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APPENDIX 7

ENVIRONMENTAL STATEMENT

GEOLOGY SOILS AND GROUNDWATER

APPENDIX 7.2
RSK GEOTECHNICAL AND GEO-ENVIRONMENTAL GROUND INVESTIGATION PHASE 2

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- NEWPORT PAGNELL -

Full planning application for employment development

GEOTECHNICAL AND GEO-ENVIRONMENTAL GROUND INVESTIGATION

BY RSK

SEGRO

newlands developments

Roxhill Developments Ltd, (Roxhill)

Willen Road, Newport Pagnell

Geotechnical and Geo-environmental ground investigation – Phase 2

313114-02 (01)

JULY 2018

RSK GENERAL NOTES

Project No.: 313114-02 (01)

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CONTENTS

1 INTRODUCTION 7
1.1 Background 7
1.2 Objective 7
1.3 Scope 7
1.4 Existing reports 8
1.5 Limitations 8
2 THE SITE 10
2.1 Site location and description 10
2.2 Proposed development 10
2.3 Initial conceptual model 10
2.3.1 Summary of potential contaminant sources (2015 findings) 11
2.3.2 Sensitive receptors 12
2.3.3 Summary of plausible pathways 12
2.3.4 Potentially complete pollutant linkages 12
3 SITE INVESTIGATION METHODOLOGY 16
3.1 Sampling strategy and methodology 16
3.1.1 Health, safety and environment considerations 16
3.1.2 Investigation locations 16
3.1.3 Soil sampling, in-situ testing and laboratory analysis 18
3.1.4 Groundwater monitoring and levelling 20
3.1.5 Groundwater developing, sampling and analysis 20
3.1.6 Ground gas monitoring 21
3.1.7 In-situ hydraulic conductivity/infiltration testing 21
4 GROUND CONDITIONS 22
4.1 Soil 22
4.1.1 Made Ground – Mixed Fill 24
4.1.2 Made Ground – Organic Clay 25
4.1.3 Made Ground – Overburden Fill 27
4.1.4 Made Ground – Quarry Tailings 29
4.1.5 Made Ground – Other Made Ground 30
4.1.6 Felmersham Member 32
4.1.7 Glacial Deposits 33
4.1.8 Kellaway Formation 34
4.1.9 Peterborough Member 34
4.1.10 Groundwater 36
4.1.11 Results of soakaway testing 39
4.1.12 Visual/olfactory evidence of soil and groundwater contamination 39
4.1.13 Visual/olfactory evidence of the presence of organic matter 39
4.2 Ground gas regime 40
4.3 Refinement of the initial conceptual site model 42
4.3.1 Uncertainty 43

5 QUANTITATIVE RISK ASSESSMENT 44
5.1 Linkages for assessment 44
5.2 Methodology and results 45
5.2.1 Direct contact with impacted soil by future residents 45
5.2.2 Inhalation exposure of future residents to asbestos fibres 45
5.2.3 Impact of organic contaminants on potable water supply pipes 46
5.2.4 Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor 46
5.2.5 Migration of dissolved phase contaminants to wider secondary aquifer body 47
5.2.6 Migration of contaminated groundwater to nearby Tongwell Brook, to the north of the site 47
5.2.7 Ground gas assessment 48
5.3 Environmental assessment conclusions 49
6 GEOTECHNICAL SITE ASSESSMENT 50
6.1 Engineering considerations 50
6.2 Geotechnical hazards 50
6.3 Foundations 52
6.3.1 General suitability 52
6.3.2 Deep spread foundations 54
6.3.3 Piled foundations 56
6.3.4 Foundation works risk assessment 58
6.3.5 Floor slabs 58
6.3.6 Roads, hardstanding and drainage 59
6.3.7 Earthworks 59
6.3.8 Chemical attack on buried concrete 60
6.3.9 Soakaways 61
7 REUSE OF MATERIALS AND WASTE 62
7.1 Reuse of suitable materials 62
7.2 Treatment to meet suitable-for-use criteria 63
7.3 Reuse of waste materials 63
7.4 Wastes for landfill disposal 63
7.4.1 Waste acceptance criteria 64
7.4.2 Waste sampling plan 64
7.4.3 Preliminary waste assessment 64
7.4.4 Asbestos within waste soils 65
7.5 Landfill tax 66
7.6 Groundwater 66
7.7 Recommendations 66
8 CONCLUSIONS AND RECOMMENDATIONS 68
8.1 Environmental 68
8.2 Reuse of materials and waste 68
8.3 Geotechnical 69
BIBLIOGRAPHY 70

TABLES

Table 1: Site setting 10
Table 2: Potential sources and types of contamination 11
Table 3: Risk estimation for potentially complete pollutant linkages 13
Table 4: Exploratory hole and monitoring well location rationale 17
Table 5: Scheduled analysis – soil 19
Table 6: Scheduled analysis – groundwater 21
Table 7: General succession of strata encountered 22
Table 8: Summary of in-situ and laboratory test results for made ground – Mixed Fill 24
Table 9: Summary of in-situ and laboratory test results for made ground – Organic Clay 26
Table 10: Summary of in-situ and laboratory test results for made ground – Overburden Fill 27
Table 11: Summary of in-situ and laboratory test results for made ground – Quarry Tailings 29
Table 12: Summary of in-situ and laboratory test results for other made ground 31
Table 13: Summary of in-situ and laboratory test results for Felmersham member 32
Table 14: Summary of in-situ and laboratory test results for glacial deposits (2015 = red, 2017 = black) 33
Table 15: Summary of in-situ and laboratory test results for Kellaway Formation 34
Table 16: Summary of in-situ and laboratory test results for Peterborough Member 35
Table 17: Groundwater results during investigation (2015 = red, 2017 = black) 36
Table 18: Groundwater monitoring data (2015 = red, 2017 = black) 38
Table 19: Summary of ground gas monitoring results 40
Table 20: Linkages for generic quantitative risk assessment 44
Table 21: Summary of main potential geotechnical hazards that may affect site 50
Table 22: Design and construction of spread foundations 55
Table 23: Design and construction of piled foundations 56
Table 24: Illustration of typical pile working loads for bored cast-in-situ piles 58
Table 25: Results of waste soils characterisation assessment (HASWASTE) 65

FIGURES

Figure 1 Site location plan

Figure 2 Exploratory hole location plan

Figure 3 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	Geotechnical and Geo-environmental ground investigation report (2015)
Appendix F	Exploratory hole records (2015 & 2017)
Appendix G	Ground gas & water monitoring data (2015 & 2017)
Appendix H	Laboratory certificates for soil analysis (2017)
Appendix I	Laboratory certificates for groundwater analysis (2017)
Appendix J	Human health generic assessment criteria
Appendix K	Generic assessment criteria for controlled waters
Appendix L	Generic assessment criteria for potable water supply pipes
Appendix M	Comparison of soil laboratory data to human health GAC
Appendix N	Comparison of water laboratory data to controlled waters GAC
Appendix O	Certificates of geotechnical analysis
Appendix P	RSK waste soils characterisation assessment tool (HASWASTE)

1 INTRODUCTION

RSK Environment Limited (RSK) has been commissioned by Roxhill Developments Ltd (Roxhill) to carry out a geotechnical and geo-environmental ground investigation of the land off Willen Road, Newton Pagnell for a proposed commercial end use. The site in question is being considered for redevelopment for a commercial end use for employment with associated car parking and infrastructure. Areas of soft landscaping are outlined around the development with storm water attenuation ponds proposed. The planned layout of the site is shown on Figure 3.

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

1.1 Background

RSK previously carried out a preliminary stage geotechnical and geo-environmental ground investigation October 2015 (ref: 313114-01 (01), Appendix E. This site investigation and report builds on, and includes the findings of the historical report.

1.2 Objective

The objective of the work is to provide the client with a geotechnical and Geo-environmental ground investigation study.

This investigation has been commissioned in order to obtain and collate information pertaining to the ground conditions beneath the site; from which potential risks to human health and the environment can be assessed, an assessment of the potential waste implications of soil arisings can be made, and outline geotechnical soil parameters can be provided for preliminary design purposes.

1.3 Scope

The scope of the investigation and layout of this report has been designed with consideration of CLR11 (Environment Agency, 2014) and BS 10175: 2013 (BSI, 2013) and guidance on land contamination reports issued by the Environment Agency (EA) (2010a).

The project was carried out to an agreed brief as set out in RSK's proposal (ref: 313114-02 (01), dated 16th March 2017. The scope of works for the assessment included:

- Excavation of up to 38no number trial pits using a wheeled operated excavator to provisional depths of 4.0m and a small number of shallow excavations to examine the makeup of any stockpiles and screening bunds on the periphery of the site.

- Sinking up to 16no windowless sampling boreholes using a tracked drive in rig to provisional depth of 5m.
- Installation of 10no combined groundwater/gas monitoring wells to provisional depths of 5m.
- Sinking up to 8no boreholes to provisional depths of between 12 and 20m using a standard Light Cable Percussive (LCP) drilling rig.
- Installation of 4-6no combined groundwater/gas monitoring wells to provisional depths of up to 20m.
- Two initial return visits to monitor groundwater/gas levels (NB; four visits is now the minimum required for a commercial development by Ciria C665 published 2007).
- One round of water sampling from installations.
- Associated sampling and on site testing including.
- 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 redevelopment
- identification of outline mitigation measures for complete pollutant linkages or recommendations for further work
- interpretation of ground conditions and geotechnical data to provide recommendations with respect to foundation options and infrastructure design
- a factual and interpretative report with recommendations for further works and/or remediation as necessary
- an assessment of the potential waste classification implications of soil arisings.

1.4 Existing reports

RSK previously issued the report 313114-01 (01) on in October 2015 with the findings of the Preliminary risk assessment, initial site investigation and a preliminary geotechnical and geo-environmental ground investigation study, a copy of which, is included within Appendix E.

The initial findings have been summarised in Section 2.

1.5 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, waterlogged, boggy and deep soft ground and ploughed areas restricted access to parts of the site. It has not been possible to investigate these inaccessible

areas. These areas were surrounded on the extremities by other exploratory hole positions. However, this may mean that made ground and natural strata have not been fully defined in these areas and there remains a possibility that made ground containing asbestos or other contaminants might be present in these areas.

In addition, groundwater levels and ground gas concentrations and flows may vary from those reported due to seasonal, or other, effects.

2 THE SITE

2.1 Site location and description

The site is located adjacent and to the east of the M1 motorway, off Willen Road, Newton Pagnell at NGR 487573, 242271, and currently comprises an area of 16 hectares of agricultural land that is bound by post and rail fences and semi-mature shrubs and trees on all sides. The site is predominantly a ploughed field though some mounds of soil are also present on site. An area of made ground is present at the site entrance to aid access on to the site. An area of water-logged ground is present along the north eastern site boundary.

The surrounding land use is a mixture of semi-rural, residential and commercial/light industrial as detailed in Table 1.

Table 1: Site setting

To the north:	A244, with agricultural fields beyond
To the east:	Sand and Gravel quarry with agricultural fields beyond.
To the south:	Agricultural fields with commercial properties beyond.
To the west:	The M1, with commercial and residential properties beyond.

2.2 Proposed development

The site in question is being considered for redevelopment for a commercial end use for employment with associated car parking and infrastructure. Areas of soft landscaping are outlined around the development with storm water attenuation ponds proposed. The planned layout of the site is shown on Figure 3.

2.3 Initial conceptual model

An initial conceptual model was completed as part of the preliminary risk assessment prior to the start of the initial ground investigation in October 2015, Appendix E. All of the complete pollutant linkages were assessed against data collected during the initial ground investigation. The findings of this report found that relevant pollutant linkages were absent and as such risks to end users are unlikely to be present from direct contact with soils.

Due to the variable nature of the made ground across the site all of the pollutant linkages will be reassessed as part of this report.

The following section has broadly been extracted from the report 313114-01 (00) dated October 2015 included as Appendix E. The information presented in Sections 2.3.1 to 2.3.3 of the report, has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The risk classification has been estimated in accordance with information in the report included within Appendix D.

2.3.1 Summary of potential contaminant sources (2015 findings)

Potential sources and contaminants of concern are summarised in Table 2.

