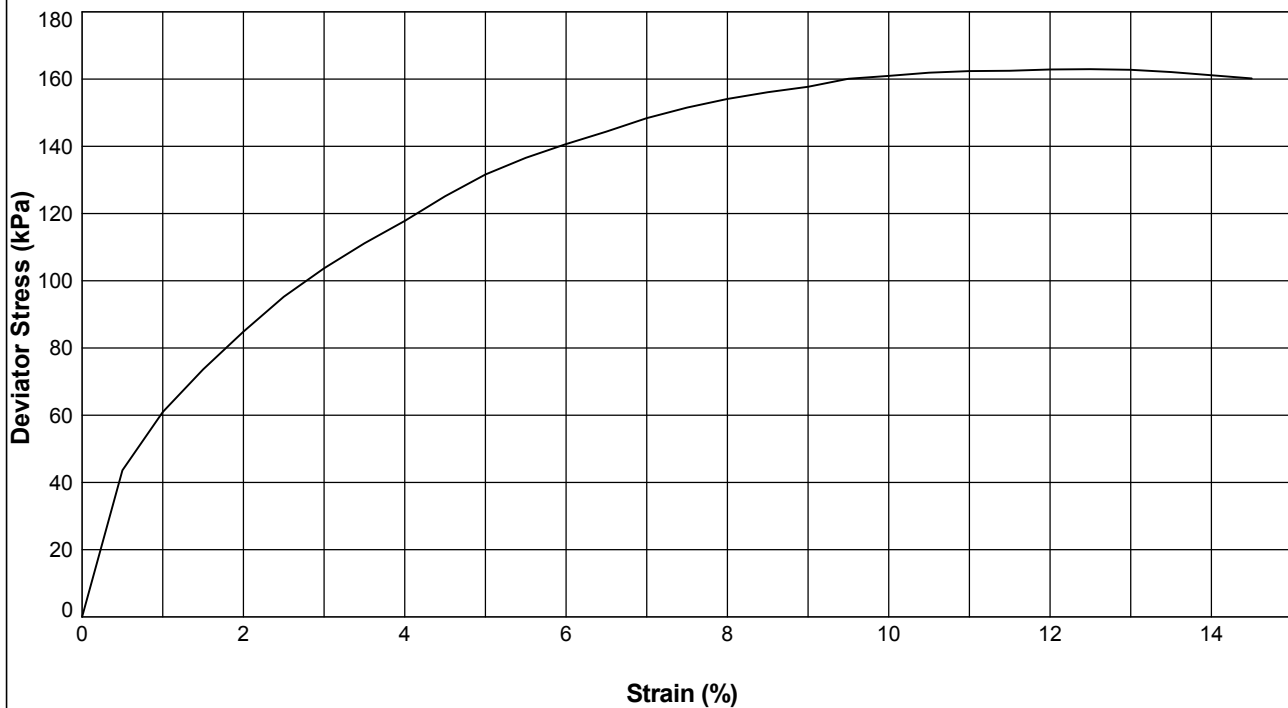
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BHA3** Sample Ref: **1** Sample Type: **U** Depth (m): **2.50**

Description : **Grey CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	103.50		
	Height (mm)	211.00		
	Moisture Content (%)	27		
	Bulk Density (Mg/m ³)	1.99		
	Dry Density (Mg/m ³)	1.57		
TEST DETAILS	Membrane Thickness (mm)	0.31		
	Rate of Axial Displacement (%/min)	2.00		
	Cell Pressure (kPa)	250		
	Membrane Correction (kPa)	0.81		
	Corrected Deviator Stress (kPa)	163		
	Undrained Shear Strength (kPa)	82		
	Strain at Failure (%)	12.5		
	Mode of Failure	Brittle		



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

M. Fisher

MAUREEN FISHER

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



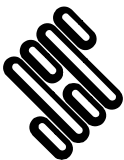
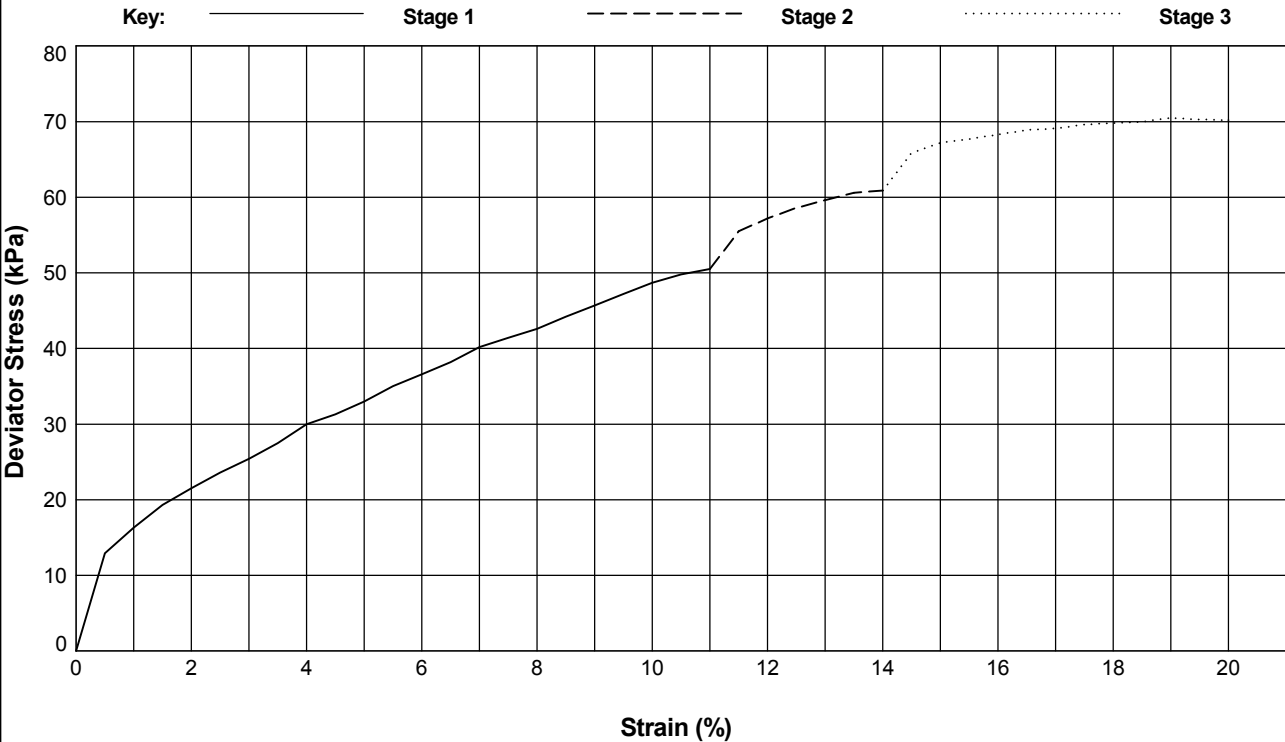
UNCONSOLIDATED QUICK UNDRAINED (MULTI-STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 9

Borehole: **BHA6** Sample Ref: **3** Sample Type: **U** Depth (m): **4.50**

Description : **Grey silty CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	104.00		
	Height (mm)	164.00		
	Moisture Content (%)	28		
	Bulk Density (Mg/m ³)	1.93		
	Dry Density (Mg/m ³)	1.50		
TEST DETAILS	Membrane Thickness (mm)	0.31	0.31	0.31
	Rate of Axial Displacement (%/min)	2.00	2.00	2.00
	Cell Pressure (kPa)	100	200	300
	Membrane Correction (kPa)	0.73	0.87	1.09
	Corrected Deviator Stress (kPa)	50	61	70
	Undrained Shear Strength (kPa)	25	30	35
	Strain at Failure (%)	11.0	14.0	19.0
	Mode of Failure			Compound



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
		02/11/17
Contract		Contract Ref:
M1 Junction 15 Main Site		782813



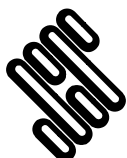
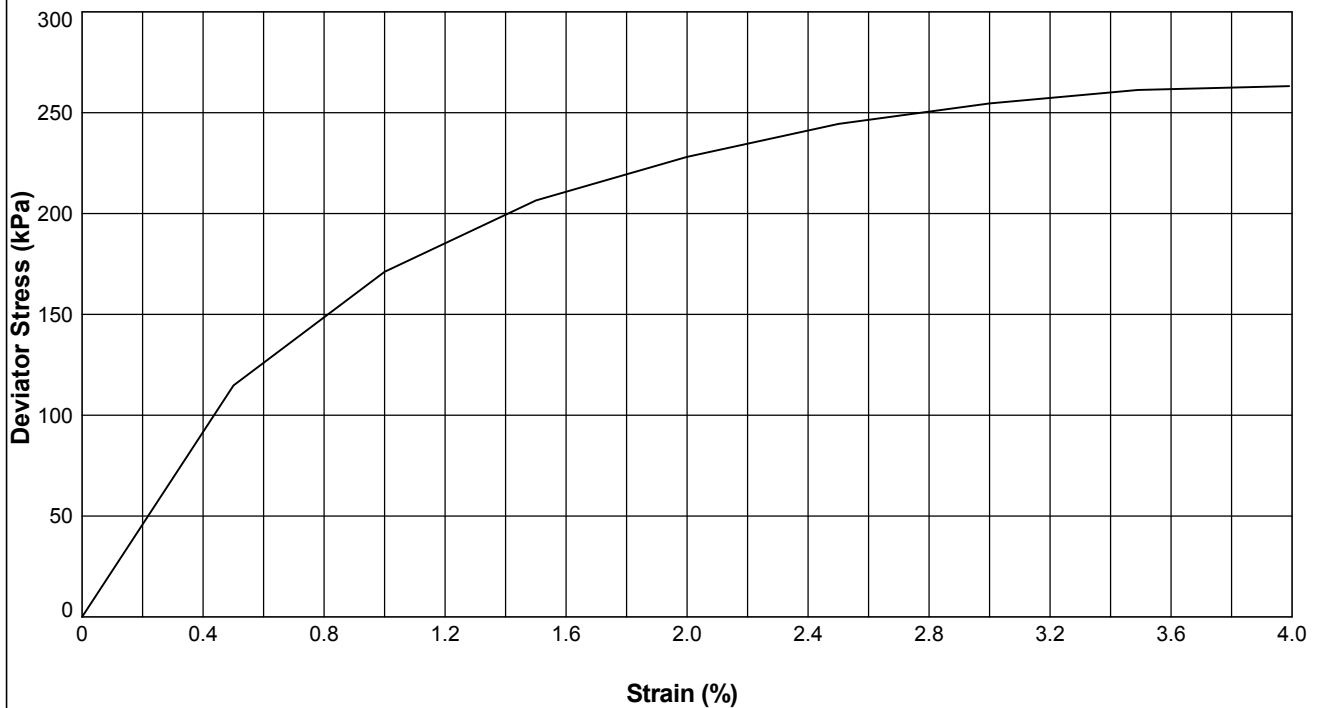
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BHA10** Sample Ref: **10** Sample Type: **U** Depth (m): **9.50**

Description : **Dark brown grey CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	100.83		
	Height (mm)	204.33		
	Moisture Content (%)	24		
	Bulk Density (Mg/m ³)	2.04		
	Dry Density (Mg/m ³)	1.65		
TEST DETAILS	Membrane Thickness (mm)	0.31		
	Rate of Axial Displacement (%/min)	2.00		
	Cell Pressure (kPa)	100		
	Membrane Correction (kPa)	0.34		
	Corrected Deviator Stress (kPa)	263		
	Undrained Shear Strength (kPa)	132		
	Strain at Failure (%)	4.0		
	Mode of Failure	Brittle		



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813



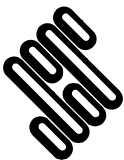
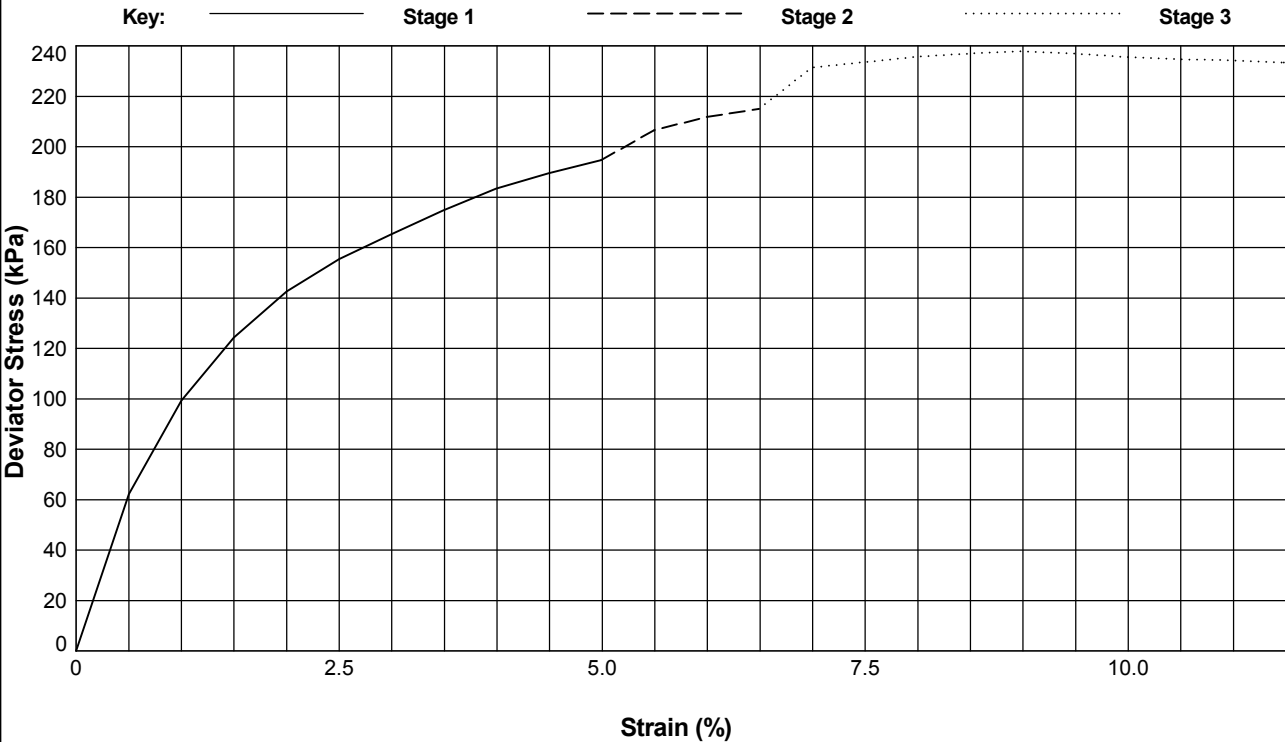
UNCONSOLIDATED QUICK UNDRAINED (MULTI-STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 9

Borehole: **BHA12** Sample Ref: **2** Sample Type: **U** Depth (m): **6.50**

Description : **Grey CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	101.83		
	Height (mm)	211.33		
	Moisture Content (%)	25		
	Bulk Density (Mg/m ³)	2.03		
	Dry Density (Mg/m ³)	1.62		
TEST DETAILS	Membrane Thickness (mm)	0.31	0.31	0.31
	Rate of Axial Displacement (%/min)	2.00	2.00	2.00
	Cell Pressure (kPa)	150	300	600
	Membrane Correction (kPa)	0.41	0.50	0.64
	Corrected Deviator Stress (kPa)	195	215	238
	Undrained Shear Strength (kPa)	97	108	119
	Strain at Failure (%)	5.0	6.5	9.0
	Mode of Failure			Brittle



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
		02/11/17
Contract		Contract Ref:
M1 Junction 15 Main Site		782813



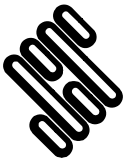
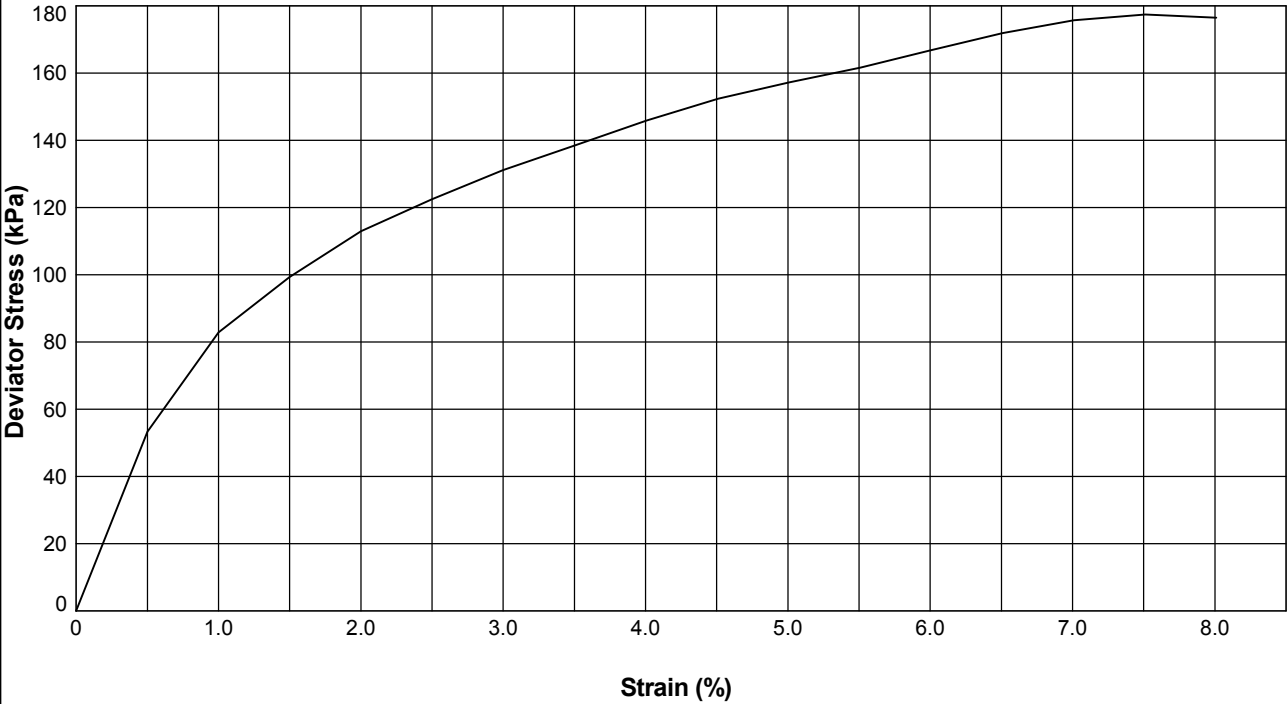
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BHA13** Sample Ref: **1** Sample Type: **U** Depth (m): **2.50**

Description : **Dark brown grey slightly sandy slightly gravelly CLAY**

STAGE NUMBER		1	2	3
SAMPLE DETAILS	Sample Condition	Undisturbed		
	Orientation of sample	Vertical		
	Diameter (mm)	103.17		
	Height (mm)	211.67		
	Moisture Content (%)	28		
	Bulk Density (Mg/m ³)	1.93		
	Dry Density (Mg/m ³)	1.51		
TEST DETAILS	Membrane Thickness (mm)	0.31		
	Rate of Axial Displacement (%/min)	2.00		
	Cell Pressure (kPa)	50		
	Membrane Correction (kPa)	0.55		
	Corrected Deviator Stress (kPa)	178		
	Undrained Shear Strength (kPa)	89		
	Strain at Failure (%)	7.5		
	Mode of Failure	Brittle		



STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By

C Cole

CATHERINE COLE

Date

02/11/17

Contract

M1 Junction 15 Main Site

Contract Ref:

782813




SUMMARY OF HAND PENETROMETER & HAND VANE TEST RESULTS

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content (%)	Vane Type	Average Reading (kPa)	Sample Description	Lab location
BHA6	4	U	10.50	18	HVP	131	Grey CLAY	C
BHA7	4	U	8.50	21	HVP	143	Grey CLAY	C
BHA8	2	U	2.50	17	HVP	118	Dark brown slightly sandy slightly gravelly CLAY	C

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

Key : HVP = Hand Vane (Peak), HVR = Hand Vane (Remoulded), PP = Pocket Penetrometer.

 <div>STRUCTURAL SOILS The Potteries Pottery Street Castleford W. Yorkshire WF10 1NJ</div>	Compiled By		Date	Contract Ref: 782813
	<i>M. Fisher</i>	MAUREEN FISHER	02.11.17	
	Contract: M1 Junction 15 Main Site			

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression			Chemical Tests			Other tests and comments
Borehole / Trial Pit	Sample Ref	Depth (m)	Type	Description	WC	LL	PL	PI	<425 µm	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
					(%)	(%)	(%)	(%)	(%)	Mg/m³	Mg/m³	kPa	kPa	kPa		(g/L)	(mg/L)	
BHA13		4.50-4.95	U	Stiff fissured dark grey CLAY.	30.2					2.04	1.57	100	79	39				One Dimensional Consolidation
BHA14		2.50-2.95	U	Very stiff fissured dark grey silty CLAY														One Dimensional Consolidation
BHA14		4.50-4.95	U	Stiff fissured grey CLAY with frequent 1 to 3 mm gypsum crystals.	25.8					2.04	1.62	100	239	120				One Dimensional Consolidation
BHA3		4.50-4.95	U	Stiff fissured dark grey CLAY with frequent 3 to 10 mm gypsum crystals.	24.9					2.05	1.64	500	218	109				One Dimensional Consolidation
BHA3		6.50-6.95	U	Stiff fissured dark grey CLAY.	19.7					2.07	1.73	150	280	140				One Dimensional Consolidation
BHA3		8.50-8.95	U	Stiff fissured dark grey CLAY with rare 5 to 30 mm pale brown hard siltstone.														One Dimensional Consolidation Triaxial Permeability
BHA5		2.50-2.95	U	Stiff brownish grey CLAY with frequent fine to coarse rounded flint and chalk gravel and 2 to 10 mm gypsum crystals.	17.8					2.16	1.83	50	289	144				One Dimensional Consolidation
BHA5		8.50-8.95	U	Stiff fissured grey CLAY with rare 5 to 40 mm pockets of grey siltstone.	21.6					2.16	1.78	200	232	116				One Dimensional Consolidation
BHA7		2.50-2.95	U	Firm fissured grey CLAY with dark blue grey staining and rare 1 to 2 mm gypsum crystals.	14.4					2.06	1.80	50	152	76				One Dimensional Consolidation
BHA7		4.50-4.95	U	Stiff fissured grey CLAY.	23.8					2.00	1.62	100 200 500	159 162 164	81				One Dimensional Consolidation

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:



**M1 JUNCTION 15 MAIN SITE
782813**

GEOLABS®

SUMMARY OF GEOTECHNICAL TESTING

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression			Chemical Tests			Other tests and comments
Borehole / Trial Pit	Sample Ref	Depth (m)	Type	Description	WC	LL	PL	PI	<425 µm	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	W/S Mg	
					(%)	(%)	(%)	(%)	(%)	Mg/m³	Mg/m³	kPa	kPa	kPa		(g/L)	(mg/L)	
BHA7		6.50-6.95	U	Stiff fissured dark grey CLAY.	23.6					2.05	1.66	150	238	119				One Dimensional Consolidation
BHA8		4.50-4.95	U	Stiff fissured dark grey CLAY.	21.2					2.11	1.74	100	169	84				One Dimensional Consolidation

Sample type: B (Bulk disturb.) BLK (Block) C (Core) D (Disturbed) LB (Large Bulk dist.) U (Undisturbed)

<div>Checked and Approved by</div>  <div>J Sturges - Operations Manager 25/10/2017</div>	Project Number:	<div>GEO / 26482</div> <div>M1 JUNCTION 15 MAIN SITE</div> <div>782813</div>	
	Project Name:		

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

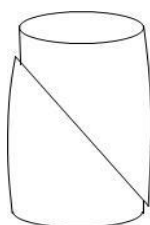
BH/TP No BHA13
 Depth (m) 4.50-4.95
 Sample Type U

Description:

Stiff fissured dark grey CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	71.1
Diameter	(mm)	37.9
Moisture Content	(%)	30.2
Bulk Density	(Mg/m ³)	2.04
Dry Density	(Mg/m ³)	1.57
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	1.7
Axial displacement rate	(%/min)	2.8
Cell pressure	(kPa)	100
Strain at failure	(%)	9.1
Maximum Deviator Stress	(kPa)	79
Shear Stress Cu	(kPa)	39

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

**M1 JUNCTION 15 MAIN SITE
782813**

GEOLABS



QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

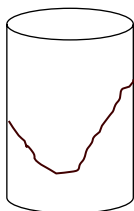
BH/TP No BHA14
 Depth (m) 4.50-4.95
 Sample Type U

Description:

Stiff fissured grey CLAY with frequent 1 to 3mm gypsum crystals.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	203.0
Diameter	(mm)	102.3
Moisture Content	(%)	25.8
Bulk Density	(Mg/m ³)	2.04
Dry Density	(Mg/m ³)	1.62
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.8
Axial displacement rate	(%/min)	2.0
Cell pressure	(kPa)	100
Strain at failure	(%)	13.3
Maximum Deviator Stress	(kPa)	239
Shear Stress Cu	(kPa)	120

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

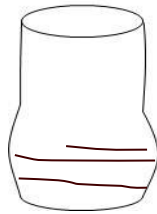
BH/TP No BHA3
 Depth (m) 4.50-4.95
 Sample Type U

Description:

Stiff fissured dark grey CLAY with frequent 3 to 10mm gypsum crystals.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	165.5
Diameter	(mm)	102.5
Moisture Content	(%)	24.9
Bulk Density	(Mg/m ³)	2.05
Dry Density	(Mg/m ³)	1.64
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.8
Axial displacement rate	(%/min)	2.4
Cell pressure	(kPa)	500
Strain at failure	(%)	12.7
Maximum Deviator Stress	(kPa)	218
Shear Stress Cu	(kPa)	109

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

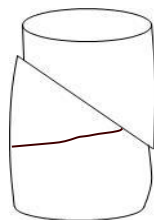
BH/TP No BHA3
 Depth (m) 6.50-6.95
 Sample Type U

Description:

Stiff fissured dark grey CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	203.4
Diameter	(mm)	103.1
Moisture Content	(%)	19.7
Bulk Density	(Mg/m ³)	2.07
Dry Density	(Mg/m ³)	1.73
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.5
Axial displacement rate	(%/min)	2.0
Cell pressure	(kPa)	150
Strain at failure	(%)	7.9
Maximum Deviator Stress	(kPa)	280
Shear Stress Cu	(kPa)	140

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

NA

Checked and Approved by:

J Sturges - Operations Manager
 25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

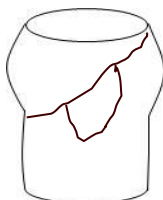
BH/TP No BHA5
 Depth (m) 2.50-2.95
 Sample Type U

Description:

Stiff brownish grey CLAY with frequent fine to coarse rounded flint and chalk gravel and 2 to 10 mm gypsum crystals.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	173.5
Diameter	(mm)	101.7
Moisture Content	(%)	17.8
Bulk Density	(Mg/m ³)	2.16
Dry Density	(Mg/m ³)	1.83
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	1.1
Axial displacement rate	(%/min)	2.3
Cell pressure	(kPa)	50
Strain at failure	(%)	19.0
Maximum Deviator Stress	(kPa)	289
Shear Stress Cu	(kPa)	144

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

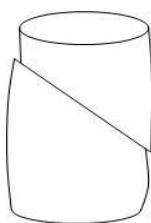
BH/TP No BHA5
Depth (m) 8.50-8.95
Sample Type U

Description:

Stiff fissured grey CLAY with rare 5 to 40 mm pockets of grey siltstone.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	62.4
Diameter	(mm)	37.6
Moisture Content	(%)	21.6
Bulk Density	(Mg/m ³)	2.16
Dry Density	(Mg/m ³)	1.78
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	1.4
Axial displacement rate	(%/min)	3.2
Cell pressure	(kPa)	200
Strain at failure	(%)	7.2
Maximum Deviator Stress	(kPa)	232
Shear Stress Cu	(kPa)	116

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

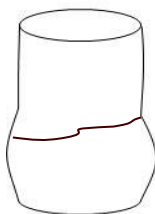
BH/TP No BHA7
 Depth (m) 2.50-2.95
 Sample Type U

Description:

Firm fissured grey CLAY with dark blue grey staining and rare 1 to 2 mm gypsum crystals.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.6
Diameter	(mm)	101.8
Moisture Content	(%)	14.4
Bulk Density	(Mg/m ³)	2.06
Dry Density	(Mg/m ³)	1.80
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.8
Axial displacement rate	(%/min)	2.0
Cell pressure	(kPa)	50
Strain at failure	(%)	13.3
Maximum Deviator Stress	(kPa)	152
Shear Stress Cu	(kPa)	76

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Checked and Approved by:

J Sturges - Operations Manager
 25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

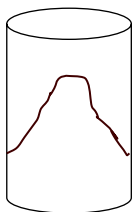
BH/TP No BHA7
 Depth (m) 4.50-4.95
 Sample Type U

Description:

Stiff fissured grey CLAY.

Specimen Details

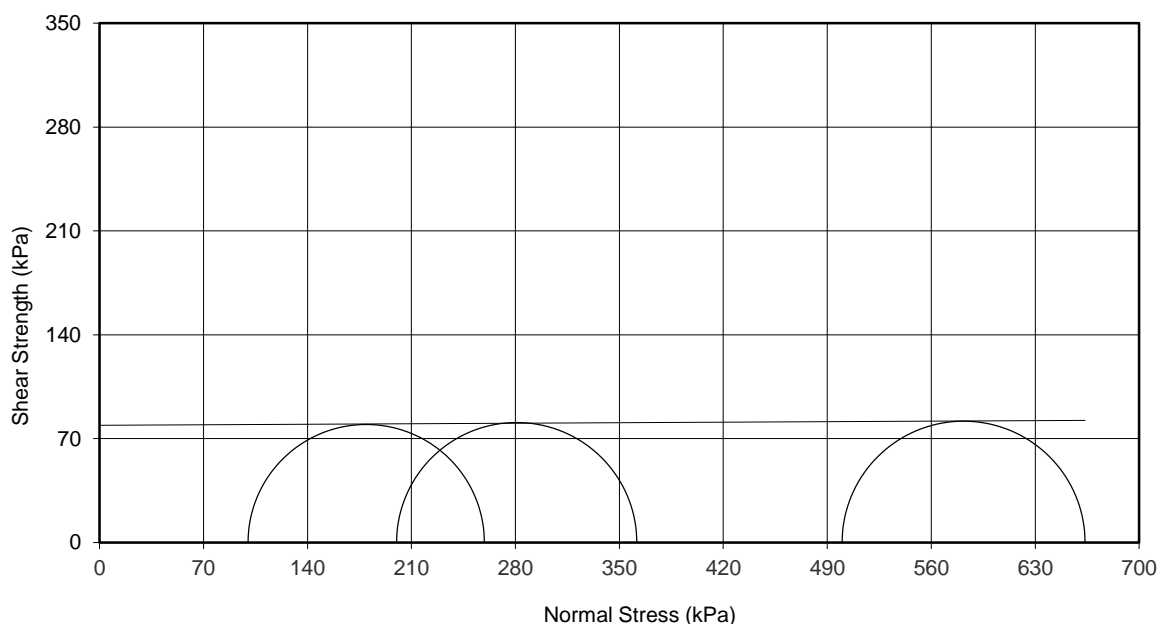
Specimen conditions		Undisturbed		
Length	(mm)	202.6		
Diameter	(mm)	102.5		
Moisture Content	(%)	23.8		
Bulk Density	(Mg/m ³)	2.00		
Dry Density	(Mg/m ³)	1.62		
Test Details		1	2	3
Latex membrane thickness	(mm)	0.3	0.3	0.3
Membrane correction	(kPa)	0.4	0.5	0.6
Axial displacement rate	(%/min)	1.0	1.0	1.0
Cell pressure	(kPa)	100	200	500
Strain at failure	(%)	5.9	6.9	7.9
Maximum Deviator Stress	(kPa)	159	162	164
Shear Stress Cu	(kPa)	80	81	82

Mode of failure

Orientation of the sample	Vertical
Distance from top of tube mm	NA

Shear Strength Parameters

Cohesion (kPa) 79
 Angle of Shear Resistance (°) 0.5



Checked and Approved by:

J Sturges - Operations Manager
 25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

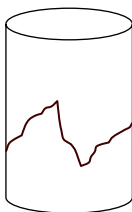
BH/TP No BHA7
 Depth (m) 6.50-6.95
 Sample Type U

Description:

Stiff fissured dark grey CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	203.0
Diameter	(mm)	101.8
Moisture Content	(%)	23.6
Bulk Density	(Mg/m³)	2.05
Dry Density	(Mg/m³)	1.66
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.5
Axial displacement rate	(%/min)	2.0
Cell pressure	(kPa)	150
Strain at failure	(%)	6.4
Maximum Deviator Stress	(kPa)	238
Shear Stress Cu	(kPa)	119

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

NA

Checked and Approved by:

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

**M1 JUNCTION 15 MAIN SITE
782813**

GEOLABS



QUICK UNDRAINED TRIAXIAL COMPRESSION TEST

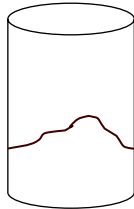
BH/TP No BHA8
 Depth (m) 4.50-4.95
 Sample Type U

Description:

Stiff fissured dark grey CLAY.