Table 2: Potential sources and types of contamination

Potential sources	Contaminants of concern
On-site historical	
Former quarry or pit (2010-2014)	Unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), asbestos etc.). Possible soil gases including methane and carbon dioxide. Oil/fuels from on site transport, PAHs, PCB's, Dioxins & furans, chlorinated aliphatic hydrocarbons and chlorinated aromatic hydrocarbons.
On-site present day	
Made ground (i.e. fill material) known to comprised overburden soils and imported soils comprising 75% 'natural waste' and 25% construction waste	Unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), asbestos etc.) and hazardous ground gases (methane and carbon dioxide)
Off-site	
Various commercial properties/warehouse uses, located beyond the motorway, adjacent to the south west boundary of the site.	Fuel oils, lubricating oils, heavy metals, polychlorinated biphenyls (PCBs), PAHs, solvents and other common industrial contaminants, asbestos,
Made ground associated with construction of the M1 adjacent to the south west of the site.	Fuel oils, lubricating oils, heavy metals, PAHs, propanone, PCBs, ethylene glycol, ash, sulphate, herbicides and asbestos

2.3.2 Sensitive receptors

The following sensitive receptors at this site include:

- future site occupants
- adjacent site users
- potable water supply pipes and buildings
- groundwater beneath the site
- groundwater in vicinity of site

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures including CDM regulations.

2.3.3 Summary of plausible pathways

The plausible pathways are summarised below:

- direct contact (soil, dust and vegetable ingestion, dermal contact, dust and fibre inhalation)
- ground gas and soil gas inhalation
- vertical and lateral migration including leaching
- chemical attack of infrastructure (including water supply pipes) and buildings.

2.3.4 Potentially complete pollutant linkages

The outline conceptual model is an estimate of the risk associated with each linkage is summarised in Table 3. The risk classification has been undertaken in accordance with CIRIA C552 (Rudland et al., 2001), a summary of which is included in Appendix D.

Table 3: Risk estimation for potentially complete pollutant linkages

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
Made Ground associated with backfilling of Quarry on-site 2012-2014.	Future site occupants	Dermal contact, soil ingestion, inhalation of dust/vapours.	Likely	Medium	**Moderate.** Site use and history (i.e. quarry) suggests there is a moderate potential for significant concentrations of contaminants within site soils.
		Ground gas and soil gas migration and explosion or asphyxiation	Low likelihood	Severe	**Moderate.** The quarry appears to have been partially infilled recently with inert fill material, in-situ overburden and fill materials (75% natural site waste, 25% builders waste). As a result, made ground is likely to be present but in accordance with an inert classification should have a low gassing potential
	Adjacent site users (residential and commercial end users)	Ground gas migration and explosion or asphyxiation	Low likelihood	Severe	**Moderate.** The potential for a contamination source is of a low likelihood as the licensed restoration limits filling to the use of inert fill.
	Buildings and infrastructure	Chemical attack	Likely	Mild	**Moderate/Low.** It is considered unlikely that naturally occurring pyritic conditions will be present onsite at shallow depths, however the made ground present may contain aggressive chemical conditions. The deeper underlying Peterborough Member is known to be pyritic strata so any deep in ground concrete will need to be of a suitable mix design.

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
	Portable water supply	Chemical attack	Low likelihood	Medium	**Moderate/Low.** New water supply pipes will be required as part of the development and are likely to be in contact with made ground. The potential for a contamination source is of a low likelihood as the licensed restoration limits filling to the use of inert fill.
	Surface water courses (126m north west and 249m east)	lateral migration including leaching in near surface soils and surface water runoff	Low likelihood	Medium	**Moderate/Low.** While shallow perched groundwater may be encountered at the site, migration of contaminants, if present, to the surface water receptor is considered low due to the distance to the receptors. The potential for a contamination source is of a low likelihood as the licensed restoration limits filling to the use of inert fill.
	Groundwater beneath the site (secondary A and undifferentiated)	Vertical and lateral migration including remobilization and leaching	Low likelihood	Medium	**Moderate/low.** Leaching of contaminants is of a low likelihood as the infill material is meant to be inert. However there is a potential for migration if contaminants are present due to the presence of high permeability sandstones (capable of supporting water supplies at a local scale) across the site.
Industrial/commercial units 50m south west.	Future site occupants	Ground gas and soil gas migration and explosion or asphyxiation	Low	Severe	**Moderate/Low.** The presence of significant made ground below the industrial and commercial site is low, however, should it be present risks to end users via ground gas migration exists.
Notes:					

The potential pollutant linkages with a risk of high to moderate/low that may drive site investigation works are:

1. Direct contact, ingestion and inhalation of contaminated made ground to proposed site users (adults commercial / industrial workers), although potential post development will be low due to hard standing and buildings separating end user from potential source.

2. The accumulation of ground gases generated from made ground and possible tank leakages, as well as off site sources within buildings posing risks to proposed site users,

3. Chemical attack from contaminants in the made ground affecting potable water supply pipes,

4. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor, and

5. Migration of contaminated groundwater to wider groundwater body and nearby groundwater abstractions.

6. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to surface watercourses including Tongwell Brook and the River Ouzel

3 SITE INVESTIGATION METHODOLOGY

RSK carried out intrusive investigation work between 20th March and the 31st March 2017 with subsequent ground gas and groundwater monitoring on 21st April and 26th April to confirm if the potential pollutant linkages identified in the outline conceptual model and to inform geotechnical constraints.

3.1 Sampling strategy and methodology

The techniques adopted for the intrusive investigation were chosen based on the objectives of the investigation, and the anticipated ground conditions on, the basis of the published geology discussed above.

Trial holes were excavated in order to facilitate inspection and logging of the shallow soils to enable the collection of representative samples for laboratory analysis. Selected trial pit locations were selected for soakaway testing.

Deeper window sampler boreholes were undertaken in order to provide information regarding the depth of fill material and undertake in-situ testing and to facilitate the installation of ground gas and groundwater monitoring wells.

Cable percussion boreholes were undertaken in order to provide information regarding the depth of fill material, the composition of strata underlying fill material, to undertake in-situ testing of all strata and to facilitate the installation of ground gas and groundwater monitoring wells

3.1.1 Health, safety and environment considerations

Prior to breaking ground, each exploratory location was surveyed to check for underground services using a Ground Penetrating Radar (GPR), Cable Avoidance Tool (CAT) and corresponding signal generator. Prior to the commencement of drilling activities, inspection pits were also excavated by hand using insulated digging tools, in order to confirm the absence of buried utility apparatus at each of the borehole locations.

3.1.2 Investigation locations

The site work was carried out by RSK between 20th and 31st March 2017, and comprised the activities summarised in Table 4, along with a justification for each exploratory hole location. The investigation and the soil descriptions were carried out in general accordance with BS5930: 2015 - Code of Practice for Ground Investigations. The exploratory hole logs and other site work records are presented in Appendix F.

The locations of the intrusive investigations are shown in Figures 2 & 3. The investigation was designed to provide coverage of strata across the site.

Table 4: Exploratory hole and monitoring well location rationale

Investigation Type	Exploratory hole number	Response zone (m bTOC)	Rationale
Cable Percussion	CP107	NA	Boreholes located across the site to confirm the base of made ground on site and to retrieve samples of the underlying natural strata. Boreholes were undertaken to allow the logging of strata, to obtain in-situ strength information, and to obtain samples for contamination and geotechnical classification.
	CP102 CP103, CP104, CP105, CP106, CP108	7.5 – 9.5 5.0 – 7.0 6.0 – 9.5 6.0 – 8.5 5.0 – 7.0 9.0 – 11.0	Boreholes located across the site to confirm the base of made ground on site and to retrieve samples of the underlying natural strata. Boreholes were undertaken to allow the logging of strata, to obtain in-situ strength information, and to obtain samples for contamination and geotechnical classification. Gas and groundwater monitoring wells were installed at varying depths within the solid strata underlying the made ground.
	CP101	N/A	Borehole not drilled as access to the proposed location could not be reached.
Window Sample borehole	WS101, WS103, WS104, WS108, WS110, WS112, WS113, WS114, WS115, WS116	1 – 4.5, 1 – 6 1 – 3.7 0.60 – 5.0 0.50 – 3.50 1.0 – 5.50 1.50 – 3.50 1.00 – 3.00 0.90 – 3.70 0.80 – 5.00	Boreholes located across the site to confirm the base of made ground on site, where possible, and to retrieve samples of the underlying natural strata. Boreholes were undertaken to allow the logging of strata, to obtain in-situ strength information, and to obtain samples for contamination and geotechnical classification. Gas and groundwater monitoring wells were installed at varying depths within the shallow made ground and superficial strata where encountered.
	WS102, WS105, WS106, WS107, WS109, WS111,	N/A	Borehole not drilled as access to the proposed location could not be reached due to soft water logged ground.

Investigation Type	Exploratory hole number	Response zone (m bTOC)	Rationale
Trial Pit	TP101 – TP110, TP112 – TP138	N/A	Non-targeted assessment to allow logging of strata, in-situ strength testing and to obtain samples for both contamination and geotechnical classification across the site
	TP111	N/A	Trial pit could not be excavated as access to the proposed location could not be reached due to soft water logged ground.
Trial pit (soakaway)	TP138	N/A	Trial pit selected for soakaway tests to determine the soakaway characteristics of the strata underlying the proposed roadways and car parks across the site.

The investigation and the soil descriptions were carried out in general accordance with 'BS 5930:2015 Code of Practice for Ground Investigations' (BSI, 2015). The exploratory hole records are presented in Appendix E.

The investigation points were located by a topographical survey. The ground levels at the borehole locations have been determined using a laser level.

3.1.3 Soil sampling, in-situ testing and laboratory analysis

Samples were taken to characterise variations in made ground and within natural strata to assess the risk to human health and groundwater.

The rationale for soil sample chemical analysis is presented in Table 5, below.

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Table 5: Scheduled analysis – soil

Exploratory hole no. and sample depth (m bgl)	Analyte	Rationale
TP104 - 0.6 TP108 - 0.4 TP108 - 1.4 TP110 - 0.5 TP112 - 0.4 TP113 - 2.6 TP115 - 1 TP120 - 1.2 TP122 - 1.2 TP128 - 0.6 TP131 - 2.5 TP133 - 1.2 TP136 - 0.2 WS110 - 2.2 WS112 - 1.1	• Metals Metals Suite - As Cd tCr, CrVI Pb Hg Se wsB Cu Ni Zn (various Limits) • PAH 16-MS • TPH-CWG (C5-36), BTEX & MTBE • pH • Asbestos Screen • Total Organic Carbon	Testing on a range of samples to classify the variations in made ground and natural strata at varying depths.
TP104 - 0.6 TP108 - 0.4 TP115 - 1 TP120 - 1.2 TP122 - 1.2 WS112 - 1.1	• Leachable metals - As Cd tCr CrVI Cu Ni Pb Zn Hg B Se	Testing on a range of samples to classify variations in made ground for leachable metals at varying depths across to site
WS113 – 0.2 – 1.2 WS113 – 0.2 – 1.0	Asbestos Fibre Screen	Visual ACM identified at 1.10m so testing to confirm quantity of fibrous material within surrounding strata.
Notes:		

Standard penetration tests (SPTs) or Standard penetration (cone) tests (CPTs) were carried out at regular intervals of 1m intervals in window sample holes and at 1m intervals in the top 5m of cable percussion holes and 1.5m intervals thereafter in accordance with part 9 of BS 1377:1990 (BSI, 1990). Where possible in cohesive deposits undisturbed tube samples were collected at varying levels across cable percussion boreholes. Test results are given on the borehole records presented in Appendix F and within the summary table included within that appendix. Disturbed samples were taken from each stratum encountered for subsequent geotechnical analysis.

3.1.4 Groundwater monitoring and levelling

Depths to groundwater were recorded using an electronic dip meter during drilling and during subsequent ground water monitoring visits. The monitoring results are given in Section 4.1.10.

The ground levels of the monitoring wells were established in relation relative to ordnance datum using a GPS to enable groundwater flow direction and a hydraulic gradient to be inferred.

The groundwater monitoring data are given in Appendix G.

3.1.5 Groundwater developing, sampling and analysis

Subsequent to the installation of groundwater monitoring wells the installations were developed at least one week before sampling.

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology. The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

The groundwater samples were collected in a containers appropriate to the anticipated testing suite required. The containers were filled to capacity and placed in a cool box to minimise volatilisation. Samples were transported directly to the testing laboratory under chain of custody documentation. The rationale for groundwater analysis is presented in Table 6, below.

Table 6: Scheduled analysis – groundwater

Exploratory hole	Analyte	Rationale
CP104 - 1.83 WS104 - 1.57 WS103 - 2.05 CP106 - 2.01 CP103 - 1.83 WS108B - 1.04 WS110B - 1.2 CP102 - 1.17	Chloride DOC Calcium Hardness pH Metals As Cd tCr, CrVI Pb Hg Se wsB Cu Ni Zn (various Limits) PAH 16-MS TPH-CWG (C5-36), BTEX & MTBE	Testing on water samples from across the site, from both shallow and deep installations into both natural and made ground strata.
Notes:		

3.1.6 Ground gas monitoring

In line with the conceptual model which indicated made ground as having the potential for gas generation, response zones were installed to target the sources or pathways as detailed in Table 3. Dual gas taps were installed in line with BS8576.

Two monitoring rounds have been undertaken to provide data to support the conceptual model. Both gas monitoring visits were undertaken at atmospheric pressures of over 1000 mbar.

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

The atmospheric pressure before and during monitoring, together with the weather conditions, was recorded. All monitoring results including those from 2015 together with the temporal conditions are contained within Appendix G and discussed in Section 4.2.

3.1.7 In-situ hydraulic conductivity/infiltration testing

A soakaway test was carried out in TP138 to establish the infiltration rate of the Felmersham Member. The tests were carried out generally in accordance with the method described in BRE Digest 365 (BRE, 2016). This involved filling the pits with water from a tanker and recording the drop in water level with time as the water soaked into the ground. Water levels did not drop in the pit over the time of the test (4.5 hours) and therefore, only one fill could be completed during the time. The data are presented in Appendix F.

4 GROUND CONDITIONS

The results of the intrusive 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 in Appendix F with the Chemical Laboratory testing included within Appendix H and Geotechnical Laboratory testing in Appendix O. Stratum descriptions, chemical laboratory testing and geotechnical laboratory testing from the 2015 investigation are also presented below.

4.1 Soil

The exploratory holes revealed that the site is underlain by a variable thickness of made ground over the Felmersham member and Glacial Deposits where present, with the Kellaways Formation and Peterborough Member encountered at depth. This appears to confirm the stratigraphical succession described within the initial conceptual model. For the purpose of discussion, the ground conditions are summarised in Table 7 and the strata discussed in subsequent subsections

Table 7: General succession of strata encountered

Strata	Exploratory holes encountered	Depth to top of stratum (m bgl)	Depth to base of stratum (m bgl)	Thickness (m)
Agricultural Topsoil	All holes except: TP01, TP126, WS05, WS113,	GL	0.10 – 1.20 (Generally 0.30 – 0. 5m)	0.10 – 1.20 (Generally 0.30 – 0.5m)
Made ground (Mixed Fill)	CP102, CP104, CP107, TP01, TP04, TP08, TP101, TP105, TP107, TP108, TP112, TP117, TP120, TP121, TP133 WS02, WS05, WS06, WS101, WS110, WS112, WS113,	GL - 3.60	1.10 – 4.00	0.10 – 2.60
Made ground (Organic Clay)	TP01, TP05, TP06, TP103, TP104, TP106, TP107, TP108, TP110, TP112 – TP115, TP117-TP126, TP129	0.10 – 1.70	1.00 – 3.10	0.50 – 3.10

Strata	Exploratory holes encountered	Depth to top of stratum (m bgl)	Depth to base of stratum (m bgl)	Thickness (m)
	WS02-04, WS06			
Made ground (Overburden Fill)	CP102, CP105, TP02, TP03, TP05, TP101 - TP107, TP109, TP112 - TP116, TP118, TP119, TP120, TP122, TP123, TP124, TP126, TP127, TP128, TP130, TP131, TP134, TP136, TP138 WS01, WS02, WS04, WS05, WS101, WS103, WS110, WS112, WS113, WS116,	0.15 – 3.60	0.50 – 4.20	0.10 – 3.20
Made ground (Possible Quarry Tailings)	CP102, TP04, TP05, TP104, TP108, TP110, TP116, TP119, TP123, TP124, TP130 WS101, WS110, WS112, WS113,	0.50 – 3.50	0.70 – 4.90	0.20 – 2.40
Made ground (Other Made Ground)	TP105, TP110, TP135 WS03, WS04, WS116,	0.50 – 2.90	1.30 – 3.00	0.80 – 1.55
Felmersham Member	CP103, CP104, CP106, TP01, TP03, TP04, TP06, TP07, TP08, TP102, TP103, TP117, TP118, TP127, TP129, TP133, TP137 WS01, WS02, WS04, WS101, WS113, WS115, WS116,	0.20 – 4.20,	1.90 – 4.45	1.90 – 3.50
Glacial Deposits	CP103, CP104, TP02, TP03, TP05, TP106, TP113, TP114, TP117, TP118, TP125, TP126, TP127, TP131, TP132, TP134, TP135, WS01, WS02, WS05, WS06, WS108, WS114, WS115	0.60 (where no made ground) 1.00 - 4.00 where made ground is present above	1.90 – 6.50	0.40 – 3.90
Kellaways	CP105, CP106,	2.90 – 4.90	>3.70 – 7.00	>0.20 –

Strata	Exploratory holes encountered	Depth to top of stratum (m bgl)	Depth to base of stratum (m bgl)	Thickness (m)
Formation	TP106 WS103, WS104, WS108, WS110, WS112,			4.00
Peterborough Member	CP102, CP103, CP104, CP105, CP106, CP107, CP108, TP01, TP04, TP07, TP08, TP101, TP104, TP105, TP115, TP120, TP121, TP123, TP124, TP133, TP134, TP135, TP136 WS03, WS04, WS05, WS116,	1.90 – 7.00	To the base of investigation where encountered (>2.70 – >12.00)	>0.20 – >8.80

4.1.1 Made Ground – Mixed Fill

Comprising generally firm, grey brown or brown, slightly sandy, gravelly clay, with a gravel content of chalk, brick and concrete the stratum was encountered beneath the agricultural topsoil and beneath other layers of made ground from depths of between ground level and 3.60m bgl. The stratum generally extended to depths of between 1.10 and 4.00 and achieved thicknesses of between 0.10m and 2.60m.

From the testing carried out it would appear that this layer has not been engineered. A summary of the in-situ and laboratory test results in this stratum is presented in Table 8 or the in-situ and laboratory test results can be found in Appendix E and O.

Table 8: Summary of in-situ and laboratory test results for made ground – Mixed Fill

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	6	35-50	Appendix E & O
Plasticity limit (%)	6	13-18	
Plasticity index (%)	6	22-32	
% Passing 425 µm	6	59-89	
Modified PI (%)	6	13 – 26.7	
Shrinkage potential	6	Low - Medium	
Plasticity term	6	Intermediate	
Natural Moisture content (%)	6	12-29	

Soil parameters	No.	Range	Reference
Classification			
Strength			
SPT 'N' values	11	2 - 16	Appendix F & E
Undrained shear strength c_u (kN/m^2) from hand shear vane	4	32 - 56	
Density/stiffness term		Very soft to Firm	
Grading			
Particle Size Distribution Cobbles Gravel Sand Silt Clay	2	 0% 34% 29-39% 16-20% 11-17%	Appendix E & O
HA DMRB SHW Series 600 Classification (based upon PSD)	2	Class 2c	
Compaction			
Re-compacted CBR (%)	11	0.0 - 92	Appendix E & O
Initial Moisture Content (%)	2	5.5-17	
Moisture content of test (%)	11	3.6-17	
Re-compacted CBR at natural moisture content (%)	2	2.4 - 69	
4.5kg Hammer Recompaction			
Maximum Dry Density (Mg/m^3)	2	1.90-2.05	
Optimum moisture content (%)	2	9-13	
Natural moisture content (%)	2	14-7.8	
Acceptable Moisture Content Range (%) assuming 95% MDD or above and less than 5% air voids.	2	8.5-18*	Assumed
Note = * indicates two very different compaction result and acceptability moisture content ranges.			

4.1.2 Made Ground – Organic Clay

The 'organic clay' comprised generally soft, or soft to firm, grey brown, mottled black, gravelly, silty clay and very clayey sand often with a strong organic odour and a gravel content of flint, chalk, brick and occasional rotten timber and metal wire. The stratum was encountered below the 'mixed fill' and 'overburden fill' and often has a layer of

mixed fill or overburden fill beneath. The stratum was encountered from depths of between 0.40m and 1.70m bgl with the exception of TP129 where it was encountered beneath the agricultural topsoil at 0.10m bgl. The stratum extends to depths of between 1.00m and 3.10m bgl, achieving a thickness of between 0.50m and 3.10m.

From the testing carried out it would appear that this layer has not been engineered. A summary of the in-situ and laboratory test results in this stratum is presented in Table 9 or the in-situ and laboratory test results can be found in Appendix E and O.

Table 9: Summary of in-situ and laboratory test results for made ground – Organic Clay

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	2	43-48	Appendix O
Plasticity limit (%)	2	17-20	
Plasticity index (%)	2	26-28	
% Passing 425 µm	2	59-68	
Modified PI (%)	2	16.5-17.1	
Shrinkage potential	2	Low	
Plasticity term	2	Intermediate	
Natural Moisture content (%)	2	12-30	
Strength			
SPT 'N' values	2	4	Appendix F & E
Undrained shear strength c_u (kN/m^2) from hand shear vane	27	30 - 138	
Density/stiffness term		Soft - Stiff	
Grading			
Particle Size Distribution Cobbles Gravel Sand Silt Clay	6	 0-17% 20-36% 27-40% 11-27% 9-24%	Appendix E & O
HA DMRB SHW Series 600 Classification (based upon PSD)	6	Class 2c (one Class 1A/B)	

Soil parameters	No.	Range	Reference
Classification			
Compaction			
Re-compacted CBR (%)	25	0.0-93	Appendix E & O
Initial Moisture Content (%)	25	4.6-24	
Moisture content of test (%)	25	4.5 - 42	
Re-compacted CBR at natural moisture content (%)	4	60 - 94	
4.5kg Hammer Recompaction			
Maximum Dry Density (Mg/m^3)	5	1.79-2.04	
Optimum moisture content (%)	5	10-16	
Natural moisture content (%)	5	4.5-11	
Acceptable Moisture Content Range (%) assuming 95% MDD or above and less than 5% air voids.	5	9 - 19	Assumed
Note = * indicates two very different compaction results and acceptability moisture content ranges. One range (3 tests) 14 – 19% and one range (2 tests) 9 – 14%.			

4.1.3 Made Ground – Overburden Fill

'Overburden Fill', representing natural deposits stripped from above the sand and gravel resource and then replaced once extraction had ceased. It comprised orange brown, very clayey, sand and gravel of flint and occasionally quartzite. This unit appeared very mixed with some pockets of gravelly very sandy clay. As such, it should be noted that this unit appears to contain a high fines content.

Overburden fill was encountered below the agricultural topsoil and beneath other layers of made ground from depths of between 0.15 – 3.60m bgl, extending to depths of between 0.50m and 4.20m bgl, achieving a thickness of between 0.10m and 3.20m.

From the testing carried out it would appear that this layer has not been engineered. A summary of the in-situ and laboratory test results in this stratum is presented in Table 8 or the in-situ and laboratory test results can be found in Appendix E and O.

Table 10: Summary of in-situ and laboratory test results for made ground – Overburden Fill

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	5	27-54	Appendix E & O
Plasticity limit (%)	5	12-19	
Plasticity index (%)	5	12-36	

Soil parameters	No.	Range	Reference
Classification			
% Passing 425 µm	5	27-86	
Modified PI (%)	5	4.9-31	
Shrinkage potential	5	Low – Medium	
Plasticity term	5	Intermediate – High	
Natural Moisture content (%)	5	11-44	
Strength			
SPT 'N' values	12	6 - 23	Appendix F & E
Undrained shear strength c_u (kN/m^2) from hand shear vane	18	58 - 98	Appendix F & E
Density/stiffness term		Loose to Medium Dense / Soft to Stiff	Appendix F & E
Grading			
Particle Size Distribution Cobbles Gravel Sand Silt Clay Silt & Clay	12	 0% 1-62% 33-66% 14-26% 10-38% 3 – 15%	Appendix E & O
HA DMRB SHW Series 600 Classification (based upon PSD)	12	Class 2A/B (2 x Class 2C and 1 x Class 1 C and 2 x Class 1A/B)	
Compaction			
Re-compacted CBR (%)	35	0-114	Appendix E & O
Initial Moisture Content (%)	35	2.8-69	
Moisture content of test (%)	35	2.5-43	
Re-compacted CBR at natural moisture content (%)	7	0 - 130	
<u>4.5kg Hammer Recompaction</u>			
Maximum Dry Density (Mg/m^3)	7	1.91-2.13	
Optimum moisture content (%)	7	6-13	
Natural moisture content (%)	7	2.8-18	
Acceptable Moisture Content Range (%) assuming 95% MDD or above and	7	6 – 17.5*	Assumed

Soil parameters	No.	Range	Reference
Classification			
less than 5% air voids.			
Note = * indicates two very different compaction result and acceptability moisture content ranges. Two main ranges depending upon material class one set 6 – 12.5% and one set 10 – 17.5%.			

4.1.4 Made Ground – Quarry Tailings

A stratum comprising what is thought to be consistent with quarry tailings was encountered generally towards the base of the made ground. The stratum comprised very soft, orange brown, silty clay. The stratum was encountered at depths of between 0.50m and 3.50m bgl, extending to depths of between 0.70m and 4.90m bgl, achieving a thickness of between 0.20m and 2.40m.