Specimen Details

Specimen conditions		Undisturbed
Length	(mm)	202.9
Diameter	(mm)	102.5
Moisture Content	(%)	21.2
Bulk Density	(Mg/m ³)	2.11
Dry Density	(Mg/m ³)	1.74
Test Details		
Latex membrane thickness	(mm)	0.3
Membrane correction	(kPa)	0.4
Axial displacement rate	(%/min)	2.0
Cell pressure	(kPa)	100
Strain at failure	(%)	4.9
Maximum Deviator Stress	(kPa)	169
Shear Stress Cu	(kPa)	84

Mode of failure

Orientation of the sample

Vertical

Distance from top of tube mm

NA

Checked and Approved by:

J Sturges - Operations Manager
 25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

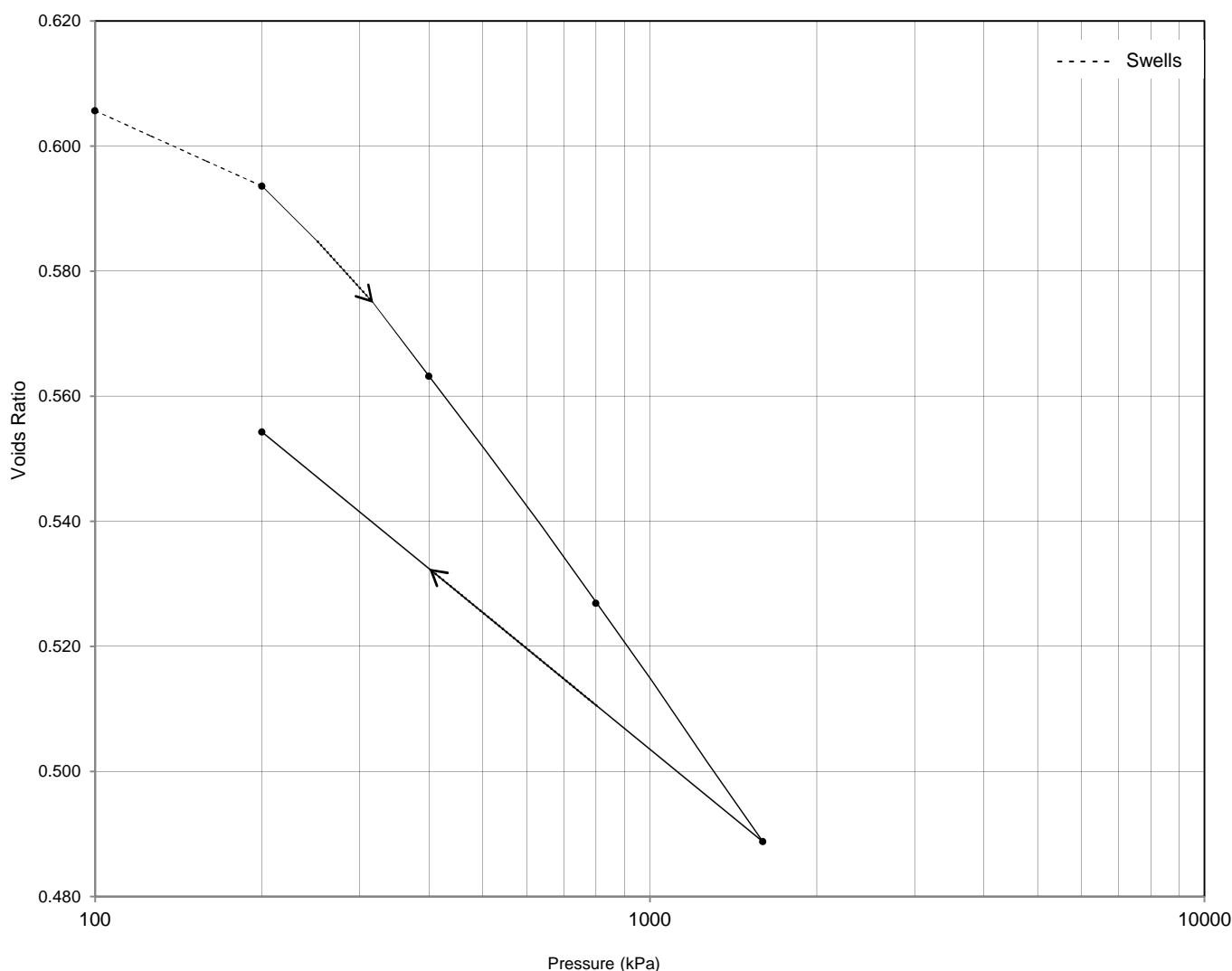
GEOLABS

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA13
Depth (m)	4.50-4.95
Sample Type	U
Depth within original (mm)	150
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY.



Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

**M1 JUNCTION 15 MAIN SITE
782813****GEOLABS**

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA13
 Depth (m) 4.50-4.95
 Sample Type U
 Depth within original (mm) 150
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 100	-	Specimen swelled	-	-	0.606
100 - 200	0.075	2.5	t50	3.70	0.594
200 - 400	0.095	0.78	t50	11.5	0.563
400 - 800	0.058	0.77	t50	11.1	0.527
800 - 1600	0.031	0.89	t50	9.21	0.489
1600 - 200	0.031	0.37 (Sv)	t50	22.5	0.554

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS®

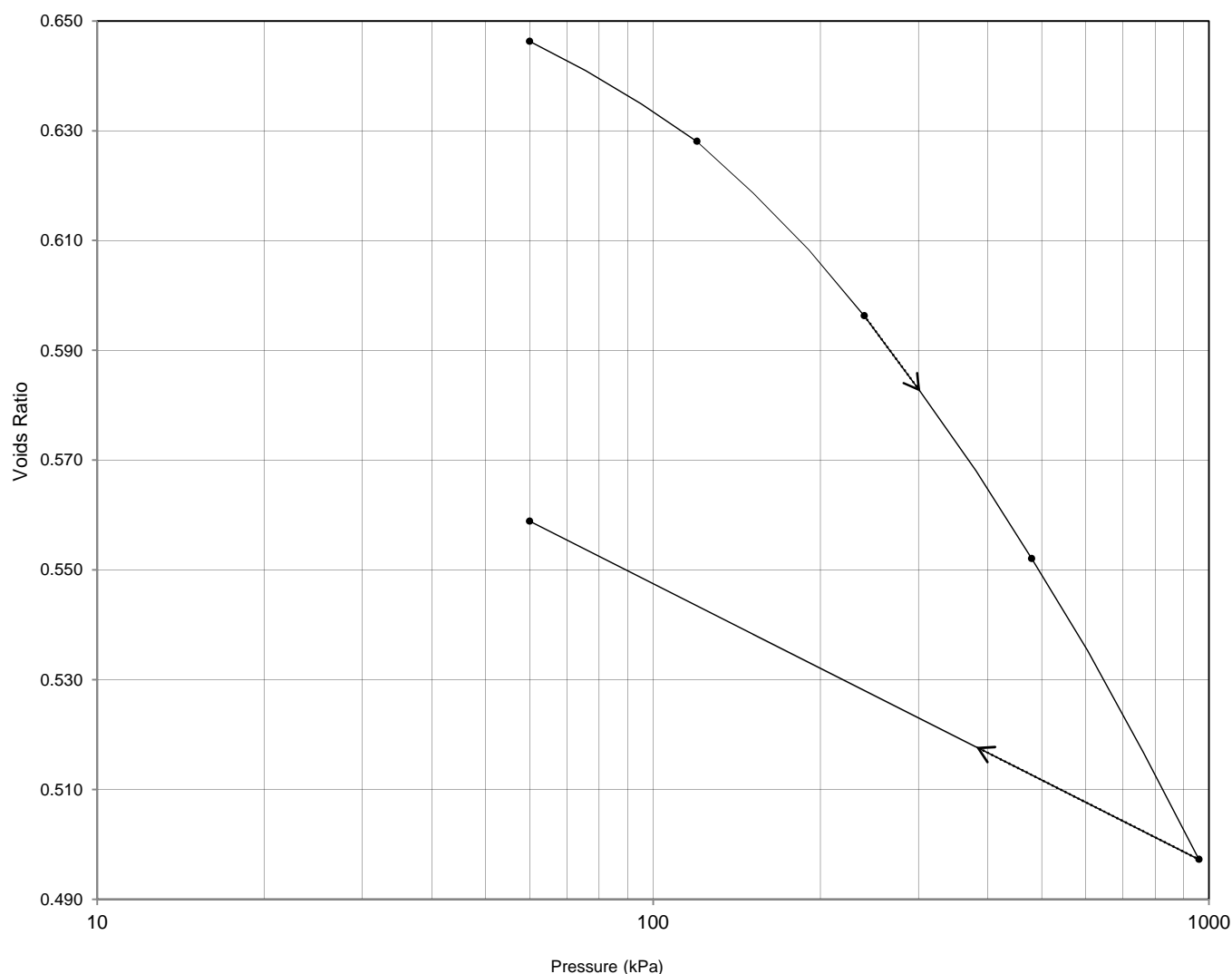
ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA14
Depth (m)	2.50-2.95
Sample Type	U
Depth within original (mm)	300
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Firm fissured greyish brown CLAY with frequent elongated 10 to 40 mm pale grey weathered flint.

Note: Some patchng required due to removal of gravel.



Initial Conditions:

Height	(mm)	18.44	Water Content	(%)	23.9
Diameter	(mm)	76.20	Voids Ratio		0.665
Area	(mm ²)	4560	Bulk Density	(Mg/m ³)	2.03
Volume	(cm ³)	84.09	Dry Density	(Mg/m ³)	1.63
Laboratory Temperature	(°C)	20.2	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	98.0

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA14
 Depth (m) 2.50-2.95
 Sample Type U
 Depth within original (mm) 300
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Firm fissured greyish brown CLAY with frequent elongated 10 to 40 mm pale grey weathered flint.

Note: Some patchng required due to removal of gravel.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 60	0.18	18	t50	0.488	0.646
60 - 120	0.18	1.02	t50	8.42	0.628
120 - 240	0.16	1.3	t50	6.44	0.596
240 - 480	0.12	1.1	t50	7.16	0.552
480 - 960	0.074	1.1	t50	6.74	0.497
960 - 60	0.046	0.49 (Sv)	t50	15.3	0.559

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

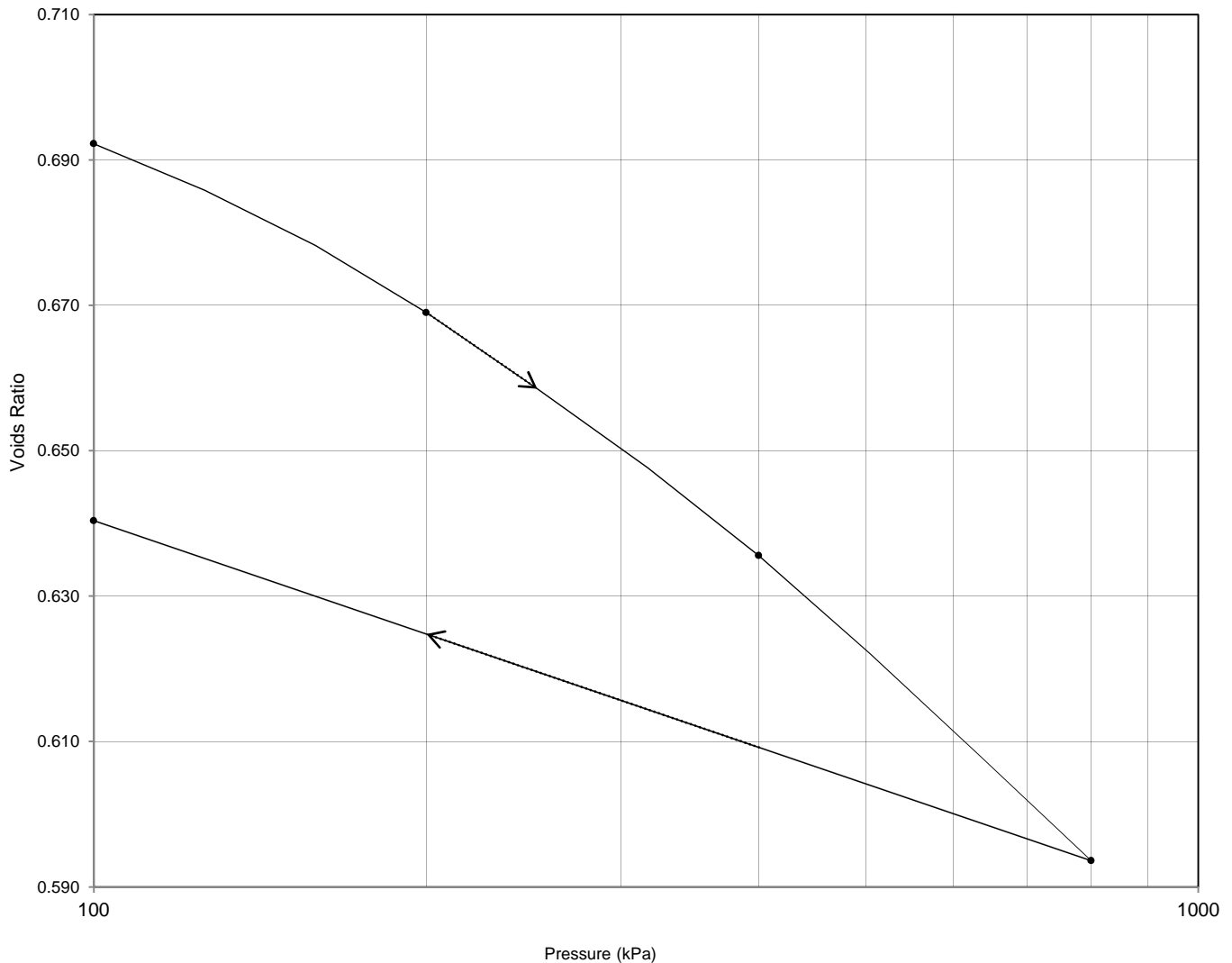
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA14
Depth (m)	4.50-4.95
Sample Type	U
Depth within original (mm)	120
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured grey CLAY with frequent 1 to 3 mm gypsum crystals.



Initial Conditions:

Height	(mm)	18.97	Water Content	(%)	25.4
Diameter	(mm)	74.98	Voids Ratio		0.705
Area	(mm ²)	4416	Bulk Density	(Mg/m ³)	2.00
Volume	(cm ³)	83.76	Dry Density	(Mg/m ³)	1.60
Laboratory Temperature	(°C)	20.2	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	98.0

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

**M1 JUNCTION 15 MAIN SITE
782813****GEOLABS**

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA14
 Depth (m) 4.50-4.95
 Sample Type U
 Depth within original (mm) 120
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured grey CLAY with frequent 1 to 3 mm gypsum crystals.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 100	0.074	48	t90	0.832	0.692
100 - 200	0.14	1.7	t50	5.31	0.669
200 - 400	0.10	2.2	t50	3.93	0.636
400 - 800	0.064	1.8	t50	4.64	0.594
800 - 100	0.042	0.89 (Sv)	t50	9.42	0.640

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

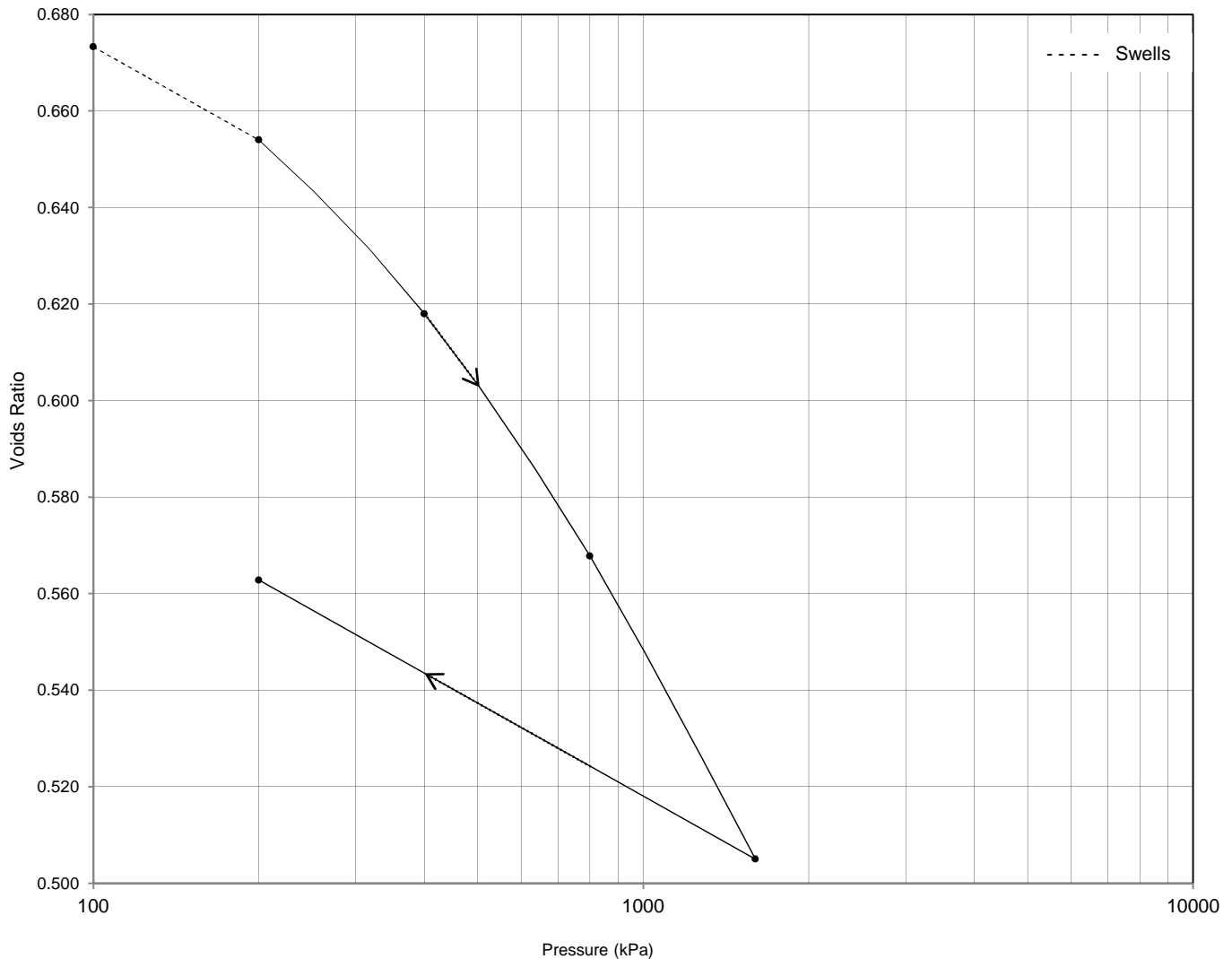
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA3
Depth (m)	4.50-4.95
Sample Type	U
Depth within original (mm)	100
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY with frequent 3 to 10 mm gypsum crystals.



Initial Conditions:

Height	(mm)	18.36	Water Content	(%)	24.0
Diameter	(mm)	76.10	Voids Ratio		0.680
Area	(mm ²)	4548	Bulk Density	(Mg/m ³)	2.01
Volume	(cm ³)	83.51	Dry Density	(Mg/m ³)	1.62
Laboratory Temperature	(°C)	22.4	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	96.0

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA3
 Depth (m) 4.50-4.95
 Sample Type U
 Depth within original (mm) 100
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY with frequent 3 to 10 mm gypsum crystals.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 100	-	Specimen swelled	-	-	0.673
100 - 200	0.12	0.94	t50	9.13	0.654
200 - 400	0.11	0.86	t50	9.69	0.618
400 - 800	0.078	0.84	t50	9.42	0.568
800 - 1600	0.050	0.95	t50	7.73	0.505
1600 - 200	0.027	0.45 (Sv)	t50	16.3	0.563

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

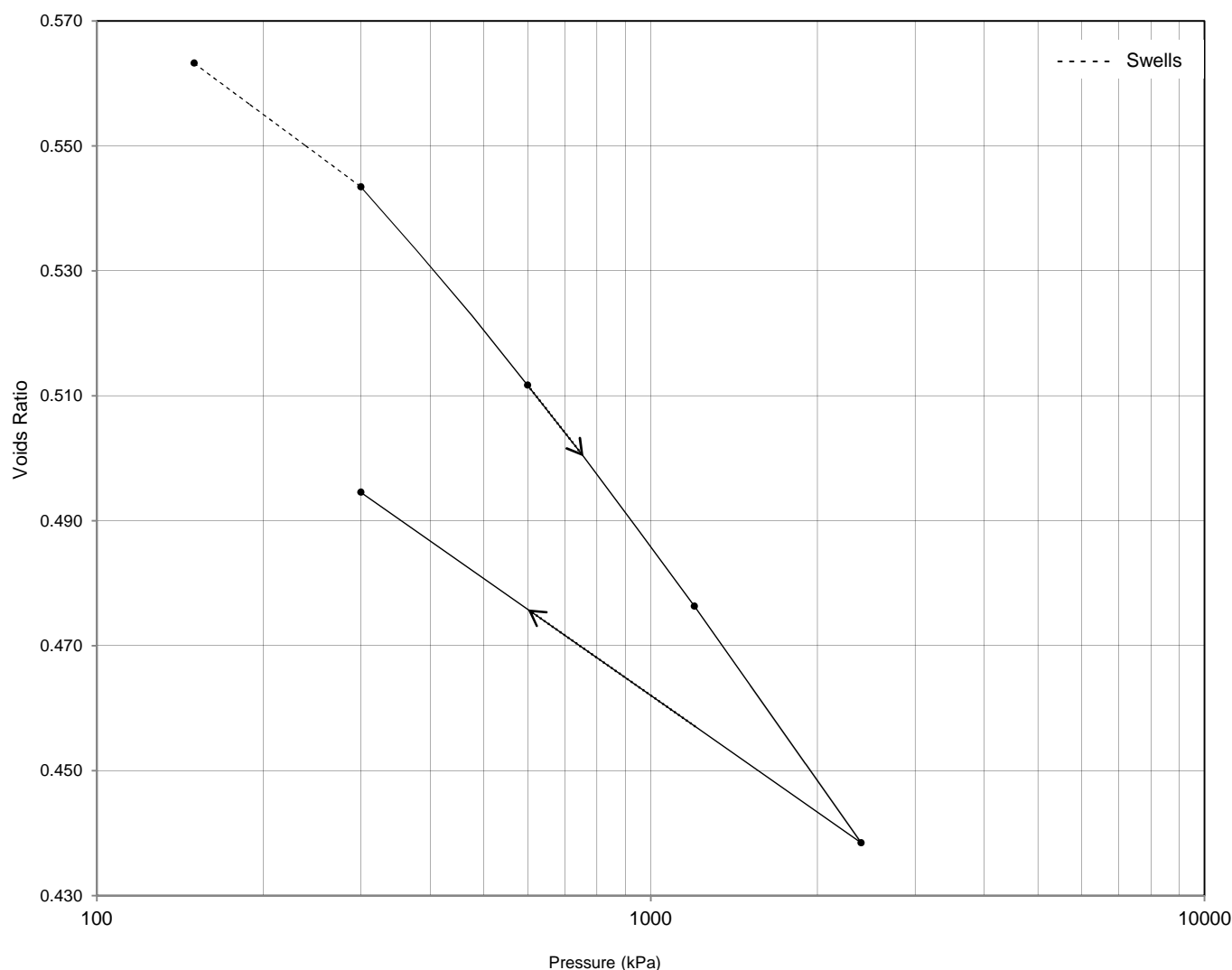
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA3
Depth (m)	6.50-6.95
Sample Type	U
Depth within original (mm)	120
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY.



Initial Conditions:

Height	(mm)	18.70	Water Content	(%)	19.9
Diameter	(mm)	74.96	Voids Ratio		0.567
Area	(mm ²)	4413	Bulk Density	(Mg/m ³)	2.08
Volume	(cm ³)	82.53	Dry Density	(Mg/m ³)	1.74
Laboratory Temperature	(°C)	19.9	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	95.5

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA3
 Depth (m) 6.50-6.95
 Sample Type U
 Depth within original (mm) 120
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 150	-	Specimen swelled	-	-	0.563
150 - 300	0.084	0.90	t50	9.94	0.543
300 - 600	0.069	0.64	t50	13.4	0.512
600 - 1200	0.039	0.76	t50	10.8	0.476
1200 - 2400	0.021	0.84	t50	9.36	0.438
2400 - 300	0.019	0.51 (Sv)	t50	15.6	0.495

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

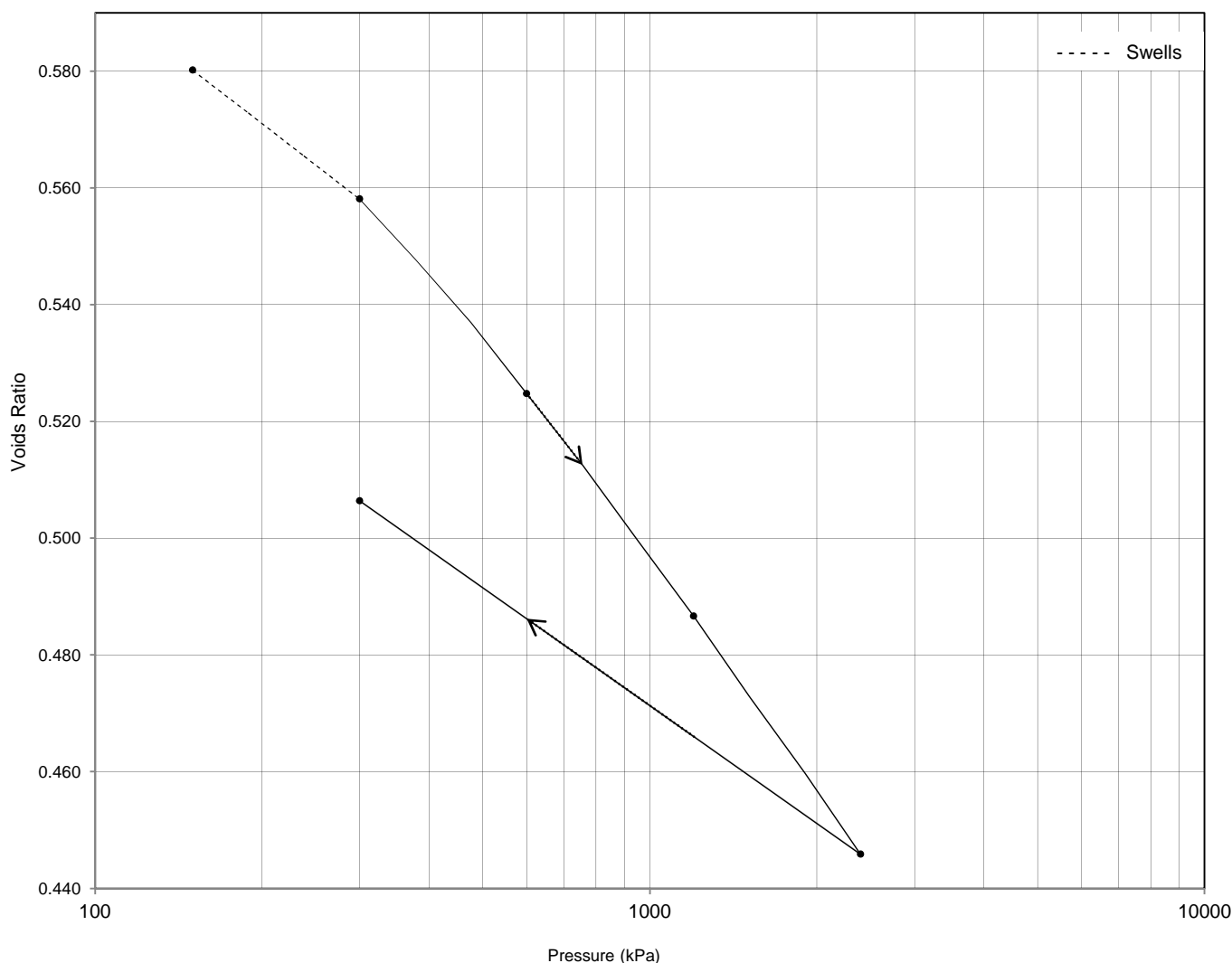
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA3
Depth (m)	8.50-8.95
Sample Type	U
Depth within original (mm)	150
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY with rare 5 to 30 mm pale brown hard siltstone.



Initial Conditions:

Height	(mm)	19.02	Water Content	(%)	20.7
Diameter	(mm)	75.00	Voids Ratio		0.585
Area	(mm ²)	4418	Bulk Density	(Mg/m ³)	2.07
Volume	(cm ³)	84.03	Dry Density	(Mg/m ³)	1.72
Laboratory Temperature	(°C)	20.4	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	96.4

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA3
 Depth (m) 8.50-8.95
 Sample Type U
 Depth within original (mm) 150
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY with rare 5 to 30 mm pale brown hard siltstone.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 150	-	Specimen swelled	-	-	0.580
150 - 300	0.093	0.65	t50	14.1	0.558
300 - 600	0.071	0.59	t50	15.1	0.525
600 - 1200	0.042	0.70	t50	12.1	0.487
1200 - 2400	0.023	0.78	t50	10.3	0.446
2400 - 300	0.020	0.39 (Sv)	t50	20.8	0.506

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

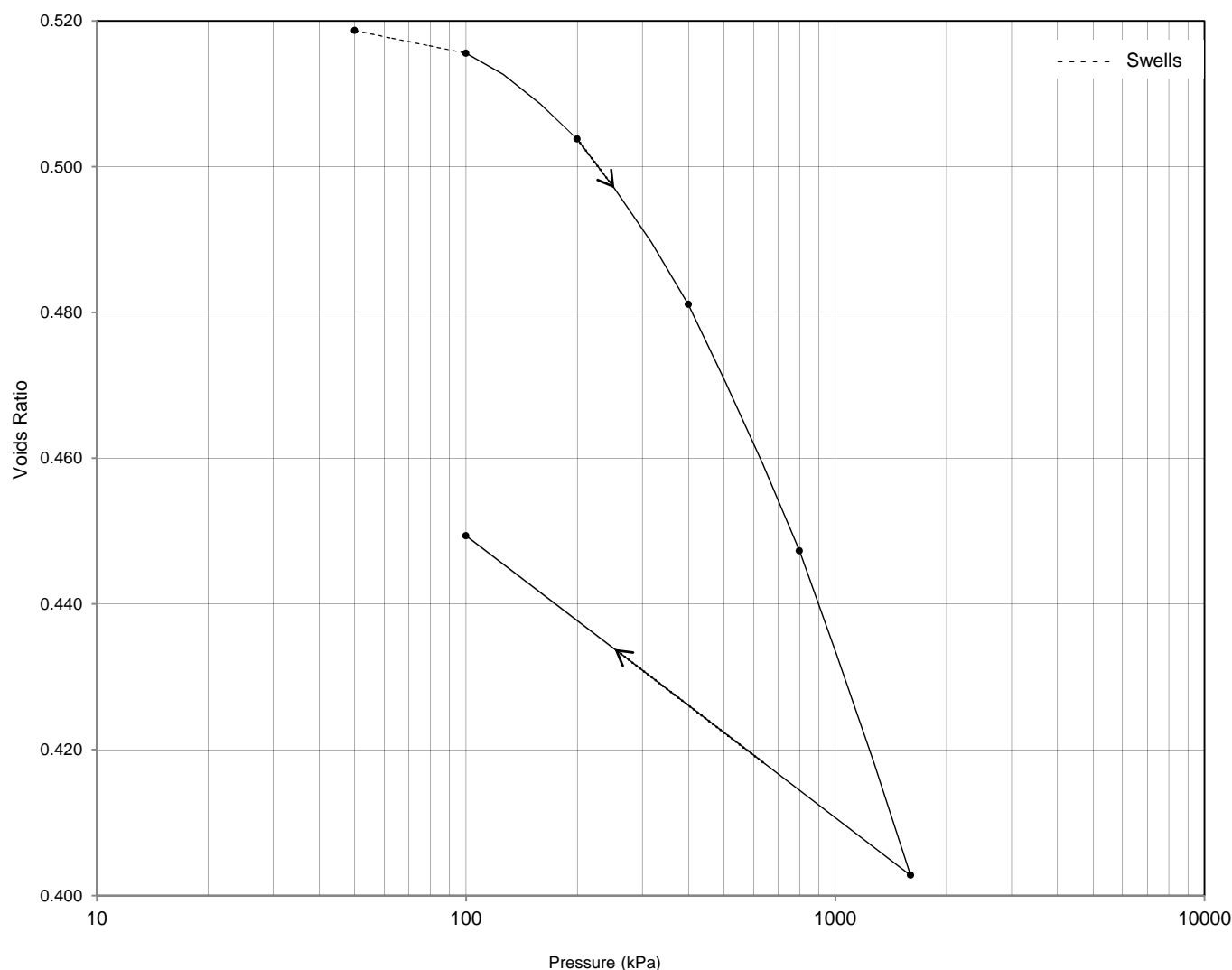
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA5
Depth (m)	2.50-2.95
Sample Type	U
Depth within original (mm)	100
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff brownish grey CLAY with frequent fine to coarse rounded flint and chalk gravel and 2 to 10 mm gypsum crystals.