From the testing carried out it would appear that this layer has not been engineered. A summary of the in-situ and laboratory test results in this stratum is presented Table 11or the in-situ and laboratory test results can be found in Appendix E and O.

Table 11: Summary of in-situ and laboratory test results for made ground – Quarry Tailings

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	4	34-56	Appendix E & O
Plasticity limit (%)	4	13-20	
Plasticity index (%)	4	21-36	
% Passing 425 µm	4	62-92	
Modified PI (%)	4	13-32	
Shrinkage potential	4	Low to High	
Plasticity term	4	Low to Intermediate	
Natural Moisture content (%)	4	17-46	
Strength			
SPT 'N' values	7	0 - 8	Appendix F & E
Undrained shear strength c_u (kN/m^2)	5	0 - 10	
Density/stiffness term		Very Soft to Soft	
Grading			
Particle Size Distribution Cobbles Gravel Sand	2	 0% 1-12% 11-27%	Appendix E & O

Soil parameters	No.	Range	Reference
Classification			
Silt Clay		35-45% 26-43%	
HA DMRB SHW Series 600 Classification (based upon PSD)	2	Class 2A/B and Class 2D	
Compaction			
Re-compacted CBR (%)	10	3.2-126	Appendix E & O
Initial Moisture Content (%)	10	8.9-20	
Moisture content of test (%)	10	4.2-20	
Re-compacted CBR at natural moisture content (%)	2	50 - 70	
4.5kg Hammer Recompaction			
Maximum Dry Density (Mg/m^3)	2	1.83-1.95	
Optimum moisture content (%)	2	12-15	
Natural moisture content (%)	2	11-13	
Acceptable Moisture Content Range (%) assuming 95% MDD or above and less than 5% air voids.	2	11 – 18.5	Assumed

4.1.5 Made Ground – Other Made Ground

In addition to the above variable made ground was encountered in the form of:

- Loose, dark grey, gravelly sand, with gravel of subangular, fine sized chalk;
- Firm dark grey silty clay;
- Cream white silty clayey gravel with gravel of chalk;
- Red brown clayey gravelly sand with gravel of quartzite and flint.

This made ground was not found to be extensive across site and has therefore been classified within one group. 'Other made ground' was encountered at depths of between 0.50m and 2.90m bgl. Additionally, a possible made ground stratum of orange brown sand and gravel of subrounded fine to medium flint encountered at depths of between 2.70m and 4.00m bgl in WS04, just north of the centre of the site.

From the testing carried out it would appear that this layer has not been engineered. A summary of the in-situ and laboratory test results in this stratum is presented in Table 12 or the in-situ and laboratory test results can be found in Appendix E and O.

Table 12: Summary of in-situ and laboratory test results for other made ground

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	1	61	Appendix E & O
Plasticity limit (%)	1	22	
Plasticity index (%)	1	39	
% Passing 425 µm	1	89	
Modified PI (%)	1	34.7	
Shrinkage potential	1	Medium	
Plasticity term	1	High	
Natural Moisture content (%)	1	31	
Strength			
SPT 'N' values	1	9	Appendix F & E
Undrained shear strength c_u (kN/m^2)	-	-	
Density/stiffness term		Soft to Firm	Appendix F & E
Grading			
Particle Size Distribution Cobbles Gravel Sand Silt Clay	2	 0% 34-38% 22-36% 15-28% 11-16%	Appendix E & O
HA DMRB SHW Series 600 Classification (based upon PSD)	2	Class 2c	
Compaction			
Re-compacted CBR (%)	5	5.6-110	Appendix E & O
Initial Moisture Content (%)	5	10-21	
Moisture content of test (%)	5	10-22	
Re-compacted CBR at natural moisture content (%)	1	84	
4.5kg Hammer Recompaction			
Maximum Dry Density (Mg/m^3)	1	1.75	
Optimum moisture content (%)	1	16	
Natural moisture content (%)	1	10	
Acceptable Moistrue Content Range	1	16.5 - 21	Assumed

Soil parameters	No.	Range	Reference
Classification			
(%) assuming 95% MDD or above and less than 5% air voids.			

4.1.6 Felmersham Member

The Felmersham Member was encountered at depths of between 1.10m and 4.20m bgl where made ground is present above the stratum achieving a thickness of 0.10 – 2.20m. Where there is no made ground cover on the Felmersham member it was encountered at depths of between 0.20 and 1.20m bgl (achieving a thickness of 1.90 – 3.50m). The stratum was found to be thickest near the edges of the site, and thinnest, or not present near to the centre. The stratum typically comprised very loose to medium dense, orange brown, occasionally clayey, sand and gravel of fine to medium sized flint.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 13 and The in-situ and laboratory test results can be found in Appendix F and O.

Table 13: Summary of in-situ and laboratory test results for Felmersham member

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	2	34-32	Appendix E & O
Plasticity limit (%)	2	15	
Plasticity index (%)	2	17-19	
% Passing 425 µm	2	40-86	
Modified PI (%)	2	7.6-14.6	
Shrinkage potential	2	Low	
Plasticity term	2	Intermediate	
Natural Moisture content (%)	2	12-24	
Strength			
SPT 'N' Values	17	N=2 – 50 for 247mm	Appendix F & E
Undrained shear strength c_u (kN/m^2)	4	32 - 56	
Density Term		Very loose to dense	
Grading			
Particle Size Distribution Cobbles Gravel	3	 0% 9-47%	Appendix E & O

Soil parameters	No.	Range	Reference
Classification			
Sand Silt Clay		31-51% 7-31% 7-25%	
HA DMRB SHW Series 600 Classification (based upon PSD)	3	Class 2A/B x 2 Class 1B x 1	

4.1.7 Glacial Deposits

Glacial Deposits were noted within the wider vicinity of the site in all directions. Glacial Deposits appear to have been encountered on the site below made ground and Felmersham Member sand and gravels at depths of between 1.00m and 4.00m bgl. Where made ground was not present above the stratum it was encountered at a depth of 0.60m. The stratum extended to depths of between 1.90m and 6.50m bgl, achieving a thickness of between greater than 0.10m where the base was not encountered and between 1.50 and 3.90m where the base was encountered.

The stratum generally comprised stiff, dark grey, slightly gravelly, slightly sandy, silty clay, with a gravelly content of fine to medium sized chalk

A summary of the in-situ and laboratory test results in this stratum is presented in Table 14 and The in-situ and laboratory test results can be found in Appendix E and O.

Table 14: Summary of in-situ and laboratory test results for glacial deposits (2015 = red, 2017 = black)

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	7	21-48	Appendix E & O
Plasticity limit (%)	7	12-19	
Plasticity index (%)	7	9-29	
% Passing 425 µm	7	51-96	
Modified PI (%)	7	7.1-25	
Shrinkage potential	7	Low to Medium	
Plasticity term	7	Low to Intermediate	
Natural Moisture content (%)	7	11-21	
Strength			
SPT 'N' values	13	N =7 to N= 59	Appendix F & E

Soil parameters	No.	Range	Reference
Classification			
Undrained shear strength c_u (kN/m^2)		39 to 150	
Density/stiffness term		Soft to very stiff	

4.1.8 Kellaway Formation

The Kellaway Formation was encountered at a depth of between 2.90m and 4.90m bgl to depths of between 3.70m and 7.00m bgl. The Kellaway Formation was encountered sporadically across the site beneath the made ground and superficial deposits. Where the base of the stratum was encountered it was found to achieve thicknesses of 4.00m bgl. The stratum is comprised of a soft to very stiff dark grey slightly sandy silty clay and a blue grey clayey sand.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 15 or the in-situ and laboratory test results can be found in Appendix E and P.

Table 15: Summary of in-situ and laboratory test results for Kellaway Formation

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	5	37-68	Appendix E & O
Plasticity limit (%)	5	14-25	
Plasticity index (%)	5	23-47	
% Passing 425 µm	5	95-100	
Modified PI (%)	5	21.9-47	
Shrinkage potential	5	Medium to High	
Plasticity term	5	Intermediate to High	
Natural Moisture content (%)	5	16-32	
Strength			
SPT 'N' values	15	11 - 41	Appendix F
Undrained shear strength c_u (kN/m^2)	-	-	
Stiffness term		Firm to very stiff	

4.1.9 Peterborough Member

The Peterborough Member was encountered below the made ground and superficial deposits, at depths of between 1.90m and 7.00m bgl. The Peterborough Member was encountered across the site in all cable percussion boreholes and in select trial pits and

window samples where the made ground and superficial cover were thin enough to be penetrated.

Where encountered, it was present to the base of exploratory holes at depths of between 2.70m and 12.00m bgl, achieving a thickness of at least 8.80m. The stratum was encountered at its shallowest in the north east corner of the site, and comprised a firm to very dark grey silty clay with occasional bands of mudstone.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 16 or the in-situ and laboratory test results can be found in Appendix E and P.

Table 16: Summary of in-situ and laboratory test results for Peterborough Member

Soil parameters	No.	Range	Reference
Classification			
Liquid limit (%)	10	38-70	Appendix E & O
Plasticity limit (%)	10	14-27	
Plasticity index (%)	10	22-48	
% Passing 425 µm	10	74-100	
Modified PI (%)	10	18.5-48	
Shrinkage potential	10	Low to High	
Plasticity term	10	Intermediate	
Natural Moisture content (%)	10	16-28	
Strength			
SPT 'N' values	15	N=11 to N=47	Appendix F
Undrained shear strength c_u (kN/m^2) from hand shear vane	36	58 to 120	Appendix E & F
Density/stiffness term		Firm to very stiff	Appendix E & F
Undrained shear strength measured by QU SS triaxial testing (kN/m^2)	1	106	Appendix O
Bulk Density (Mg/m^3)	1	2.09	Appendix O
Dry Density (Mg/m^3)	1	1.78	Appendix O
Natural Moisture Content at test (%)	1	18	Appendix O
Settlement Properties			
Coefficient of Consolidation C_v (m^2/Yr) at Overburden pressures *Taken from testing at or close to existing overburden pressures*	3	3.7 - 19	Appendix O
Coefficient of compressibility M_v (m^2/MN)	3	0.11 – 0.17	Appendix O

Soil parameters	No.	Range	Reference
Classification			
Taken from testing at or close to overburden pressures			

4.1.10 Groundwater

Groundwater was encountered during the investigation as detailed in Table 17.

Table 17: Groundwater results during investigation (2015 = red, 2017 = black)

BH/TP	Stratum	Strike (m bgl)	Depth Risen To (m bgl)
WS01	Made ground (overburden fill)	1.60	n/a
WS02	Made ground (mixed fill)	2.50	n/a
WS03	Made ground (other)	2.90	n/a
TP01	Made ground (organic clay)	0.90	Seepage
TP04	Made ground (washout material)	2.10	Low flow
TP05	Made ground (washout material)	2.70	Low flow
TP07	Felmersham Member	2.80	Low flow
CP102	Peterborough Member	6.00	5.70
CP103	Glacial Deposits / Felmersham Member	3.70	3.00
CP104	Glacial Deposits	3.50	3.30
CP105	Overburden Fill	1.10	Seepage
CP105	Kellaway Formation	6.90	5.70
CP106	Felmersham Member	2.10	1.90
CP107	Peterborough Member	6.10	5.80
CP108	Peterborough Member	11.50	11.0
WS101	Made ground (quarry tailings)	1.80	n/a
WS103	Felmersham Member	1.50	n/a
WS104	Felmersham Member	1.10	Seepage
WS110	Made ground (Mixed Fill)	1.10	Seepage
WS112	Made ground (Mixed Fill)	2.30	Seepage
WS113	Made ground (Overburden Fill)	1.60	n/a
WS114	Glacial Deposits	1.20	n/a
WS115	Felmersham Member	2.70	n/a
WS116	Made ground (Overburden Fill)	1.50	Seepage

BH/TP	Stratum	Strike (m bgl)	Depth Risen To (m bgl)
TP101	Topsoil / Made ground (Overburden Fill)	0.50	Seepage
TP103	Topsoil / Made ground (Overburden Fill)	0.35	Seepage
TP103	Made ground (Organic Clay)	2.60	n/a
TP104	Made ground (Overburden Fill)	0.50	Seepage
TP104	Peterborough Member	3.90	n/a
TP110	Topsoil / Made grand (quarry tailings)	0.60	Seepage
TP110	Made ground (Organic Clay)	1.70	n/a
TP112	Made ground (Organic Clay)	0.50	Seepage
TP112	Made ground (Organic Clay / Mixed Fill)	1.90	Seepage
TP114	Topsoil / Made ground (Organic Clay)	0.50	Seepage
TP114	Made ground (Overburden Fill)	2.80	Seepage
TP114	Glacial Deposits	3.80	Seepage
TP115	Made ground (Organic Clay / Mixed Fill)	2.10	Seepage
TP119	Made ground (Overburden Fill)	0.50	Seepage
TP119	Made grand (Organic Clay)	2.20	Seepage
TP124	Topsoil / Made ground (Overburden Fill)	0.50	Seepage
TP124	Made ground (Organic Clay)	1.50	Seepage
TP126	Made ground (Overburden Fill)	1.00	Seepage
TP126	Made ground (Organic Clay / Overburden Fill)	2.60	Seepage
TP131	Made ground (Organic Clay)	1.70	Seepage
TP131	Made ground (Organic Clay/Overburden Fill)	3.60	Seepage
TP133	Made ground (Mixed Fill)	2.20	Seepage
TP134	Topsoil / Made ground (Overburden Fill)	0.50	Seepage
TP134	Made ground (Overburden Fill)	1.60	Seepage
TP135	Topsoil / Made ground (Other Mixed ground)	0.55	Seepage
TP137	Felmersham Member	1.10	Seepage

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations and local drainage conditions which might be impacted by the quarry dewatering operations ongoing to the east. Ongoing monitoring would be required to establish both the full range of conditions and any trends in groundwater levels.