Initial Conditions:

Height	(mm)	18.42	Water Content	(%)	17.9
Diameter	(mm)	76.16	Voids Ratio		0.517
Area	(mm ²)	4556	Bulk Density	(Mg/m ³)	2.11
Volume	(cm ³)	83.91	Dry Density	(Mg/m ³)	1.79
Laboratory Temperature	(°C)	22.4	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	93.9

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA5
 Depth (m) 2.50-2.95
 Sample Type U
 Depth within original (mm) 100
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff brownish grey CLAY with frequent fine to coarse rounded flint and chalk gravel and 2 to 10 mm gypsum crystals.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 50	-	Specimen swelled	-	-	0.519
50 - 100	0.041	14	t90	2.63	0.516
100 - 200	0.078	2.4	t50	3.61	0.504
200 - 400	0.075	1.4	t50	5.98	0.481
400 - 800	0.057	1.0	t50	8.00	0.447
800 - 1600	0.038	0.88	t50	8.83	0.403
1600 - 100	0.022	0.30 (Sv)	t50	26.3	0.449

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

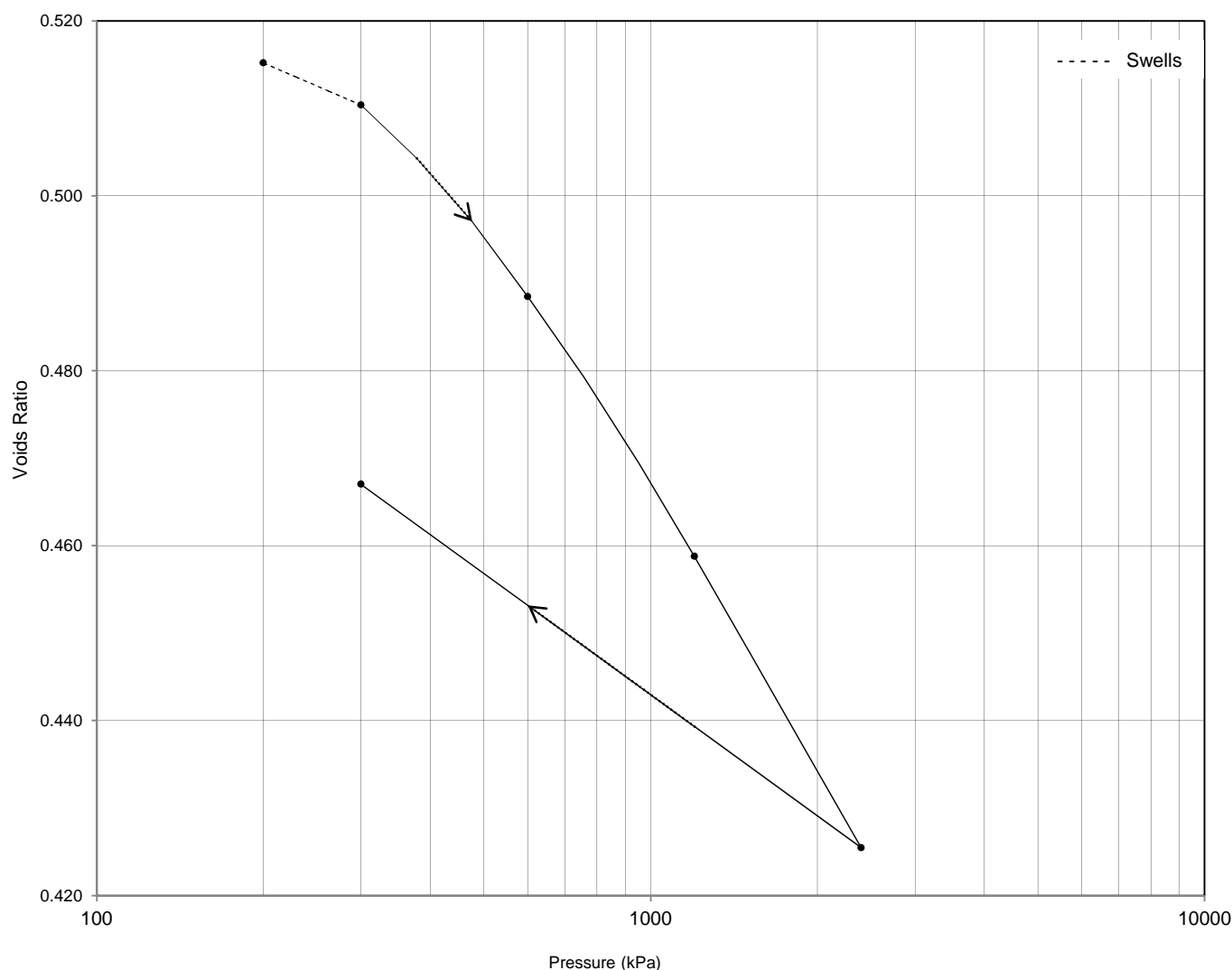
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA5
Depth (m)	8.50-8.95
Sample Type	U
Depth within original (mm)	200
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured grey CLAY with rare 5 to 40 mm pockets of grey siltstone.



Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA5
 Depth (m) 8.50-8.95
 Sample Type U
 Depth within original (mm) 200
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured grey CLAY with rare 5 to 40 mm pockets of grey siltstone.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 200	-	Specimen swelled	-	-	0.515
200 - 300	0.032	7.9	t90	5.00	0.510
300 - 600	0.048	1.4	t50	6.66	0.488
600 - 1200	0.033	1.4	t50	6.21	0.459
1200 - 2400	0.019	1.6	t50	5.35	0.425
2400 - 300	0.014	0.63 (Sv)	t50	13.5	0.467

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

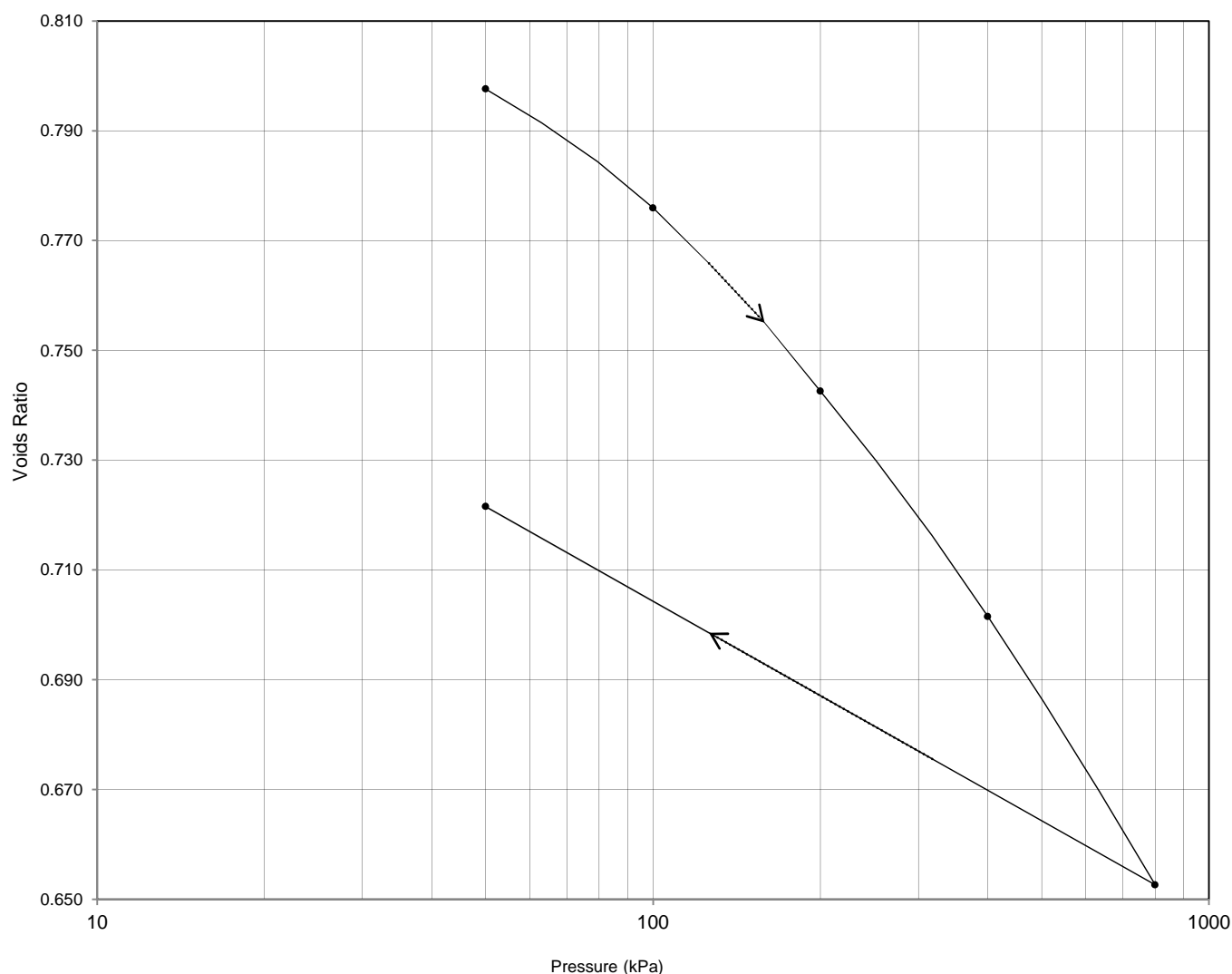
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA7
Depth (m)	2.50-2.95
Sample Type	U
Depth within original (mm)	350
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Firm fissured grey CLAY with dark blue grey staining and rare 1 to 2 mm gypsum crystals.



Initial Conditions:

Height	(mm)	18.68	Water Content	(%)	30.1
Diameter	(mm)	76.19	Voids Ratio		0.810
Area	(mm ²)	4559	Bulk Density	(Mg/m ³)	1.96
Volume	(cm ³)	85.17	Dry Density	(Mg/m ³)	1.50
Laboratory Temperature	(°C)	22.2	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	101.2

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA7
 Depth (m) 2.50-2.95
 Sample Type U
 Depth within original (mm) 350
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Firm fissured grey CLAY with dark blue grey staining and rare 1 to 2 mm gypsum crystals.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 50	0.14	2.4	t50	3.79	0.798
50 - 100	0.24	1.2	t50	7.34	0.776
100 - 200	0.19	1.3	t50	6.80	0.743
200 - 400	0.12	1.3	t50	6.33	0.701
400 - 800	0.072	1.4	t50	5.72	0.653
800 - 50	0.056	0.51 (Sv)	t50	15.4	0.722

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

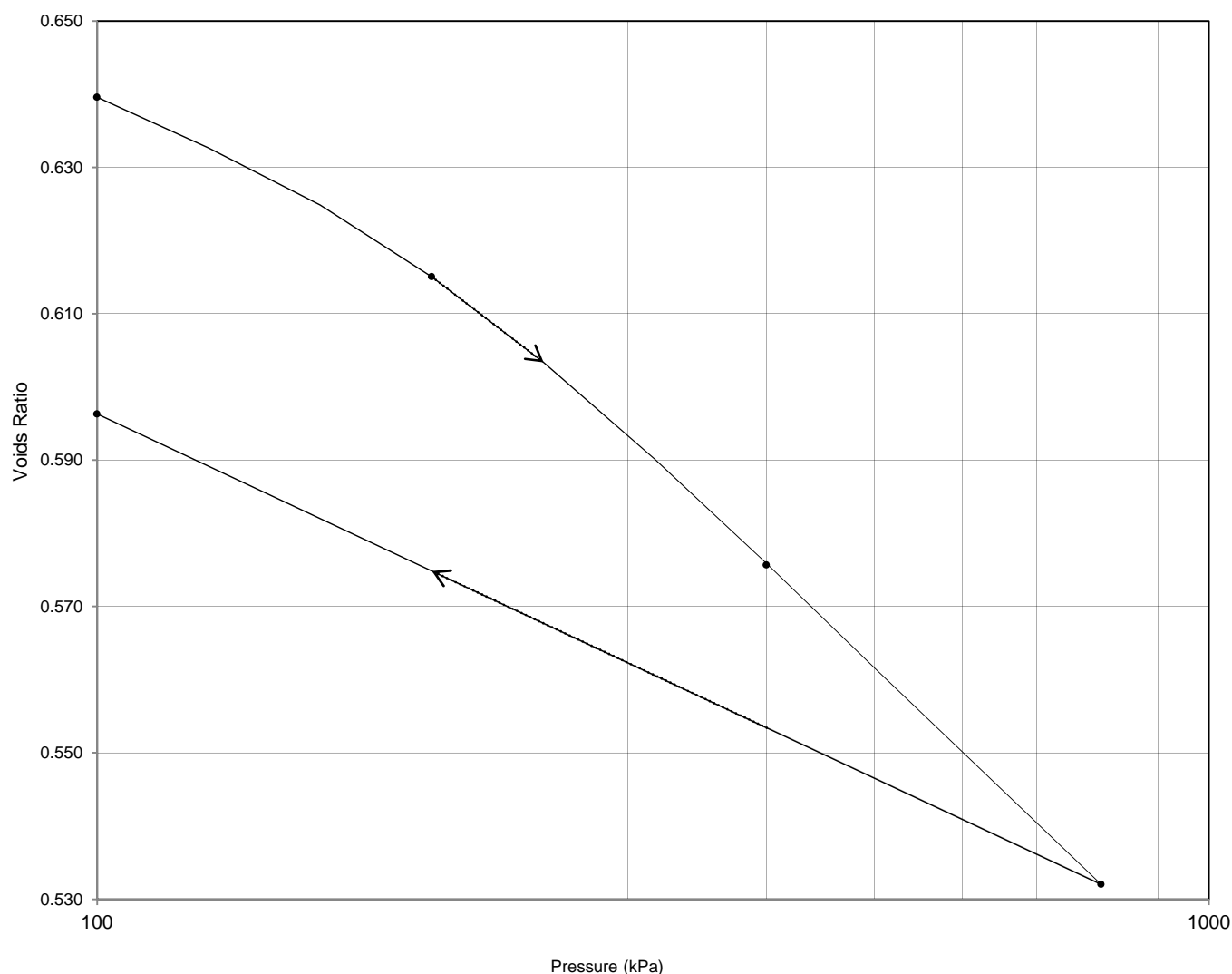
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA7
Depth (m)	4.50-4.95
Sample Type	U
Depth within original (mm)	360
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured grey CLAY.



Initial Conditions:

Height	(mm)	19.02	Water Content	(%)	23.8
Diameter	(mm)	74.98	Voids Ratio		0.647
Area	(mm ²)	4416	Bulk Density	(Mg/m ³)	2.04
Volume	(cm ³)	83.98	Dry Density	(Mg/m ³)	1.65
Laboratory Temperature	(°C)	22.1	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	99.9

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

**M1 JUNCTION 15 MAIN SITE
782813****GEOLABS**

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA7
 Depth (m) 4.50-4.95
 Sample Type U
 Depth within original (mm) 360
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured grey CLAY.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 100	0.043	23	t90	1.73	0.640
100 - 200	0.15	1.0	t50	8.95	0.615
200 - 400	0.12	0.74	t50	12.0	0.576
400 - 800	0.069	0.78	t50	10.7	0.532
800 - 100	0.060	0.42 (Sv)	t50	20.4	0.596

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

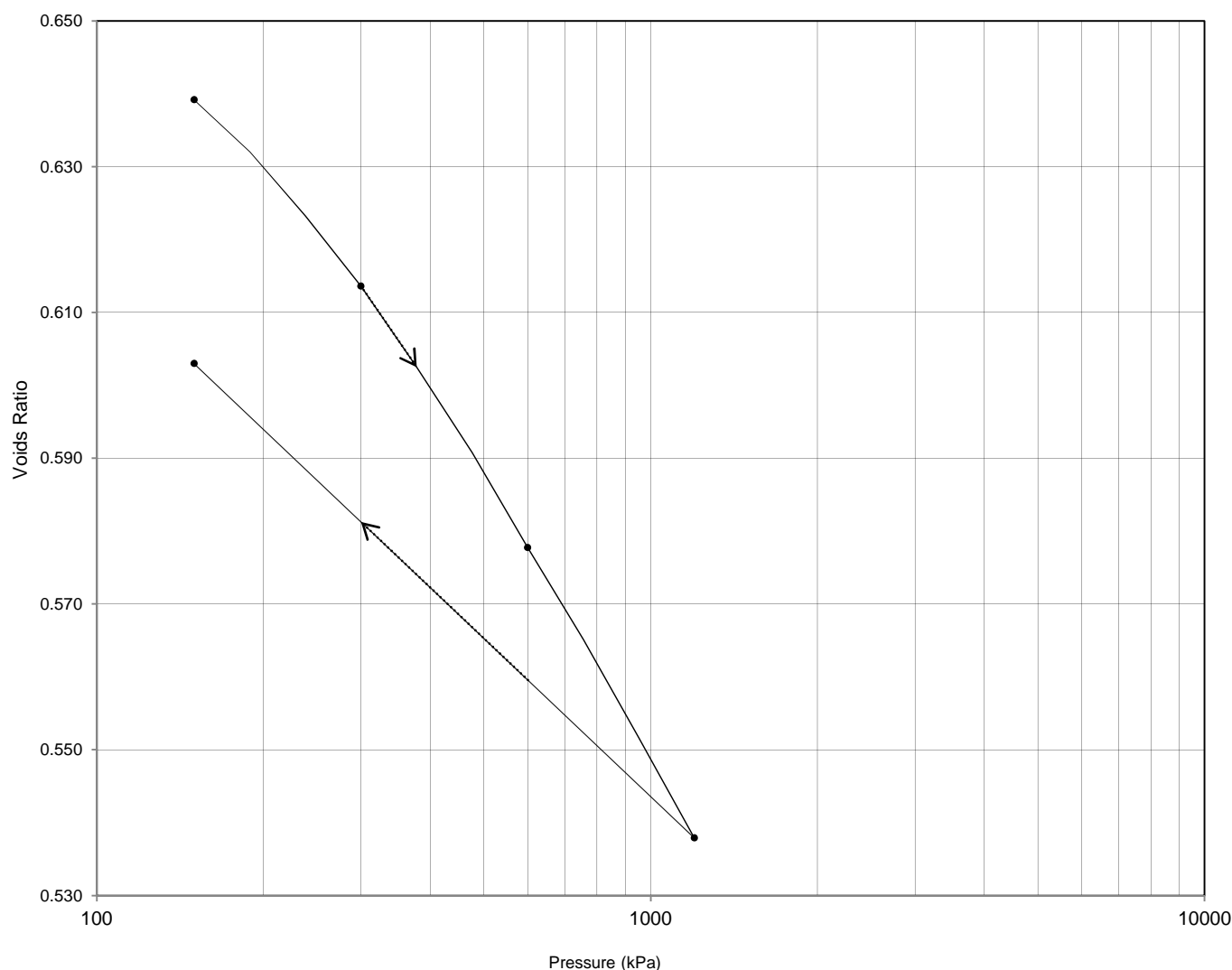
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA7
Depth (m)	6.50-6.95
Sample Type	U
Depth within original (mm)	360
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY.



Initial Conditions:

Height	(mm)	18.76	Water Content	(%)	23.0
Diameter	(mm)	74.96	Voids Ratio		0.646
Area	(mm ²)	4413	Bulk Density	(Mg/m ³)	2.03
Volume	(cm ³)	82.79	Dry Density	(Mg/m ³)	1.65
Laboratory Temperature	(°C)	20.2	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	96.7

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA7
 Depth (m) 6.50-6.95
 Sample Type U
 Depth within original (mm) 360
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 150	0.027	12	t50	0.770	0.639
150 - 300	0.10	0.66	t50	13.5	0.614
300 - 600	0.074	0.61	t50	14.1	0.578
600 - 1200	0.042	0.59	t50	13.9	0.538
1200 - 150	0.040	0.33 (Sv)	t50	25.4	0.603

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

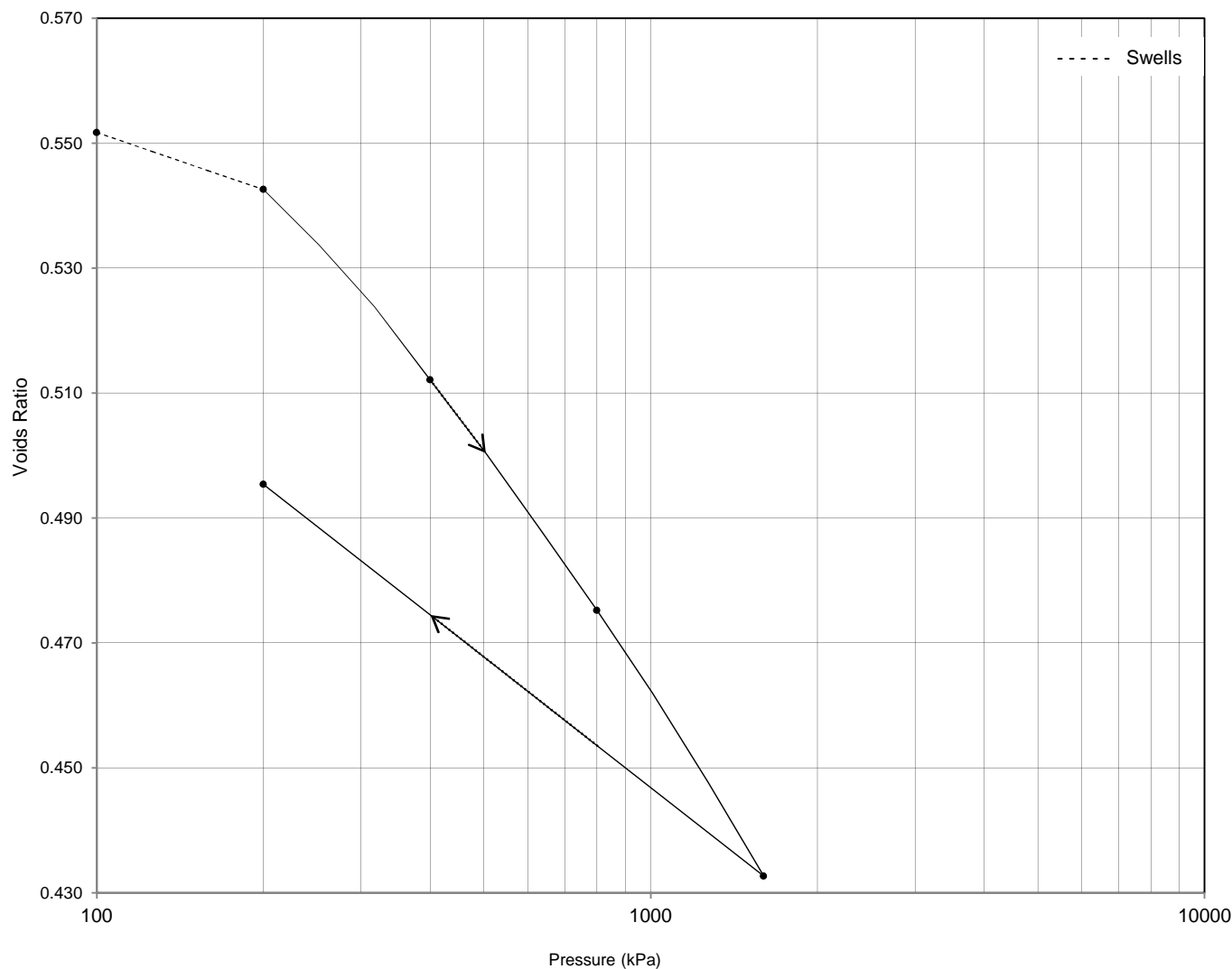
GEOLABS®

ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP	BHA8
Depth (m)	4.50-4.95
Sample Type	U
Depth within original (mm)	130
Orientation within original	Vertical
Specimen preparation	Undisturbed

Description:

Stiff fissured dark grey CLAY.



Initial Conditions:

Height	(mm)	18.39	Water Content	(%)	20.3
Diameter	(mm)	76.06	Voids Ratio		0.554
Area	(mm ²)	4544	Bulk Density	(Mg/m ³)	2.11
Volume	(cm ³)	83.56	Dry Density	(Mg/m ³)	1.75
Laboratory Temperature	(°C)	20.2	Particle density	(Mg/m ³)	2.72 (Assumed)
			Degree of Saturation	(%)	99.7

Checked and Approved by

J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813



ONE DIMENSIONAL CONSOLIDATION PROPERTIES OF SOIL

BH / TP BHA8
 Depth (m) 4.50-4.95
 Sample Type U
 Depth within original (mm) 130
 Orientation within original Vertical
 Specimen preparation Undisturbed

Description:

Stiff fissured dark grey CLAY.

Pressure Range (kPa)	m_v (m ² /MN)	c_v (m ² /year)	Time Fitting		Voids Ratio
			Method	minutes	
0 - 100	-	Specimen swelled	-	-	0.552
100 - 200	0.059	4.4	t50	1.98	0.543
200 - 400	0.099	0.59	t50	14.4	0.512
400 - 800	0.061	0.81	t50	10.0	0.475
800 - 1600	0.036	1.2	t50	6.41	0.433
1600 - 200	0.031	0.44 (Sv)	t50	17.8	0.495

Checked and Approved by



J Sturges - Operations Manager
25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
782813

GEOLABS®

Determination of Permeability in a Triaxial Cell

Borehole Ref.: BHA3
 Depth (m): 8.50 - 8.95
 Sample Type: U

Description:
 Stiff fissured dark grey gravelly CLAY. Gravel is 5-13 mm siltstone.

SPECIMEN DETAILS

Depth within original sample n/a
 Orientation within original n/a
 Specimen preparation Undisturbed

TEST DETAILS

Cell Preparation Performed in accordance with Clause 3.5

		INITIAL	FINAL
Diameter	mm	102.69	102.63
Height	mm	100.02	99.95
Moisture Content	%	21	23
Bulk Density	Mg/m ³	2.06	2.10
Dry Density	Mg/m ³	1.71	1.71

SATURATION STAGE

Saturation initially by constant moisture content, followed by back-pressure assistance.

Pore pressure coefficient ('B' value) 0.48 1.00

CONSOLIDATION STAGE

Effective pressure kPa 70
 Volume change mL 1.6

PERMEABILITY STAGE

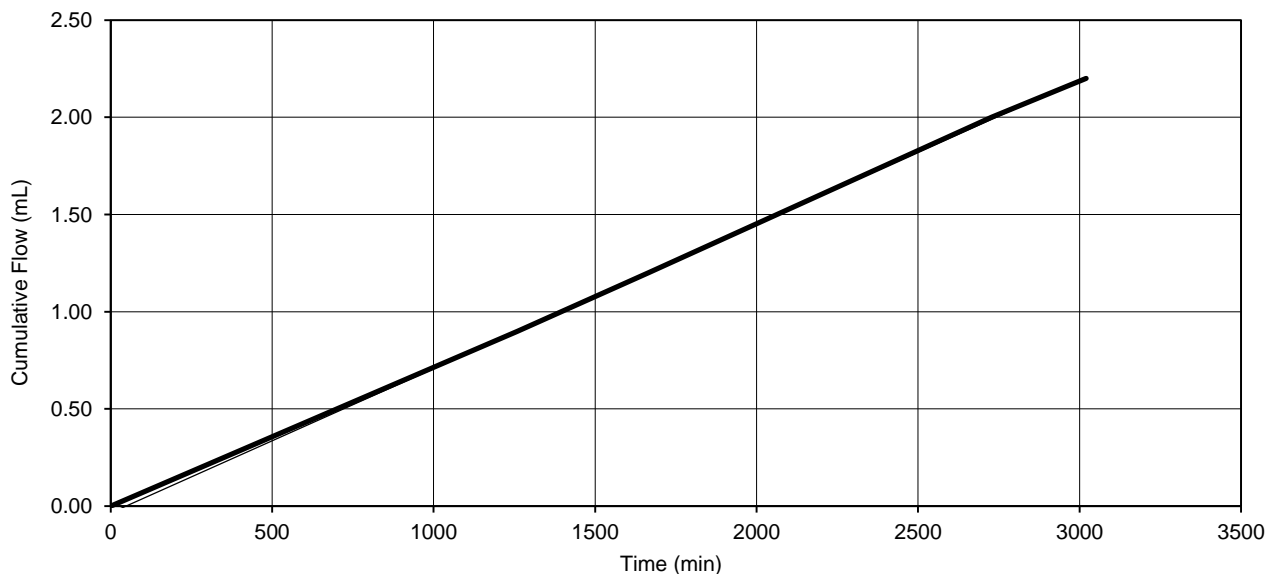
Pressure difference across specimen kPa 20
 Hydraulic gradient 20.4
 Mean effective stress kPa 70

TEST DURATIONS

Saturation days 8
 Consolidation days 2
 Flow days 2

Coefficient of Permeability

k_v at 20 °C = 7.3×10^{-11} m/s



Checked and Approved by

P. Heritage

P Heritage - Project Co-ordinator
 25/10/2017

Project Number:

GEO / 26482

Project Name:

M1 JUNCTION 15 MAIN SITE
 782813

GEOLABS®



FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06799

Issue Number: 1

Date: 13 October, 2017

Client: Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Mark Athorne

Project Name: M1 Junction

Project Ref: 782813

Order No: N/A

Date Samples Received: 05/10/17

Date Instructions Received: 06/10/17

Date Analysis Completed: 13/10/17

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Iain Haslock
Analytical Consultant

Envirolab Job Number: 17/06799

Client Project Name: M1 Junction

Client Project Ref: 782813

Lab Sample ID	17/06799/1	17/06799/2	17/06799/3	17/06799/4	17/06799/5	17/06799/6	17/06799/7	17/06799/8	Units	Method ref
Client Sample No										
Client Sample ID	BHA3	BHA8	BHA10	BHA10	BHA10	BHA10	TPA1	TPA1		
Depth to Top	2.50	2.50	2.00	3.50	6.00	7.00	0.80	1.80		
Depth To Bottom										
Date Sampled										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	3A	3A	3	5E	3	3	5E	5E		
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	A-T-044
pH BRE _D ^{M#}	8.33	8.43	7.97	8.03	7.82	7.74	7.54	8.30	pH	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	1990	431	1960	33	1940	1890	58	88	mg/l	A-T-026s
Sulphate BRE (acid sol) _D ^{M#}	1.14	0.13	0.92	0.05	1.33	0.62	0.03	0.02	% w/w	A-T-028s
Sulphur BRE (total) _D	0.49	0.05	0.69	0.03	0.43	0.59	0.02	0.03	% w/w	A-T-024s

Envirolab Job Number: 17/06799

Client Project Name: M1 Junction

Client Project Ref: 782813

Lab Sample ID	17/06799/9	17/06799/10	17/06799/11						Units	Method ref
Client Sample No										
Client Sample ID	TPA2	TPA2	TPA3							
Depth to Top	1.50	2.50	1.00							
Depth To Bottom										
Date Sampled										
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	5A	5A	5							
% Stones >10mm _A	<0.1	<0.1	<0.1						% w/w	A-T-044
pH BRE _D ^{M#}	8.30	8.31	8.10						pH	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	117	133	22						mg/l	A-T-026s
Sulphate BRE (acid sol) _D ^{M#}	0.07	0.05	0.04						% w/w	A-T-028s
Sulphur BRE (total) _D	0.03	0.02	0.05						% w/w	A-T-024s

REPORT NOTES

General:

This report shall not be reproduced, except in full, without written approval from Envirolab.

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

APPENDIX Q

UPDATED GEOTECHNICAL RISK REGISTER

Geotechnical Risk Register



The site covers an area of approximately 1721Ha, the centre of which is defined by the following National Grid co-ordinates: 474940, 254715. The site is bound to the north east by the M1 road, to the south east by the A508 road and to the south west and north west by fields; to the north west there are no physical boundaries other than the hedgerows which form the field boundaries, while to the south west is a small unnamed brook.

Geotechnical Risk Register

The Geotechnical Risk Register has been compiled to show the degree of risk attached to various ground related aspects of the proposed development. The purpose of the register is to provide an assessment of the risk to the project posed by common ground related problems, and to identify suitable mitigation measures for the control of risk to an acceptable level. The risk register should be developed and refined as the geotechnical design and assessment progresses such that the register will allow the management of the geotechnical risks.