The results of the subsequent groundwater monitoring and well surveying exercise are summarised in Table 18.

Table 18: Groundwater monitoring data (2015 = red, 2017 = black)

Monitoring well	Response zone (m bgl)	Stratum	TOC elevation (m AOD)	Depth to water (m bgl)	Depth to water (m AOD)
WS01	1.0-3.0	MG (OF) & FM	61.39	1.42-1.43	59.97-59.96
WS02	1.0-3.0	MG (OF/OC/M)	60.70	1.62-1.65	59.08-59.05
WS04	1.0-3.0	MG (OF/OC/O)	59.28	0.78-0.90	58.50-58.38
WS05	2.0-3.0	PM	58.07	2.24-2.29	55.83-55.78
BH A (s)	Unknown, base at 2.39		59.70	1.84-1.86	57.86-57.84
BH A (d)	Unknown, base at 9.53		59.70	1.85-1.87	57.85-57.83
BH B (s)	Unknown, base at 1.66		61.13	0.89-1.14	60.24-59.99
BH B (d)	Unknown, base at 3.29		61.13	2.15-2.23	58.98-58.90
CP102	7.5 – 9.5	PM	59.858	0.49 – 0.71	59.37-59.15
CP103	5.0 – 7.0	GLD / PM	60	1.28 – 1.32	58.72-58.68
CP104	6.0 – 9.5	GLD / PM	60.574	1.29 – 1.42	59.28-59.15
CP105	6.0 – 8.5	KF / PM	59.425	1.44 – 2.09	57.99-57.34
CP106	5.0 – 7.0	KF / PM	58.752	1.34 – 1.58	57.41-57.17
CP108	9.0 – 11.0	PM	61.157	1.37 – 1.67	59.79-59.49
WS101	1.0 – 4.5	MF / QT / OF / FM	59.867	1.76 – 1.81	58.11-58.06
WS103	1.0 – 6.0	FM / KF	58.873	1.52 – 1.53	57.35-57.34
WS104	1.0 – 3.7	FM / KF	58.471	1.06 – 1.08	57.41-57.39
WS108	0.6 – 5.0	FM / GLD	60.183	0.53 – 0.55	59.65-59.63
WS110	0.5 – 3.5	MF / QT	59.529	0.67 – 0.70	58.86-58.83
WS112	1.0 – 5.5	MF / QT	60.283	0.93 – 0.97	59.35-59.31
WS113	1.5 – 3.5	OF / QT / FM	61.535	1.77 – 1.82	59.77-59.72
WS114	1.0 – 3.0	GLD	62.877	1.57 -1.62	61.31-61.26
WS115	0.9 – 3.7	FM	62.335	1.43 – 1.5	60.91-60.84
WS116	0.8 – 5.0	OF / OMG / FM /PM	58.942	1.02 – 1.06	57.92-57.88
Notes: MG = made ground, OF = overburden fill, OC = organic clay, M = mixed, O = other FM = Felmersham Member, PM = Peterborough Member, (s) = shallow, (d) = deep BH A & B discovered on site installed by others historically.					

The findings reflect the general groundwater table at shallow levels across the site and appears to be in continuity within the made ground and surrounding natural strata. Ground water was encountered at an elevation of between 57m AOD in the north of the site and 60m AOD in the south of the site. While groundwater appears closest to surface

(~0.50m bgl) in the centre of the site and deeper around the perimeter of the site (~1.50m bgl), reference to its position relative to AOD indicates the groundwater gradient drops towards the north, suggesting groundwater flow is in this direction.

4.1.11 Results of soakaway testing

One soakaway test was carried out in TP138 in clayey silty sand and gravel deposits of the Felmersham member. There was no change in water level throughout the 4.5 hours of the test and therefore an infiltration rate could not be calculated. The results of the soakaway test can be found in Appendix F.

4.1.12 Visual/olfactory evidence of soil and groundwater contamination

No significant visual or olfactory evidence of hydrocarbons or other organic contamination has been identified.

4.1.13 Visual/olfactory evidence of the presence of organic matter

The majority of visual and olfactory indicators of the presence of rotting organic matter were encountered in the mixed fill and organic clay fractions of the made ground present on the site. The organic clay generally had a strong organic (rotten) odour and was found to contain organic matter comprising rotting wood and vegetation. Whilst occasionally an organic odour was noted within the mixed fill (TP01 at 0.90m bgl). It is possible that this relates to filling and placement of mixed overburden and topsoil (possibly stripped from site at commencement of quarrying) or / and organic matter build up in stagnant old wash out ponds or imported fills.

Black mottling and some possible clinker was also noted within made ground across the site. The following boreholes were noted to either contain an organic odour, black mottling or metal debris within the made ground.

Exploratory Position	Depth encountered from (m bgl)	Depth encountered to (m bgl)	Comments
WS04	1.30	2.70	Organic odour
WS02	1.40	2.00	Organic odour
WS03	0.90	2.90	Organic odour
WS06	1.70	3.00	With metallic inclusions and an organic odour
TP103	1.10	3.10	Organic odour
TP104	0.50	2.60	Organic odour

Exploratory Position	Depth encountered from (m bgl)	Depth encountered to (m bgl)	Comments
TP105	0.40	1.60	With clasts of bituminous hardstanding
TP107	0.82	2.40	With metallic inclusions
TP110	1.30	2.90	With black mottling
TP114	0.50	2.80	Organic odour
TP117	1.20	2.90	Organic odour
TP120	1.10	3.20	Organic odour
TP121	1.80	2.90	Organic odour
TP124	0.70	2.40	Very black and with metallic inclusions
TP129	1.10	2.80	Black staining and an organic odour
TP131	0.50	3.60	Organic odour

4.2 Ground gas regime

The results of the ground gas monitoring and testing carried out are given in Appendix G. The minimum and maximum results are recorded in Table 19.

Table 19: Summary of ground gas monitoring results

Borehole	Response zone/strata	Response strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow rate (l/hr)	Water level (m b TOC)	Atmospheric pressure (mbar)
CP102	7.5 – 9.5	PM	N/A	2	0.0	0.3 – 1.7	19.7 – 20.9	-0.3 – 0.1	0.89 – 1.11	1010 – 1025
CP103	5.0 – 7.0	GD / PM	N/A	2	0.0	0.3 – 0.6	20.4 – 20.8	<0.1 – 0.1	1.71 – 1.75	1010 – 1025
CP104	6.0 – 9.5	GD / PM	N/A	2	0.0	0.2 – 0.6	19.7 – 20.7	<0.1 – 0.1	1.70 – 1.83	1010 – 1025

Borehole	Response zone/strata	Response strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow rate (l/hr)	Water level (m b TOC)	Atmospheric pressure (mbar)
CP105	6.0 – 8.5	KF / PM	N/A	2	0.0	0.2 – 0.7	20.5 – 20.7	<0.1 - 3.1	1.84 – 2.49	1010 – 1025
CP106	5.0 – 7.0	KF / PM	N/A	2	0.0	0.5 – 0.6	19.9 – 20.4	<0.1 – 0.1	1.75 – 1.99	1010 – 1025
CP108	9.0 – 11.0	PM	N/A	2	0.0	0.2 – 0.3	20.4 – 20.7	<0.1 – 0.8	1.74 – 2.04	1010 – 1025
WS101	1.0 – 4.5	MF / QT / OF / FM	MG	2	0.0	3.1 – 3.4	16.0 – 18.7	<0.1 – 0.1	2.23 – 2.28	1010 – 1025
WS103	1.0 – 6.0	FM / KF	N/A	2	0.0	0.9 – 1.3	19.3 – 20.1	0.1 – 0.1	2.02 – 2.03	1010 – 1025
WS104	1.0 – 3.7	FM / KF	N/A	2	0.0	1.0 – 1.0	20.2 – 20.6	0.1 – 0.1	1.55 – 1.57	1010 - 1025
WS108	0.6 – 5.0	FM / GD	N/A	2	0.0 – 0.0	1.2 – 2.0	19.8 – 20.6	-0.3 – 0.5	0.97 – 0.99	1010 - 1025
WS110	0.5 – 3.5	MF / QT	MG	2	0.0	2.9 – 4.6	16.4 – 19.8	<0.1 – 0.1	1.10 – 1.13	1010 - 1025
WS112	1.0 – 5.5	MF / QT	MG	2	0.0	0.9 – 1.0	19.9 – 20.5	-0.3 – 0.3	1.40 – 1.44	1010 - 1025
WS113	1.5 – 3.5	OF / QT / FM	MG	2	0.0	0.3 – 0.5	20.6 – 20.8	0.1 – 0.1	2.22 – 2.27	1010 - 1025
WS114	1.0 – 3.0	GLD	N/A	2	0.0	2.4 – 2.9	17.4 – 19.4	0.1 – 0.1	2.01 – 2.06	1010 - 1025
WS115	0.9 – 3.7	FM	N/A	2	0.0	2.0 – 2.2	15.8 – 18.8	0.1 – 0.1	1.85 – 1.92	1010 - 1025
WS116	0.8 – 5.0	OF / OMG / FM /PM	MG	2	0.0	2.1 – 2.5	17.1 – 19.1	0.0 – 0.1	1.44 – 1.48	1010 - 1025

Note: *MF –Mixed Fill, OC – Organic Clay, OF – Overburden Fill, QT – Possible Quarry Tailings, OMG – Other Made Ground. GD – Glacial Deposits, FM – Felmersham Member, PM – Peterborough Member*

Steady state gas concentrations and flows are presented in this table.

Slightly elevated concentrations of carbon dioxide were noted in the majority of holes installed at the site. In addition, low flow rates were noted with all boreholes below 0.6 l/hr with a maximum of 3.1 l/hr CP105. It should be noted that monitoring has only been undertaken during periods of high and steady pressures (1010 and 1025 mbar). Based on the monitoring to date, including frequency and temporal conditions at the time of monitoring, it is not thought sufficient to determine a worst-case scenario for the site, for which additional monitoring, ideally during periods of low and / or falling atmospheric pressure would be required.

The above monitoring results are consistent with those undertaken as part of the previous phase of site investigation, the report for which is present in Appendix E. Two initial monitoring visits of four newly installed boreholes (WS01, 02, 04, 05) and four historic monitoring wells (BHAs, BHAd, BHBs, BHBd). This monitoring identified maximum flows of 0.3 l/hr, methane concentrations of <0.1% and carbon dioxide concentrations ranging between <0.1% and 3.6%, and were undertaken during pressures of 1005mbar and 1025mbar.

Installations within CP102 – CP108 and WS112 all have saturated response zones. Given that the highest flow rate falls within a saturated borehole (CP105) this could artificially lower the flow rates and gas levels detected during the monitoring.

4.3 Refinement of the initial conceptual site model

The preliminary investigation has generally confirmed the anticipated ground conditions as set out in the preliminary conceptual model.

The site is underlain by several types of made ground that have been placed in order to backfill the former quarry. Below the made ground some Felmersham Member deposits still remain, which are in turn underlain by Glacial Deposits. Below the Glacial Deposits are the silty clays of the Peterborough Member.

Several exploratory holes have been undertaken on the edges of the site due to surface conditions being too poor and a number of these have indicated that no Made Ground is present this being a result of being located beyond the boundary extents of the quarrying carried out. It should be appreciated that variable depths of quarrying has taken place and reference to periodic satellite photographs appears to indicate that the quarrying operations worked around the site sequentially in cells with wash out tailing ponds and excavations with areas of competent land between these areas where plant roads and washing pant was sited so this may also explain differences within certain areas inside the main area of the site.

Sources of limited potential for contamination and ground gases have been identified, comprising organic backfill material which includes brick, wood and metals which has been placed at the site in variable thicknesses.

Groundwater has been encountered within all strata across the site generally being present at around 57m AOD in the north of the site and 60m AOD in the southwest of the site. While groundwater appears closest to surface (~0.50m bgl) in the centre of the site and deeper around the perimeter of the site (~1.50m bgl), reference to its position relative to AOD indicates the groundwater gradient drops towards the north, suggesting groundwater flow is in this direction. The following pollutant linkages are thought to be present on site and will be assessed individually in Section 5.

1. Direct contact, ingestion and inhalation of contaminated made ground (in proposed soft landscaping) to proposed site users (adults commercial / industrial workers),

2. Inhalation of asbestos fibres from made ground (in proposed soft landscaping) to proposed site users (adults commercial / industrial workers),

3. Chemical attack from contaminants in the made ground affecting potable water supply pipes and buildings,

4. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor, and

5. Migration of contaminated groundwater to wider groundwater body and nearby groundwater abstractions.

6. Migration of contaminated groundwater to nearby Tongwell Brook, to the north of the site.

7. The accumulation of ground gases generated from made ground and possible tank leakages, as well as off site sources within buildings posing risks to proposed site users

4.3.1 Uncertainty

It should be noted that as part of this site investigation, only two rounds of ground gas monitoring have been undertaken to supplement past work done in 2015. This typically would not be sufficient to robustly assess the worst case ground gas regime for the site. In addition, during the monitoring events of both investigations, atmospheric pressure was high and steady. It is anticipated that further rounds of monitoring at lower and preferably falling atmospheric pressures will need to be undertaken to confidently confirm the ground gas regime.

An operational quarry is present to the east of Willen Road. This quarry is likely to have been dewatered as part of the operations. This could affect the groundwater table on the site which may rebound once operations have finished to the east of Willen Road.

Waterlogged, boggy and deep soft ground and ploughed areas restricted access to parts of the site. It has not been possible to investigate these inaccessible areas. These areas were surrounded on the extremities by other exploratory hole positions. However, this may mean that made ground and natural strata have not been fully defined in these areas and there remains a possibility that made ground containing asbestos or other contaminants might be present in these areas.

5 QUANTITATIVE RISK ASSESSMENT

In line with CLR11 (EA, 2004), 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.

5.1 Linkages for assessment

Section 4.3 presents the refined conceptual model which identified the linkages that required assessment after the findings of the site investigation had been considered. These linkages together with the method of assessment are presented in Table 20.

Table 20: Linkages for generic quantitative risk assessment

Potentially relevant pollutant linkage	Assessment method
1. Direct contact with impacted soil by future residents	Human health GAC in Appendix J for a proposed commercial end use with areas of soft landscaping. Statistical analysis undertaken owing to majority of sampling locations being non-targeted and made ground of similar composition.
2. Inhalation exposure of future residents to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
3. Contaminants permeating potable water supply pipes	Comparison of soil data to GAC in Appendix L for plastic water supply pipes using UKWIR (2010) guidance.
4. Leaching of soil contaminants and dissolved phase migration to the Secondary A aquifer of the Felmersham Member below the site and nearby surface water receptor	Comparison of soil and soil leachate data to Table 1 of Appendix K for a Secondary aquifer and river owing to linkages identified to the Secondary A aquifer within Felmersham Member and the freshwater receptor 126m north east of the site.
5. Migration of contaminated groundwater to wider groundwater body and nearby groundwater abstractions	Comparison of groundwater data to GAC in Table 1 of Appendix N for secondary aquifer
6. Migration of contaminated groundwater to nearby Tongwell Brook, to the north of the site	Comparison of groundwater data to GAC in Table 1 of Appendix N for secondary aquifer
7. Concentrations of methane and carbon dioxide in ground	Gas screening values (GSV) have been calculated using maximum methane and carbon dioxide concentrations with

Potentially relevant pollutant linkage	Assessment method
gas entering and accumulating in: depressions and excavations that could affect workers enclosed spaces or small rooms in new buildings, which could affect future residents. In the case of methane this could create a potentially explosive atmosphere, while death by asphyxiation could result from carbon dioxide.	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 al., 2007) owing to the development comprising buildings with a ground floor slab or the generic Traffic Lights, as presented within the NHBC ground gases guide (Boyle and Witherington, 2007) and the aforementioned CIRIA report C665, owing to the development comprising low-rise housing with suspended floors. In addition, the gas regime is considered within the context of a conceptual model as required by both aforementioned guidance documents and BS8576
Notes:	

5.2 Methodology and results

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

5.2.1 Direct contact with impacted soil by future residents

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 1.0%. The direct comparison table, which presents the chemical laboratory data set compared against the appropriate GAC, is included within Appendix M.

All samples are below the GAC and the results of the assessment indicate the strata encountered are suitable for a commercial end use.

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 within the areas investigated. It should however be noted that the made ground is variable and should, during the development of the site, contamination be encountered, further investigation may be required.

5.2.2 Inhalation exposure of future residents to asbestos fibres

Laboratory screening of a soil sample from TP110 at 0.50m identified chrysotile asbestos fibres. These samples were then further analysed and the presence of fibres of chrysotile was confirmed, with a maximum of 0.01% by weight present. Given that asbestos fibres have been identified in a single location only, and that they have been

identified at trace concentrations, risks to end users from the inhalation of asbestos fibres is considered negligible.

A possible asbestos containing fragment of tile was noted and sampled in the field from WS113 at a depth of 1.00 – 1.20m bgl. This sample was sent for laboratory asbestos identification and was found to not contain asbestos. An additional soil sample was screened for the presence of asbestos from WS113 at 0.20 - 1.00m bgl. Screening of this sample returned no asbestos fibres.

5.2.3 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 pollutant 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.

5.2.4 Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor

Leachable contaminants were analysed in six soils samples from across the site at between 0.40 and 1.20m bgl of variable made ground. None of these samples exceeded the UK drinking water standards GACs. An initial assessment of data suggested that some samples may exceed the freshwater EQS GACs for the site. However, the mBat tool was used to calculate a site specific freshwater EQS for the site and none of the samples analysed exceeded the site specific GACs.

Based upon the available testing results the made ground present and tested does not appear to form a potential source for the leaching of contaminants. This is in line with the quarry restoration requirements for the use of inert fills and is therefore the Made Ground is not considered a risk to future site users and the site it suitable for the proposed development in this context. It should however be noted that the made ground is variable and should, during the development of the site, contamination be encountered, further investigation may be required.

5.2.5 Migration of dissolved phase contaminants to wider secondary aquifer body

The analytical results show that the concentrations of all determinants are below their respective GAC for UK/EC drinking water standards with the exception of dissolved boron in groundwater samples from CP102.

This indicates that pollutant linkages associated with contaminants in the dissolved phase in relation to UK drinking water standards are unlikely to be present on site with the exception of boron. The concentration of boron within CP102 (1050µg/l) have been recorded above the screening value (1000µg/l), however the exceedance is considered marginal. When considered alongside the relatively low concentrations of water soluble boron within soils at the site, the risk presented by boron in the dissolved phase to controlled waters is considered negligible.

A single elevated concentration of chloride has been identified in groundwater from CP103 (674mg/l), which exceeds the screening value (250mg/l). While this exceedance has been identified, concentrations across the rest of the site are significantly lower (maximum 133mg/l). When this is considered alongside the fact that the site is not located within a groundwater source protection zone, and no recorded potable water abstractions are located within 2km of the site, the identified chloride is not considered to present a risk to controlled waters.

During the initial site investigation, undertaken in 2015 groundwater could not be obtained from WS04 or WS05 due to the very low rate of recharge after purging, and testing was not undertaken on groundwater within the existing boreholes at the site as the position of the well screen and as such the origin of the groundwater could not be confirmed. Historic boreholes have not been re-sampled as part of this phase of works.

5.2.6 Migration of contaminated groundwater to nearby Tongwell Brook, to the north of the site

The analytical results show that the concentrations of both zinc and nickel exceed the respective GAC for Freshwater environmental quality standards (EQS).

The Mbat tool has been used to calculate site specific Freshwater EQS GACs. When the most appropriate GAC for the whole site was applied to zinc there were two exceedances (CP104 at 67µg/l and WS103 at 49µg/l) over the GAC (35.22µg/l), noted as detailed in Appendix N.

Although exceedances of zinc are noted in groundwater beneath the site, elevated levels of zinc are not identified in soil or soil leachate testing undertaken at the site, in addition the Tongwell Brook is located 126m northwest of the site and as such, some natural attenuation of contaminants will occur during migration. Therefore, it is considered that as there is no significant source of available zinc to leach into groundwater, and the concentrations identified are not consistently high, thus the risks to the Tongwell Brook are considered low to negligible.

5.2.7 Ground gas assessment

The results have been assessed in accordance with the guidance provided in BS8576, NHBC guidance and *CIRIA Report C665*. In the assessment of risks and selection of appropriate mitigation measures, both reports highlight the importance of the conceptual model.

CIRIA C665 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.

The site is to be redeveloped with a regional distribution centre (RDC) and therefore falls under Situation A. Situation A relates to all development types except low-rise housing and, by combining the qualitative assessment of risk (see refined conceptual model in Section 5.3) 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 commercial buildings and therefore falls under Situation A.

The combined 2015 and 2017 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 3.1 l/hr has been recorded.

The calculated GSV using both 2015 and 217 monitoring date for methane is 0.0031 l/hr and the GSV for carbon dioxide is 0.1426 l/hr. Based on the GSVs the site has been characterised as CS1.

For both types of development, CIRIA C665 provides details of the typical scope of protective measures to be adopted for the relevant site characterisation.

It should be noted that for low risk sites (Characteristic Situation 1/2), CIRIA C665 recommends a minimum thickness of gas resistant membrane of 2000 gauge, as C665

considers that the standard unreinforced 1200 gauge membrane/DPM is unlikely to survive the construction process intact.

The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation has not established the 'worst-case' scenario and therefore further monitoring is required to characterise adequately the ground gas regime. The worst-case scenario has not been determined as monitoring has only been undertaken during periods of high pressure, and a number of boreholes installed have saturated response zones. The majority of boreholes that have saturated zones fall within natural deposits, whilst the majority of response zones within the made ground are not saturated.

It is recommended that further monitoring should be carried out to enable the confident assessment of risk and subsequent design of an appropriate gas protection scheme(s) for the proposed development.

5.3 Environmental assessment conclusions

With respect to human health, the results of the GQRA indicate that relevant pollutant linkages are absent and as such risks to end users are unlikely to be present, associated with direct contact with soils at the site. Given that asbestos fibres have been identified in a single location only, and that they have been identified at trace concentrations, risks to end users from the inhalation of asbestos fibres is considered negligible. As asbestos containing material has been identified during the investigation site workers should remain vigilant during any earthworks or groundworks and aware of the potential for ACM to be present.

Based on available monitoring data, groundwater is considered to flow north, towards the Tongwell Brook, which is located 126m north of the site. Testing of soil leachate and groundwater has not indicated the presence of any significant concentrations of contaminants and that the risks to controlled waters presented by the site are considered low to negligible.

Based on the GSVs the site has been characterised as CS1. The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation may not have established the 'worst-case' scenario and therefore further monitoring is required to adequately characterise the long-term ground gas regime.

6 GEOTECHNICAL SITE ASSESSMENT

6.1 Engineering considerations

It is understood that the proposed development is to involve the construction of commercial premises for employment purposes including associated access roads, car parking and storm water attenuation ponds. The proposed layout is included in Figure 3. At this stage no specific information relating to building loads has been provided and therefore column loads of up to 1000kN have been considered along with a ground floor loading of 50kN/m^2.

6.2 Geotechnical hazards

A summary of commonly occurring geotechnical hazards is given in Table 21 together with an assessment of whether the site may be affected by each of the stated hazards.