The inclusion of a risk in the register does not constitute confirmation that the problem actually exists at the site. A probability of 'very unlikely' is indicative of a condition which the available data suggests should not be present. The calculated risk is not the risk that the impact will occur it is the risk that the mitigation will be required to enable the project to progress. For the purposes of this risk register the magnitude of each impact and the resulting severity of risk is measured against that which would 'normally' be expected for each element. Before incorporation into a project risk register the impacts and risks for each element should be moderated by an assessment of the cost and time implication of individual mitigation measures.

The Geotechnical Risk Register has been developed in general accordance with the guidance presented in ICE/DETR Document 'Managing Geotechnical Risk' (2001) and the HA documents HD41/03 and HD22/02. The degree of risk (R) is determined by combining an assessment of the probability (P) of the hazard occurring with an assessment of the Impact (I) the hazard and associated mitigation will cause if it occurs ($R = P \times I$). The scale against which the probability and impact are measure and the resulting degree of risk determined is presented below.

Probability	(P)	X	Impact	(I)	=	(R)	Risk
Very Likely (VLk)	5		Very High (VH)	5		20 – 25	Severe (Sv)
Likely (Lk)	4		High (H)	4		15 – 19	Substantial (Sb)
Plausible (P)	3		Medium (M)	3		10 – 14	Moderate (Md)
Unlikely (U)	2		Low (Lw)	2		5 – 9	Minor (Mn)
Very Unlikely (VU)	1		Very Low (VLw)	1		1 – 4	None / Negligible (N)

	Site / Ground Conditions	Hazard	Potential Impact	Before Control			Comments and Proposed Mitigation	RR
				P	I	R		
Contaminated Land	Previous site use	Contaminated Ground	Health and safety, environmental damage, pollution requiring Remediation	U	H	Mn	Ground investigation has confirmed the site is primarily greenfield with the exception of a small area around the the gun club affected by lead shot and the derelict barns area. Site wide testing does not indicate the presence of any significant contamination. See seperate Contaminated Land Risk Assessments for further details.	N
				2	3	6		
Underground Voids	Mine Shafts	Shaft Collapse	Surface deformation, structural damage. Health and Safety	VU	H	N	Site is not within mining area as defined on Coal Authority (CA) gazetteer, web site and in CA scoping response letter. Previous investigation and current site investigation confirmed geology, and this confirms neglible risks.	N
				1	4	4		
	Shallow Mining	Workings Collapse crown holes, subsidence	Surface deformation, structural damage.	VU	H	N	Site is not within mining area as defined on Coal Authority (CA) gazetteer, web site and in CA scoping response letter. Previous investigation and current site investigation confirmed geology, and this confirms neglible risks.	N
				1	4	4		
	Deep Mining	Workings Consolidation, subsidence	Surface deformation	VU	M	N	Site is not within mining area as defined on Coal Authority (CA) gazetteer, web site and in CA scoping response letter. Previous investigation and current site investigation confirmed geology, and this confirms neglible risks.	N
				1	3	3		
	Natural cavities; solution features, Caves and Gulls	Unstable natural ground	Surface deformation, structural damage. Health and Safety	U	M	Mn	Geology not conducive to the formation of major solution features. Gypsum known to occur at depth in very thin veins and nodules but not of sufficient nature for commercial exploitation. Localised minor removal plausible through natural groundwater movements. Ground Investigation undertaken, geology confirmed and no naturally occurring voids indicated to be present.	N
				2	3	6		
	Other voids; basements, sumps, tanks, wells and adits etc.	Collapse, subsidence	Surface deformation, structural damage. Health and Safety	P	Lw	Mn	The vast majority of the site is undisturbed farm land. There is a recessed concrete tank located within the derelict farm buildings at the site, although the walkover has not indicated any other possible voids, man made or otherwise, at the site. Vigilance required during construction works in order to ensure tank is appropriately remediated and backfilled.	N
				3	2	6		

	Condition	Hazard	Impact	P	I	R	Comment / Mitigation	RR
Slopes and Earthworks	Existing steep slopes on site	Slope failure	Site stability; surface deformation at crest, structural damage to services , highways and adjoining property.	VU 1	H 4	N 4	A railway cutting is located adjacent to the western edge of the site currently stable and showing no sign of instability from the limited access available when viewing from public rights of way and footbridge during the investigation. It is understood that an earth screening bund is to be positioned at the western extent of the site, which will most likely add load to the existing railway cutting slope. Ground modelling, settlement and slope stability assessments will be required to confirm the designs at detailed design stages.	Md
	Gradient on site	Earthworks or retaining walls required to accommodate layout	Increased cost of development	VLk 5	H 4	Sv 20	Significant cut to fill earthworks will be required to develop the site to form the proposed development plateau, landscape bund and access roads. Therefore significant slopes may be created as part of the finished design. Drainage will be important in the design of these slopes. Ground modelling and slope stability assessments will be required to confirm the designs at detailed design stages.	Md
	As-dug cut material unsuitable as fill	Unstable earthworks	Surface deformation, structural damage	P 3	H 4	Md 12	The supplementary ground investigation confirms that the ground model and that natural materials present within the cut areas will be suitable for reuse. However these materials are expected to be sensitive to moisture content change and will need careful handling for reuse within structural fill areas. All materials should be suitable for use within landscape fill areas.	Md
	Embankment Stability	Slope failure	Site stability; surface deformation at crest, structural damage to services , highways and adjoining property.	P 3	VH 5	Sb 15	The supplementary ground investigation undertaken confirms the underlying geology is in line with expectations. No particularly problematic ground conditions have been identified that would cause concern regarding foundation settlement or bearing failure. However, embankments will need to be carefully designed and will need to accommodate suitable drainage systems and take account of the prevailing underlying ground conditions.	Md
	Cutting Stability	Slope failure	Site stability; surface deformation at crest, structural damage to services , highways and adjoining property.	P 3	VH 5	Sb 15	Ground Investigations have been undertaken to confirm the underlying geology and this is in line with expectations. No particularly problematic ground conditions have been identified that would cause concern regarding slope failure. However the overconsolidated clays are likely to be susceptible to swelling and stress relief upon unloading and as such care must be taken with respect to the design of cut slopes and designs will need to accommodate suitable drainage systems.	Sb
	Insufficient suitable fill	Import required to achieve design levels	Increased cost of development	VU 1	H 4	N 4	A careful cut to fill balance should be achieved to avoid the unnecessary importation of fill materials. The supplementary ground investigation has typically confirmed the site ground model and strata properties will be suitable for reuse.	N

	Condition	Hazard	Impact	P	I	R	Comment / Mitigation	RR
Foundations & Substructures	Loose or soft, compressible soils at shallow depth	Ground unsuitable for conventional shallow footings	Excess settlement or alternative foundations	P 3	H 4	Md 12	The supplementary ground Investigation has confirmed that some areas of slightly softer materials are present across the site, particularly within the western corner of the site, adjacent to the railway line. It should be stressed that these softer Oadby Member clays may be susceptible to settlement.	Md
	Adjacent Structures	Works on site affecting stability of adjacent structures	Alternative design or altered development layout.	P 3	H 4	Md 12	No buildings immediately adjacent to the site. However the design of cuttings and fill along the north east and south east will need to be suitably robust and take account of the proximity and loading from the M1 and A508 respectively. The supplementary ground Investigation has confirmed the ground model and strata properties to assist in suitable design.	Mn
	Differential Settlement	Settlements / heave beneath buildings as a result of cut to fill works.	Damage to floors and structures.	P 3	H 4	Md 12	Careful design has to be undertaken to smooth the transition from cut in situ materials to engineered fill materials. Foundation designs will need to take account of the transition and differing solutions may need to be adopted across the building footprint. Floor slabs and ground engineering solutions will need to be carefully designed to accommodate this risk. Design will need to take account of specification for earthworks. Supplementary ground Investigation have identified softer than expected materials of the Oadby Member across the site, particularly in the western corner of the site, adjacent to the railway line. Upon unloading in cut areas (north) glacial clays are susceptible to swelling and heave which could exacerbate differential settlement if some form of treatment or stabilisation is not undertaken.	Sb
	Aggressive Ground Chemistry	Attack of buried concrete	Protection required	Lk 4	M 3	Md 12	Available information suggests that gypsum a naturally occurring sulphate could be present within several strata beneath the site and this will require more resistant concrete mix designs to be used to protect in ground concrete from attack. Supplementary ground Investigation has confirmed that strata beneath the site are affected by above average sulphates and more resistant concrete mix designs will be required.	Md

	Condition	Hazard	Impact	P	I	R	Comment / Mitigation	RR
Floor slabs and Road Pavements	Soft and compressible near surface soil	Ground unsuitable for conventional ground bearing slab	Alternative floor design	U 2	M 3	Mn 6	Careful design has to be undertaken to smooth the transition from cut insitu materials to engineered fill materials. Foundation and floor slab designs will need to take account of the transition and differing solutions may need to be adopted across the building footprint. Floor slabs and ground engineering solutions will need to be carefully designed to accommodate this risk. Design will need to take account of specification for earthworks which may need to include soil stabilisation improvement. Any stabilisation needs to take account of the risk of heave from the presence of naturally occurring high sulphate concentrations in the soils. The supplementary ground Investigation has identified softer than expected clays within the Oadby Member of the site, particularly within the western corner of the site adjacent to the railway line. Upon unloading in cut areas (north) glacial clays are susceptible to swelling and heave which could exacerbate differential settlement if some form of treatment or stabilisation is not undertaken.	Sb
	Soft and compressible near surface soil	Low CBR due to soft formation	Surface damage or alternative design	U 2	M 3	Mn 6	CBR is anticipated to be low for the majority of the cohesive soils expected to be present across the site. CBR will be highly dependent upon ground conditions exposed following completion of earthworks and as such will depend upon earthworks specification and prevailing weather conditions.	Md
	Frost susceptible soils	Frost Heave	Surface damage or alternative design	P 3	M 3	Mn 9	Final floor slabs and road pavement construction thickness design should incorporate this risk.	Mn
Drainage & Flooding	High permeability Strata	Ineffective storm water attenuation ponds/water & ecology features	Ponds need lining if required to retain water.	U	M	Mn	Shallow soils across the majority of the site are anticipated to be cohesive and are likely to retain water. The supplementary ground Investigation has confirmed the geology differential across the site. Cohesive soils cover most areas and are unlikely to be conducive to soakaway SUDS although granular glaciofluvial deposits beneath the till maybe exposed by earthworks in some places and may allow the use of soakaways.	Md
	Low Permeability Strata	Ineffective soakaways	Alternative drainage required	VLk	M	Sb		Md
	High groundwater	Effects planned plateau and cutting levels and foundation designs and in particular cutting depths.	Alternative vertical alignment/plateau levels required affecting cut fill balance feasibility	Lk 4	H 4	Sb 16	The supplementary ground Investigation has confirmed that the site is underlain by low permeability, unproductive strata (Oadby Member and Whitby Mudstone Formation) with localised perched trapped groundwater tables at variable depths. A more continuous groundwater table has been identified to be present at levels of around 75 to 94m AOD within the underlying granular Fluvio Glacial deposits. Trapped semi artesian groundwater is present within the underlying Whitby Mudstone Formation at depth. Drainage will need to be included in cut faces to pick up shallow perched water tables however the deeper groundwater table appears to be below the proposed development platform levels.	Mn
	Embankment earthworks and cutting slopes will require drainage.	Insufficient attenuation soakaways and ponds to accommodate earthworks drainage	Flooding	Lk 4	M 3	Md 12		Mn
	Local watercourse	Flooding	Flood protection required	P 3	H 4	Md 12	The site is not located within an area at risk of flooding, however specialist flood risk assessment and drainage designs will be required.	Md

	Condition	Hazard	Impact	P	I	R	Comment / Mitigation	RR
Temporary Works & Construction Issues	Loose or unstable strata at shallow depth	Excavation Instability	Collapse or support required. Health and safety	P 3	H 4	Md 12	The supplementary ground Investigation has confirmed that where present cohesive soils are stable in the short term, however, where granular Glacial Fluvial deposits are encountered or exposed by earthworks reprofiling and or groundwater is present collapse or even running sand may occur. Should man entry be required suitable support or battering back of excavation sides will be required and atmospheres will need to be tested. Groundwater dewatering may be required where excavations penetrate into granular deposits beneath the continuous water table.	Md
	Hard Strata / obstructions at shallow depth	Hard Digging / Hard driving	Increase cost and delay	U 2	M 3	Mn 6	The supplementary ground Investigation has confirmed the geological model and no hard digging was encountered in the depths and areas of cut. Hard strata in the form of bedrock mudstones, were present at depth within the solid geology but are unlikely to be encountered as part of the major earthworks or foundation excavations.	Mn
	Presence of UNRECORDED sensitive underground services.	Damage during works posing risk to H&S of personnel and public	Increased cost of delay and for unplanned diversions and protection or repair.	U 2	H 4	Mn 8	Vigilance throughout works. Ensure up to date service drawings are obtained and site is scanned before works commence. No unrecorded services identified during the intrusive investigations, land drains are present. However, it is known that land drainage is present across the site.	Mn
	Shallow Groundwater	Inundation of Excavations	Increase cost and delay. Health and safety	P 3	M 3	Mn 9	Shallow localised groundwater tables will be encountered within the Glacial Till where granular pockets are present. A deeper continuous groundwater table appears to be present in the Glaciaofluvial deposits but it is unlikely that excavations and earthworks will breach this.	Mn
	Contaminated Ground	Precautions for Groundworkers	Increase cost and delay. Health and safety	U 2	M 3	Mn 6	Vigilance throughout the works. Seek advice of Environmental Engineer if any identified unusual odourous or visually contaminated materials encountered. The supplementary ground Investigation confirms no significant contamination has been identified across the site.	N
	Contaminated Ground	Increased Disposal Costs	Increase cost and delay. Health and safety	U 2	M 3	Mn 6		

Note: The register only considers geotechnical risk other risks may be present on site, including in-ground risks such as; ecology, archaeology, buried services, UXO etc., which are outside the scope of this assessment.

APPENDIX R

UPDATED CONTAMINATED LAND REGISTER

Contaminated Land Risk Assessment

In accordance with Environment Agency publication CLR 11 ‘*Model Procedures for the Management of Land Contamination*’, a preliminary contaminated land risk assessment has been developed for the Site.

The risk assessment has been carried out using the risk model defined and outlined in the following table.

Potential sources have been identified from the desk study information and the guidance provided in EA publication CLR 8 ‘*Potential Contaminants for the Assessment of Land*’.

Hazard linkages will be determined by the proposed investigation and the risk re-assessed on the basis of the viability of the linkage.

If the hazard linkage is confirmed then remediation or management solutions will be proposed to ensure that no unacceptable risk remains following development.