Table 21: Summary of main potential geotechnical hazards that may affect site

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	✓			Variable depths and composition of made ground present beneath the site. This will impact upon foundation depths and solutions and it is likely that ground improvement will be required to allow construction of a ground bearing floor slab and external loading bays, car parks and access roads.
Shrinkable clay soils	✓			Cohesive soils identified as variably low to high volume change potential. Design of shallow foundations and floors shall need to take account potential volume change of soils.
Highly compressible and low bearing capacity soils, (including peat and soft clay)	✓			The presence of variable Made Ground including very soft and soft silty clay deposits (washout material) and organic deposits will affect foundation design and construction and ground improvement is likely to be required to facilitate construction of ground bearing floor slabs, external loading bays, car parks and access roads.
Silt-rich soils susceptible to rapid loss of strength in wet conditions	✓			The presence of very silty clay deposits (tailings material) will affect ground improvement and foundation design and construction

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Running sand at and below water table		✓	None identified during the investigation but it is anticipated that deep excavations into sand and gravels and fill materials, particularly below perched groundwater tables could result in running sands and instability.	
Karstic dissolution features (including 'swallow holes' in Chalk terrain)			✓	Geology beneath the site not affected.
Evaporite dissolution features and/or subsidence			✓	Geology beneath the site not affected.
Ground subject to or at risk from landslides			✓	Current topography and geology beneath the site does not suggest susceptibility to slope instability is present, the site being fairly flat.
Ground subject to peri-glacial valley cambering with gulls possibly present			✓	Current topography and geology beneath the site does not suggest susceptibility
Ground subject to or at risk from coastal or river erosion			✓	Topography does not suggest any significant risks.
High groundwater table (including waterlogged ground)	✓	Shallow perched water identified during both investigations (2015 and 2017). The 2015 investigation was undertaken during prolonged dry spell but perched water was still present. Will affect temporary and permanent works.		
Rising groundwater table due to diminishing abstraction in urban area			✓	Unlikely to affect site due to depth to fact that the area is not urban and is unlikely that significant abstraction has been undertaken in the past.
Variable Groundwater Table		✓	It is likely that the site has a shallow perched water table, which is in continuity with the surrounding areas, however, this may be affected partly by any abstractions taking place in the quarry adjacent to this site and a change in water table might occur in the future.	
Underground mining			✓	No underground mining will have taken place at the site.

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Quarries	✓	Site was a former sand and gravel quarry and has been subsequently partially infilled and restored. Land to the north of the Willen Road is an active quarry.		
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)			✓	The site is a former quarry, backfilled with overburden and imported soils, as such, underground structures are unlikely to be present or affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	✓	The site is a backfilled former quarry, therefore, this will affect ground engineering and foundation design and construction as mixed fill is present to varying depths across the site.		
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)	✓	Adverse ground chemistry relating to the presence of sulphides/sulphates within made ground which will impact on the type of concrete used on the site.		
Poor surface conditions	✓	Deep and variable depths of topsoil have been identified across the site and the site had been extensively cultivated with deep ploughing having taken place (circa 0.5-0.8m depth) resulting is very soft and saturated areas which were not trafficable at the time of investigation. This could affect construction and ground improvement works. The extent of the issues is likely to depend greatly upon prevailing weather conditions.		
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.				

6.3 Foundations

6.3.1 General suitability

The exploratory holes revealed that the site is underlain by a variable thickness of made ground comprising various types of backfill over remaining thin deposits of the Felmersham Member sand and gravel (where present), Glacial Deposits and the Kellaway Formation, with Peterborough Member encountered at depth.

Given the presence of made ground of variable strength and depth, and generally thin localised bands of remaining Felmersham Member sand and gravel, any foundations would have to be taken down through any Made Ground and into the competent natural clay soils of the Glacial Deposits or the Kellaways Formation and Peterborough Member.

The natural strata of the Glacial Deposits, Kellaways Formation, and Peterborough Members were encountered at depths of between 1.0m and 4.90m bgl, but generally below 3.0m bgl, although they were found to be shallower in the north east of the site.

Foundations would need to be deepened and be taken down through the Made Ground to varying depths of between 1.00 and 4.90bgl into suitable strength strata. In doing this there are numerous practical considerations, which, would constrain and may potentially preclude the use of a traditional deepened spread foundation including:

- Instability is anticipated to occur when excavating to depth through uncompacted and unconsolidated fill materials, therefore it is likely that shoring would be required.

- Groundwater influx can be anticipated and this could cause instability and softening of the founding stratum prior to casting. Therefore it may be necessary to install cut off sheet piling or /and undertake dewatering to facilitate foundation construction. There would of course also be the issue of treating and disposing of the groundwater under licence.

- Disposal of significant volumes of arisings.

Therefore, when considering the above issues, it is anticipated that the use of traditional deepened spread foundations may not be economic, thus it is anticipated that a piled solution will need to be considered for structural foundations.

When considering floor slabs suspended floors acting upon the foundations can be considered for smaller spans but tend not to be economic for larger spans due to the loads carried. Therefore for larger floor plan areas and spans ground bearing floor slabs supported upon ground improvement are the only real option. When taking into account the variable depths of uncompacted and unconsolidated fill present it is clear that ground improvement or piling of the variable made ground beneath the larger span floor slabs would be necessary to support the slab and reduce the risks of differential settlement and bearing capacity failure from occurring.

Options for ground improvement which might be considered include:

- Dynamic compaction

- High Energy Impact Compaction

- Vibro replacement stone columns

- Ex-situ, excavate, stabilise/modification and recompaction exercise. stabilisation through

- Insitu soil mixing of near surface made ground deepened where required down to suitable strength natural deposits.

- Compaction and surcharge.

The use of Dynamic Compaction or High Energy Impact Compaction could be precluded by the presence of soft and wet silts and clays, which have been identified within exploratory holes and appear to relate to the extensive tailing settlement ponds that were present. The clays and organic made ground are unlikely to improve with compaction alone due to high moisture contents and the silts could liquefy under vibration compaction so this calls into question whether the use of this technique would be effective.

The use of vibro replacement stone columns may also be precluded by the presence of the soft and wet silts and clays and local organic matter present within the buried tailings ponds and any buried organic matter as these deposits would not be improved by vertical vibration and could therefore result in significant stone takes potentially making this uneconomic or unfeasible. However, the information within this report should be sent to specialist contractors to confirm if this technique would be feasible.

Given the presence of saturated silts and clay fill and shallow perched water tables, it is anticipated that the volumes of cement or lime additives that would be needed to create improvement by means of insitu soil mixing techniques or ex-situ excavate, treat and recompaction techniques, are likely to make these options uneconomic. In addition, the presence of the shallow groundwater table would limit the practical depths of excavation, treat and recompaction techniques. Stabilisation techniques affecting the Peterborough Member clays may also result in heave as lime is known to react with the naturally occurring high concentrations of sulphates, which are known to be present within these deposits.

For a surcharging solution it would be necessary to import a significant volume of overburden, place it and compact it in place and then monitor the settlement until it has reduced to a suitable level. It would then be necessary to remove the overburden from site. This would be costly and could take a significant duration.

Therefore, at this stage, based upon the information available it is suggested that ground bearing floor slabs would need to be supported on piles or would require a combination of shallow excavate treat and compaction and surcharging to make them viable and avoid differential settlement risks.

6.3.2 Deep spread foundations

As detailed above the shallow ground conditions are likely to result in instability and the presence of shallow groundwater tables which will affect the viability of temporary works necessary to allow deep foundations to be dug to the depths necessary to allow

formation on to suitable bearing stratum. Therefore, unless dewatering or and land lowering is proposed it is considered unlikely that deep foundations will be economic.

However, outline recommendations for the design and construction of deep spread foundations in relation to the ground conditions are set out below in Table 22.

Table 22: Design and construction of spread foundations

<table>
<tr><th>Design/construction considerations</th><th>Design/construction recommendations</th></tr>
<tr><td>Founding stratum</td><td>Firm to Stiff clay of Glacial Deposits or Peterborough Member Clays (SPT N >14 or Cu = 60kPa).</td></tr>
<tr><td>Depth</td><td>Foundations should be taken through any made ground and remaining Felmersham Member and into the stiff dark grey clays of the Glacial Deposits and/or Peterborough Member.

It is anticipated that foundation depths could vary between 1.0m and 4.30m bgl, but generally below 3.0m bgl, although these deposits appear to be present at shallower depths in the north east of the site.

Foundations should extend at least 0.1m into the founding stratum below any overlying made ground or to any greater depth required in respect of the special design considerations given below.</td></tr>
<tr><td>Special design considerations</td><td>Owing to the presence of shrinkable clay soils, foundations should be designed taking into account all the normal precautions, including minimum founding depths, to minimise the risk of future foundation movements in accordance with NHBC standards or similar.

Minimum depths based upon clay shrinkability (Low to High) would be 1.00m bgl where ground is not within the zone of influence of existing or proposed trees or hedges.</td></tr>
<tr><td>Bearing capacity</td><td>Pad foundations formed on to firm to stiff Glacial Deposits or firm to stiff Peterborough Member (SPT N >13 or Cu>60kPa) at depths of 4m below existing ground levels, with groundwater at 1.5m bgl would be anticipated to provide the following;

<table>
<tr><th>Pad Foundation Width (m)</th><th>Net Allowable Bearing Capacity (kN/m^2)</th><th>Net Allowable Capacity (kN)</th></tr>
<tr><td>1.00</td><td>114</td><td>114</td></tr>
<tr><td>1.50</td><td>114</td><td>258</td></tr>
<tr><td>2.00</td><td>114</td><td>458</td></tr>
<tr><td>2.50</td><td>114</td><td>716</td></tr>
<tr><td>3.00</td><td>109</td><td>977</td></tr>
<tr><td>4.00</td><td>81</td><td>1302</td></tr>
<tr><td>5.00</td><td>65</td><td>1628</td></tr>
</table>
The allowable bearing capacity includes an overall safety factor of 3 against bearing capacity failure and with total settlements associated with the bearing pressure estimated to be less than 25mm.</td></tr>
</table>

Design/construction considerations	Design/construction recommendations
Stability of excavations	In the event that excavations are to remain open for long periods and when considering the fact that the fill is not compacted and consolidated and that there is a potential for perched groundwater tables to be encountered it is very likely that the large pad or long strip foundation excavations would not retain their integrity and stability particularly where deeper foundations excavations are to be employed down to depths of around 4m bgl. Therefore consideration should be given to the use of trench support systems or battering and stepping back of trench and pad excavations.
Dewatering	Perched groundwater was generally encountered within the made ground and Felmersham Member sands and gravels sitting upon the less permeable clays of the Glacial Deposits and Peterborough Member clays. This groundwater has caused localised softening within the top of the underlying clays extending to about 1m into the clays. As such, perched groundwater ingress into open excavations extending down into the underlying firm to stiff clay (Glacial Deposits or Peterborough Member) are very likely to occur and should be avoided as it will cause softening and degradation of the founding soils, Dewatering or sheet piling may therefore be required to facilitate foundation excavation and construction. The nature of the soils encountered suggests that pumping from open sumps should be sufficient to keep the excavations reasonably dry, however, sheet piling or box shoring, may also be required to reduce groundwater ingress and maintain stability Pumping from open sumps in non-cohesive soils should be avoided as this can result in instability and general loosening of the soils at the base of the excavation. It is likely that dewatering in non-cohesive soils will require the use of well-pointing systems. Should mass ground improvement techniques such as soil mixing stabilisation be utilised the need for dewatering may not be required as these techniques would be expected to improve stability and strength of mixed soils and reduce permeability. Therefore foundations maybe dug through such treated horizons or if sufficient improvement provided, formed within stabilised and treated strata.
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete.

6.3.3 Piled foundations

Recommendations for the design and construction of pile foundations in relation to the ground conditions are set out in Table 23.

Table 23: Design and construction of piled foundations

Design/construction considerations	Design/construction recommendations

Design/construction considerations	Design/construction recommendations	
Pile type	The construction of both bored and driven piles is considered technically feasible at this site	
Possible constraints on choice of pile type	None other than ground conditions.	
Temporary casing	Allowance should be made for temporary casing to extend the boreholes through any potentially unstable made ground. Alternatively, the use of continuous-flight-auger (CFA) injected bored piles usually overcomes this issue.	
Man-made obstructions	No significant obstructions identified.	
Hard strata	An allowance should be made for chiselling to form rock sockets within the Peterborough Member and for the presence of thin 'rock' bands (claystone, sandstone).	
Pile design parameters for made ground	The contribution of the made ground (4m) has been ignored in the calculation of shaft friction.	
Pile design parameters for Peterborough Member	Pile design parameter	CFA
	Undrained shear strength c_u (kN/m^2)	110 @4mbgl, increasing to 300 @12.5mbgl, 300 below this.
	Adhesion factor α	0.50 to 12.5mbgl, 0.40 thereafter
	End bearing capacity factor	9
General parameters	Limiting concrete stress (N/mm^2)	8.75
	Limiting shaft friction (kN/m^2)	110
	Global margin of safety	3.0
Special precautions relating to bored pile shafts and bases	Bored pile concrete should be cast as soon after completion of boring as possible and in any event the same day as boring. Prior to casting the base of the pile bore should be clean, otherwise a reduced safe working load will be required. Similarly, if the pile bore is left open the shaft walls may relax/soften, leading to a reduced safe working load.	

The design procedure for piles varies considerably, depending on the proposed type of pile. However, for illustrative purposes Table 24 gives likely working pile loads for traditional bored, cast-in-situ concrete piles of various diameters and lengths, based on the design parameters given in Table 23. For preliminary purposes, the soil profile encountered at CP108 has been adopted.