	Category	Definition
Potential Severity	Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters
	Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures
	Mild	Pollution of non sensitive waters, minor damage to buildings or structures
	Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non sensitive ecosystems or species
Probability of Risk	High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor
	Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term
	Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so
	Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable

		Potential severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Negligible
	Unlikely	Moderate/Low	Low	Negligible	Negligible

Contaminated Land Risk Assessment (Conceptual Site Model)

Source (type and location)	Pathway	Receptor	Initial Assessment from Desk Study Information			Proposed Investigation /Comments	Hazard Linkage	Revised Risk	Proposed Remediation / Management	Residual Risk
			Severity	Prob.	Risk					
Petroleum hydrocarbon compounds (petrol, diesel & oil) and associated volatile organic compounds within shallow soil / groundwater (associated with minor spills and releases associated with neighbouring agricultural fields and current use of the site as motorway junction).	Inhalation of vapour	Site workers	Medium	Unlikely	Low	Ground Investigation was undertaken in areas not previously investigated to inform detailed design and to confirm these assumptions. No Made Ground was identified, or materials thought to be contaminated by visual or olfactory means. A screening spread of samples from the shallow and near surface soils were tested to confirm chemical status of the extended area site and no significant contamination was identified. Groundwater monitoring wells to be installed and where feasible groundwater samples to be taken and testing to confirm existing groundwater quality in areas not previously investigated.	Absent	Negligible	Vigilance to be maintained throughout the earthworks and enabling works. Should any suspicious, unexpected strata, materials or Made Ground materials be identified visually or by means of strange odours the advice of a specialist Geo-environmental Engineer should be sought. The Geo-Environmental advisor shall provide advice on immediate actions and undertake investigation, testing and liaison with regulators and contractors on how to proceed safely.	Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Ingestion and absorption via direct contact	Site workers	Medium	Unlikely	Low		Absent	Negligible		Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Migration by surface run-off	Surface water drainage	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Migration by liquid flow	Surface water drainage	Medium	Unlikely	Low		Absent	Negligible		Negligible
		Aquifer	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Plant uptake	Local flora	Mild	Unlikely	Very Low		Absent	Negligible		Negligible
Toxic & phytotoxic heavy metals and semi metals within natural & made ground soils/ groundwater	Inhalation of fugitive dust	Site workers	Medium	Unlikely	Low	Ground Investigation was undertaken in areas not previously investigated to inform detailed design and to confirm these assumptions. No Made Ground was identified, or materials thought to be contaminated by visual or olfactory means. A screening spread of samples from the shallow and near surface soils were tested to confirm chemical status of the extended area site and no significant contamination was identified. Groundwater monitoring wells to be installed and where feasible groundwater samples to be taken and testing to confirm existing groundwater quality in areas not previously investigated.	Absent	Negligible	Vigilance to be maintained throughout the earthworks and enabling works. Should any suspicious, unexpected strata, materials or Made Ground materials be identified visually or by means of strange odours the advice of a specialist Geo-environmental Engineer should be sought. The Geo-Environmental advisor shall provide advice on immediate actions and undertake investigation, testing and liaison with regulators and contractors on how to proceed safely.	Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Ingestion and absorption via direct contact	Site workers	Medium	Unlikely	Low		Absent	Negligible		Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Migration by surface run-off	Surface water drainage	Medium	Low likelihood	Low		Absent	Negligible		Negligible
	Migration in solution via groundwater	Surface water drainage	Medium	Low likelihood	Low		Absent	Negligible		Negligible
		Aquifer	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Plant uptake	Local flora	Mild	Likely	Low		Absent	Negligible		Negligible

Source (type and location)	Pathway	Receptor	Initial Assessment from Desk Study Information			Proposed Investigation	Hazard Linkage	Revised Risk	Proposed Remediation / Management	Residual Risk
			Severity	Prob.	Risk					
Fly Tipped Material	Ingestion and absorption via direct contact	Site workers	Medium	Low likelihood	Moderate /Low	Site walkover and observations during investigations suggests there is no obvious significant fly tipped materials at the site.	Likely	Moderate Negligible		Negligible
		End users	Medium	Low likelihood	Moderate /Low		Absent			Negligible
Asbestos within Made Ground (associated with the current development of Junction 15 and the aligning embankments)	Inhalation of fugitive dust	Site workers	Medium	Likely	Moderate	<p>Ground Investigation was undertaken in areas not previously investigated to inform detailed design and to confirm these assumptions.</p> <p>No Made Ground was identified, or materials thought to be contaminated by visual or olfactory means. A screening spread of samples from the shallow and near surface soils were tested to confirm if asbestos was present. No asbestos was identified during logging of samples and none was identified in testing.</p>	Absent	Negligible	<p>Vigilance to be maintained throughout the earthworks and enabling works. Should any suspicious, unexpected strata, materials or Made Ground materials be identified visually or by means of strange odours the advice of a specialist Geo-environmental Engineer should be sought. The Geo-Environmental advisor shall provide advice on immediate actions and undertake investigation, testing and liaison with regulators and contractors on how to proceed safely.</p> <p>Demolition and enabling works of derelict farm buildings and gun club to be controlled ensuring that suitable asbestos surveys are undertaken in advance. Any identified asbestos containing materials (ACM) shall be removed and disposed of to a suitably licensed waste disposal facility under suitable H&S notifications and controlled procedures.</p>	Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
Ground Gas from Made Ground and natural strata beneath the site.	Migration in to excavations/ workings	Site workers	Severe	Unlikely	Moderate / Low	<p>Prior to the sites current configuration, the site was Greenfield, with no signs of naturally occurring sources of potential soil gas.</p> <p>The previous investigation relating to the main development site did not indicate any elevated concentrations of ground gases to be present in the natural strata. This was confirmed by this additional ground investigation.</p> <p>It should be noted that cohesive soils would prevent/ limit potential pathways and available information on embankment fill materials, these do not suggest a high gasing potential for made ground soils being primarily natural soil origins with low to negligible organic matter contents.</p>	Absent	Negligible	Construction workers should still ensure that any works that need to be undertaken below ground level or within excavation are treated as confined space works and all normal confined space H&S protocols are adopted including but not limited to atmosphere testing and suitable excavation support.	Negligible
Aggressive substances (sulphates, acids, phenols, petroleum) in Shallow soils / groundwater	Direct contact with construction materials	Buried Structures	Medium	High Likelihood	High	Available data suggests the potential presence of naturally occurring high sulphates levels in deep Whitby Mudstone Formation and also likely to be present in the overlying Oadby Till.	Highly likely	High	Design of in ground concrete will take account of the anticipated ground conditions and available test results to ensure a suitably robust concrete mix design is utilised in accordance with BRE SD1:2005.	Negligible
		Buried Services	Medium	High Likelihood	High	Previous investigations have indicated that elevated concentrations of sulphates exist at the site in shallow soils and this has been confirmed by these works too. Development concrete mix designs to compensate for identified risks.	Highly likely	High		Negligible
Herbicides and Pesticides within shallow soil (associated with the arable fields)	Inhalation of vapour	Site workers	Medium	Unlikely	Low	<p>The fields are identified as being part of a modern arable farm. Modern arable farming should only utilise non persistent biodegradable safe pesticides and herbicides for crop production which are licensed and controlled. However, the use of environmentally persistent pesticides and herbicides may have historically been used in arable farming and as such the presence of widespread soil contamination by older uncontrolled and unlicensed persistent and dangerous herbicides and pesticides is considered possible though is unlikely. Previous ground Investigation testing for the main development site did not reveal any elevated concentrations and nor did investigation and testing of this additional phase of works.</p>	Absent	Negligible	<p>Vigilance to be maintained throughout the earthworks and enabling works. Should any suspicious, unexpected strata, materials or Made Ground materials be identified visually or by means of strange odours the advice of a specialist Geo-environmental Engineer should be sought.</p> <p>The Geo-Environmental advisor shall provide advice on immediate actions and undertake investigation, testing and liaison with regulators and contractors on how to proceed safely.</p>	Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Ingestion and absorption via direct contact	Site workers	Medium	Unlikely	Low		Absent	Negligible		Negligible
		End users	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Migration by surface run-off	Surface water drainage	Medium	Unlikely	Low		Absent	Negligible		Negligible
	Migration by liquid flow	Surface water drainage	Medium	Unlikely	Low		Absent	Negligible		Negligible
		Aquifer	Medium	Unlikely	Low		Absent	Negligible		Negligible
							Absent	Negligible		Negligible

	Plant uptake	Local flora	Medium	Unlikely	Low		Absent	Negligible		Negligible
Ground Gas migration from Wooton Quarry historical landfill adjacent north of the site.	Migration in to excavations	Site workers	Severe	Unlikley	Moderate/ Low	Historical Wooton Quarry landfill noted adjacent north of the site. During the walkover leachate and gas monitoring/ pumping stations were identified to be in operation at the site of the historical landfill to monitor both forms of contaminant.	Absent	Negligible	Construction workers should still ensure that any works that need to be undertaken below ground level or within excavation are treated as confined space works and all normal confined space H&S protocols are adopted including but not limited to atmosphere testing and suitable excavation support.	Negligible
							Absent	Negligible		
	Migration in to development	End Users	Severe	Unlikely	Low	Previous Ground Investigation has been undertaken and 4 monitoring visits to monitor soil gas and groundwater within areas of the main development site. This monitoring confirms that no significant or elevated concentrations of harmful gases are present within the strata beneath the site and this has been confirmed by recent monitoring in this phase of work too.				Negligible

APPENDIX S

HASWASTE

**Envirolab reference**[illegible]



M1 Junction 14; Supplementary Investigation (313582)

TP/WS/BH

Depth (m)

Envirolab reference

WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6	BHA8	TPA3
0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80	1.00	0.10

POPs Dioxins and Furans Input Total Dioxins and Furans
OR individual Dioxin and Furan results.

2,3,7,8-TeCDD	mg/kg								
1,2,3,7,8-PeCDD	mg/kg								
1,2,3,4,7,8-HxCDD	mg/kg								
1,2,3,6,7,8-HxCDD	mg/kg								
1,2,3,7,8,9-HxCDD	mg/kg								
1,2,3,4,6,7,8-HpCDD	mg/kg								
OCDD	mg/kg								
2,3,7,8-TeCDF	mg/kg								
1,2,3,7,8-PeCDF	mg/kg								
2,3,4,7,8-PeCDF	mg/kg								
1,2,3,4,7,8-HxCDF	mg/kg								
1,2,3,6,7,8-HxCDF	mg/kg								
2,3,4,6,7,8-HxCDF	mg/kg								
1,2,3,7,8,9-HxCDF	mg/kg								
1,2,3,4,6,7,8-HpCDF	mg/kg								
1,2,3,4,7,8,9-HpCDF	mg/kg								
OCDF	mg/kg								
Total Dioxins and Furans	mg/kg								

Some Pesticides (POPs unless otherwise stated)

Aldrin	mg/kg	0.050000	0.050000			0.050000			
α Hexachlorocyclohexane (alpha-HCH) (leave empty if total HCH results used)	mg/kg	0.050000	0.050000			0.050000			
β Hexachlorocyclohexane (beta-HCH) (leave empty if total HCH results used)	mg/kg	0.050000	0.050000			0.050000			
α Cis-Chlordane (alpha) OR Total Chlordane	mg/kg								
δ Hexachlorocyclohexane (delta-HCH) (leave empty if total HCH results used)	mg/kg								
Dieldrin	updated v5.4ei mg/kg	0.050000	0.050000			0.050000			
Endrin	mg/kg	0.050000	0.050000			0.050000			
γ Hexachlorocyclohexane (gamma-HCH) (lindane) OR Total HCH	updated v5.4ei mg/kg	0.050000	0.050000			0.050000			
Heptachlor	mg/kg	0.050000	0.050000			0.050000			
Hexachlorobenzene	mg/kg								
o,p'-DDT (leave empty if total DDT results used)	mg/kg								
p,p'-DDT OR Total DDT	updated v5.4ei mg/kg	0.050000	0.050000			0.050000			
γ Trans-Chlordane (gamma) (leave empty if total Chlordane results used)	mg/kg								
Chlordecone (kepone)	mg/kg								
Pentachlorobenzene	mg/kg								
Mirex	mg/kg								
Toxaphene (camphchlor)	mg/kg								
Tin									
Tin (leave empty if Organotin and Tin excl Organotin results used)	mg/kg								
Organotin									
Dibutyltin; DiBT	mg/kg								
Tributyltin; TriBT	mg/kg								
Triphenyltin; TriPT	mg/kg								
Tetrabutyltin; TeBT	mg/kg								
Tin excluding Organotin									
Tin excl Organotin	mg/kg								



Haswaste, developed by Dr. Iain Haslock.

M1 Junction 14; Supplementary Investigation (313582)

TP/WS/BH

Depth (m)

Envirolab reference

Asbestos in Soil

Asbestos detected in Soil (enter Y or N)

Thresholds

Y

Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)

see "Carc HP7 % Asbestos in Soil (Fibres)" below

%

Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)

≥0.1%

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)

Y

WSA1	WSA2	WSA4	WSA5	WSA6	WSA8	BHA6	BHA6	BHA8	TPA3
0.20	0.50	0.40	0.30	0.40	0.50	0.40	0.80	1.00	0.10

NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7

0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You If Asbestos in Soil ab cannot use Asbestos % results when visual identifiable pieces are present.

NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.

All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.

All visual asbes

Hazardous Property	Thresholds	Cut Off Value
Corrosive HP8	≥5%	<1%
Irritant HP4	≥10%	<1%
Irritant HP4	≥20%	<1%
Specific Target Organ Toxicity HP5	≥1%	
Specific Target Organ Toxicity HP5	≥20%	
Specific Target Organ Toxicity HP5	≥1%	
Specific Target Organ Toxicity HP5	≥10%	
Aspiration Toxicity HP5	≥10%	
Acute Toxicity HP6	≥0.1%	≥0.1%
Acute Toxicity HP6	≥0.25%	≥0.1%
Acute Toxicity HP6	≥5%	<0.1%
Acute Toxicity HP6	≥25%	<1%
Acute Toxicity HP6	≥0.25%	<0.1%
Acute Toxicity HP6	≥0.5%	<0.1%
Acute Toxicity HP6	≥1%	<0.1%
Acute Toxicity HP6	≥5%	<1%
Acute Toxicity HP6	≥0.1%	<0.1%
Acute Toxicity HP6	≥0.5%	<0.1%
Acute Toxicity HP6	≥2.5%	<0.1%
Acute Toxicity HP6	≥22.5%	<1%
Carcinogenic HP7	≥0.1%	
Carcinogenic HP7	≥0.1%	
Carcinogenic HP7	≥1%	
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg	
Carcinogenic HP7 b1a/p marker test (Unknown TPH with ID only)	≥0.01%	
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5	
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2	
Toxic for Reproduction HP10	≥0.3%	
Toxic for Reproduction HP10	≥3%	
Mutagenic HP11	≥0.1%	
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg	
Mutagenic HP11 b1a/p marker test (Unknown TPH with ID only)	≥0.01%	
Mutagenic HP11	≥1%	
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg	
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg	
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg	
HP13 Sensitising	≥10%	

0.00822	0.00757	0.00701	0.00704	0.00858	0.00685	0.00534	0.00521	0.00578	0.00671
0.00318	0.00145	0.00512	0.00217	0.00115	0.00138	0.00205	0.00192	0.00249	0.00319
0.00793	0.00566	0.01075	0.00569	0.00508	0.00510	0.00499	0.00499	0.00757	0.00613
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00730	0.00691	0.00667	0.00691	0.00845	0.00672	0.00442	0.00442	0.00586	0.00499
0.00720	0.00160	0.00210	0.00210	0.00200	0.00160	0.00150	0.00160	0.00110	0.10000
0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00095	0.00069	0.00107	0.00015	0.00015	0.00016	0.00094	0.00081	0.00082	0.00173
0.00747	0.00708	0.00609	0.00705	0.00659	0.00689	0.00456	0.00456	0.00513	0.00513
0.01525	0.00737	0.01295	0.00788	0.00716	0.00677	0.00658	0.00667	0.00875	0.10623
0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00003	0.00002
0.00730	0.00692	0.00595	0.00691	0.00845	0.00673	0.00442	0.00442	0.00499	0.00499
0.00001	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
0.00014	0.00014	0.00010	0.00009	0.00009	0.00009	0.00010	0.00009	0.00008	0.00010
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00743	0.00705	0.00607	0.00702	0.00656	0.00681	0.00453	0.00452	0.00510	0.00511
0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014
0.01512	0.00725	0.01284	0.00777	0.00706	0.00669	0.00547	0.00567	0.00566	0.10612
0.00730	0.00691	0.00667	0.00691	0.00845	0.00672	0.00442	0.00442	0.00586	0.10600
0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
0.00001	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
7.52	7.45	7.55	7.00	7.53	7.88	7.71	7.45	8.25	7.75
7.52	7.45	7.55	7.00	7.53	7.88	7.71	7.45	8.25	7.75
0.00720	0.00485	0.00667	0.00364	0.00404	0.00384	0.00384	0.00384	0.00586	0.10000
0.00730	0.00691	0.00595	0.00691	0.00845	0.00672	0.00442	0.00442	0.00499	0.00499
0.00730	0.00691	0.00595	0.00691	0.00845	0.00672	0.00442	0.00442	0.00499	0.00499
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.00566	0.00485	0.00667	0.00364	0.00404	0.00384	0.00384	0.00384	0.00586	0.00465
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.00730	0.00691	0.00667	0.00691	0.00845	0.00672	0.00442	0.00442	0.00586	0.00499

Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%)	0.33535	0.09375	0.11363	0.08896	0.09127	0.08044	0.07700	0.07533	0.08198	0.48156
Ecotoxic HP14	≥25%	<0.1%	0.08384	0.02344	0.02841	0.02225	0.02282	0.02011	0.01925	0.01883	0.02050	0.12039
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%)	0.08385	0.02345	0.02842	0.02226	0.02283	0.02012	0.01926	0.01884	0.02051	0.12040
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenzo(a,h)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%		0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004
Ecotoxic HP14 individual substance specific thresholds (Co, n-HCH, DiBT, TriBT)	≥0.025%		0.00001	0.00001	0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	≥0.005%		0.00000500	0.00000500	0.00000000	0.00000000	0.00000000	0.00000500	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	≥0.00000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	≥0.00000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

If other contaminants need adding to Haswaste, please contact Envirolab.