Table 24: Illustration of typical pile working loads for bored cast-in-situ piles

Typical pile working loads (kN)			
Depth of pile below existing ground level (m)	Pile diameter		
	350mm	450mm	600mm
10.00	262	363	536
11.00	309	426	624
12.00	356	488	712
13.00	399	545	791
14.00	440	597	860
15.00	480	649	929
Notes:			

It should be stressed that the above capacities do not take into consideration pile group effects which is more pronounced for a large number of closely spaced piles.

Notwithstanding the above, a specialist piling contractor should be contacted at an early stage for their advice on the most suitable pile type and capacity for the soils encountered at this site.

6.3.4 Foundation works risk assessment

It is anticipated that a foundation works risk assessment report will not be required for the development because no significant free-phase product was identified at the site, and concentrations of chemicals of potential concern (COPC) within made ground, natural soils and groundwater were typically below corresponding GAC

6.3.5 Floor slabs

It is assumed that the design loading for the proposed ground floor slabs is 50kN/m^2.

The sub-grade soil conditions beneath the footprint of the proposed buildings comprise very soft to firm or loose variable made ground. As such, it is not possible to recommend a ground bearing floor slab could be adopted without some ground improvement.

Therefore, ground-bearing floor slabs can only be adopted if the formation is first treated by a ground improvement techniques or piling.

At this stage, based upon the information available and for the reasons outlined above in section 6.3.1 it is suggested that ground bearing floor slabs would need to be supported on piles.

6.3.6 Roads, hardstanding and drainage

In the 1m to 1.5m below the proposed finished ground level the exploratory holes have revealed a soil profile comprising very soft to firm and loose, variable made ground with Glacial Deposits and deposits of the Felmersham Member towards the perimeter of the site.

In pavement design terms, the groundwater conditions are anticipated to comprise an intermediate water table, i.e. between 300mm and 1000mm of the pavement formation level, based on current site levels.

The variability of the near surface deposits and the presence of extremely soft deep ploughed saturated soils suggests very low CBR is currently available as demonstrated by the fact that drilling rigs and tracked excavators could not get to all locations on the site. The CBR will of course vary significantly with prevailing weather conditions. However, for the purposes of design an existing CBR of <1% should be assumed.

The presence of extensive deep made ground across the majority of the site will require ground improvement within all highway, parking and loading bay areas,

Laboratory testing in the form of re-compacted California bearing ratio (CBR) testing suggests that CBR's ranging between 0 – 94% could be achieved at the existing moisture contents in the various strata present between ground level and 2.8m bgl. These results have been undertaken upon non standard sample tests due to the size of particles present and this probably explains some of the higher CBR results attained.

The sub-grade soils at the site may be susceptible to improvement by rolling with conventional compaction plant or potentially the High Energy Impact Compaction rollers across the access highways, car parking and service yards, however as detailed above in section 6.3.1 it is uncertain whether this would be very affective, particularly at depth due to the high groundwater table and variability in the soils present.

Indeed it is likely that deeper and more robust forms of treatment will be required in the service yards and particularly at the loading/docking bay interface with the buildings and therefore more robust forms of ground improvement or improvements to greater depths might be needed in these areas such as vibro replacement, soil mixing or even soil stabilisation.

The sub-grade soils can be regarded as frost-susceptible, based upon the criteria given in Appendix 1 of TRRL (1970) Report Road Note 29. When the sub-grade is frost-susceptible the thickness of sub-base must be sufficient to give a total thickness of non-frost-susceptible pavement construction over the soil of not less than 450mm.

6.3.7 Earthworks

A series of soil classification, compaction and recompacted CBR tests have been undertaken upon the various near surface strata encountered across the site to characterise these soils. The classification in terms of earthworks materials are included

in the tables in Section 4.1 on ground conditions. The data indicates that the made ground materials are very mixed although taken as a whole are generally wet stoney cohesive soils. The compaction tests indicate quite a range of moisture contents that would in theory enable these materials to be recompacted to greater than 95% of maximum dry density and less than 5% air voids although the ranges fall in to two broad ranges: 6 -12% and 11 – 20% and this seems to relate as you would expect to the class and grading of the materials. The as received natural moisture contents are on the whole slightly dry of the optimum range although several are wetter, than optimum so that suggests that they might be suitable for recompaction provide the moisture content could be adequately controlled and managed, recompacted CBR tests carried out on the compaction points also tend to suggest that high CBR can be achieved if soils are recompacted at suitable moisture contents.

6.3.8 Chemical attack on buried concrete

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 brownfield development / site where disturbance of pyrite-bearing ground could result in additional sulphate. An extended suite of chemical analyses appropriate to this site classification was carried out on soil samples.

“Characteristic value” is the average of the highest 20% of results. The maximum water-soluble sulphate content in soil of 0.938g/l has been taken as the characteristic value. As this value is below the limiting value of 3.0g/l consideration of magnesium is not required. Based on Table C1 and C2 in the BRE guidance, Result one for Design Sulphate Class for the site is DS-2.

Although for the purposes of this assessment the site has been classified as brownfield, the pH is nowhere less than the limiting value of 5.5. The third assessment of Design Sulphate Class specific to brownfield sites is therefore not required in this case.

Because of the possible presence of sulphides in both the made ground and underlying natural strata a calculation was made using the measured concentrations of Total Sulphur and Acid Soluble Sulphate of the amount of Oxidisable Sulphide present. A maximum Oxidisable Sulphide content of 8.77% was calculated. Since this value is greater than 0.3% oxidisable sulphide, a Total Potential Sulphate concentration of 8.91% (three times the Total Sulphur content) has been calculated. Based on this value, result three for Design Sulphate Class for the site is DS-5.

Based on (reasoning) it has been assumed that groundwater conditions are mobile based on the granular content of made ground. Beware “static” class for poorly backfilled foundation excavations in pyritic clay, which subsequently fill with water. From consideration of the characteristic pH value, an Aggressive Chemical Environment for Concrete classification of AC-5 May be assumed for design purposes.

6.3.9 Soakaways

Based upon the results of the soakaway tests presented in Section 4.1.11 above the ground conditions do not appear suitable from a geotechnical viewpoint for the use of pit soakaways to discharge surface run-off water. At this stage only one soakaway test has been undertaken in TP138 in deposits of the Felmersham Member and this proved unsuccessful. It is unlikely that borehole soakaways into the Peterborough Member will be a suitable alternative on this site.

7 REUSE OF MATERIALS AND WASTE

7.1 Reuse of suitable materials

Under the Waste Framework Directive naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development.

In accordance with the definition provided in the Waste Framework Directive, materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Thus, soils that are not of clean and natural origin, i.e. made ground (whether contaminated or not) and other materials such as recycled aggregate, do not become waste until the aforementioned criteria are met.

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current re-use scenarios covered by the CoP comprise:

- Re-use on the site of origin (with or without treatment)
- Direct transfer of clean and natural soils between sites
- Use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed Soil Treatment Facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not currently permitted under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or re-used in line with the CoP. The MMP is likely to form part of the site waste management plan.

The site has been developed previously and the investigation has confirmed the presence of made ground. Therefore, before any excavation works begin on-site, an MMP will need to be prepared, reviewed by a QP; and a Declaration lodged with the EA.

As noted above, under the Waste Framework Directive naturally occurring soils are not considered waste and therefore arisings of clean natural soils, e.g. from foundation and drainage excavations, may be re-used on the site. However, it is important that these soils should be stockpiled separately and not become cross-contaminated with made ground / contaminated soils or construction wastes.

If it is proposed to import clean and naturally occurring soils direct from another site, the receiving site's MMP would need to be updated in advance of importation.

7.2 Treatment to meet suitable-for-use criteria

Where materials do not meet the suitable for use criteria it may be possible to treat them under an environmental permit (mobile treatment licence) to enable them to be reused onsite.

To enable the treatment options to be determined, an options appraisal and a remediation strategy document will be necessary to support discussion of the issues with regulators and third parties.

7.3 Reuse of waste materials

If material is discarded as waste then its reuse on site may still be possible. Waste soils and recycled aggregate can be reused on site under a standard rules environmental permit or a U1 waste exemption from the Environmental Permitting (England and Wales) Regulations 2010 provided that they are suitable for the proposed use, i.e. not cause harm to human health or the environment. However, it should be noted that these have strict limits on the quantity of material that can be reused.

7.4 Wastes for landfill disposal

Wastes require pre-treatment prior to disposal at landfill. Pre-treatment must be a physical, thermal, chemical or biological process (including sorting) that changes the characteristics of the waste to reduce its volume, reduce its hazardous nature, facilitate its handling and enhance its recovery.

The latest, edition of the EA's 'Technical Guidance WM3' (2015) Guidance on the classification and assessment of waste, requires that within a mixed waste* the separately identifiable wastes are assessed separately. Mixing of different types of

hazardous waste and hazardous waste with other waste substances is prohibited under the Waste Framework Directive. Wastes that have been mixed must be separated whenever possible.

It is best practice to provide your waste carrier (or the disposal site) with details of how the waste has been treated. Your waste carrier may provide a pre-treatment confirmation form or space on the waste transfer note to detail the pre-treatment.

The classification of waste soil is a two-stage process, the first being an assessment of whether the soil is considered hazardous or not following the guidance within Technical Guidance WM3. For off-site disposal to landfill the results of Waste Acceptance Criteria (WAC) testing must then be reviewed to establish if the soil is acceptable at the relevant class of landfill or requires pre-treatment to reduce specific hazardous properties.

7.4.1 Waste acceptance criteria

All inert, stable non-reactive hazardous and hazardous wastes have limit values (waste acceptance criteria) set out in legislation that must be met before that class of landfill can accept the waste. Currently, no WAC are in place for non-hazardous waste.

Soil and other materials that are found not to be hazardous may be classified as either non hazardous or inert. In order to determine whether they can be classed as inert the soil must be tested and found to be below the inert waste acceptance criteria.

7.4.2 Waste sampling plan

Technical Guidance WM3 sets out in its Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. At this stage RSK consider that the level of soil sampling is sufficient to robustly categorise the material.

RSK recommends that a Sampling Plan be prepared to support any waste classifications and hazardous waste assessments, prior to development.

7.4.3 Preliminary waste assessment

Given the level of data obtained, scale of the development and heterogeneity of the site soils the following assessment should be considered indicative and further assessment should be undertaken following the preparation of a Waste Sampling Plan.

Envirolab (an RSK company) has developed a waste soils characterisation assessment tool (HASWASTE), which follows the guidance within Technical Guidance WM3. The analytical results have been assessed using this tool for potential off-site disposal of materials in the future. The results are presented in Table 25 and Appendix P.

Table 25: Results of waste soils characterisation assessment (HASWASTE)

Sample ref/location	Strata	Waste classification
WS02 at 1.80m bgl	MG – Organic Clay	Not hazardous
WS04 at 0.50m bgl	MG – Overburden Fill	Not hazardous
WS06 at 0.40m bgl	MG – Mixed Fill	Not hazardous
TP01 at 0.50m bgl	MG – Mixed Fill	Not hazardous
TP02 at 0.20m bgl	Agricultural Topsoil	Not hazardous
TP04 at 0.60m bgl	MG – Mixed Fill	Not hazardous
TP05 at 0.50m bgl	MG – Mixed Fill	Not hazardous
TP07 at 0.20m bgl	Agricultural Topsoil	Not hazardous
TP104 at 0.60m bgl	MG – Organic Clay	Not hazardous
TP108 at 0.40m bgl	Agricultural Topsoil / MG	Not hazardous
TP108 at 1.40m bgl	MG – Organic Clay	Not hazardous
TP110 at 0.50m bgl	Agricultural Topsoil	Not hazardous
TP112 at 0.40m bgl	MG – Overburden Fill	Not hazardous
TP113 at 2.60m bgl	MG – Overburden Fill	Not hazardous
TP115 at 1.00m bgl	MG – Organic Clay	Not hazardous
TP120 at 1.20m bgl	MG – Organic Clay	Not hazardous
TP122 at 1.20m bgl	MG – Organic Clay	Not hazardous
TP128 at 0.60m bgl	MG – Overburden Fill	Not hazardous
TP131 at 2.50m bgl	MG – Organic Clay	Not hazardous
TP133 at 1.20m bgl	MG - Mixed Fill	Not hazardous
TP136 at 0.20m bgl	Agricultural Topsoil	Not hazardous
WS110 at 2.20m bgl	MG - Mixed Fill	Not hazardous
WS112 at 1.10m bgl	MG - Mixed Fill	Not hazardous
Notes: MG – Made Ground		

None of the samples were classified as hazardous waste. Therefore to determine whether waste might be classified as inert or non hazardous WAC testing will need to be undertaken.

7.4.4 Asbestos within waste soils

The latest, edition of Technical Guidance WM3, requires that within a mixed waste the separately identifiable wastes be assessed separately.

For instance where waste soil contains identifiable pieces of asbestos (visible to the naked eye) the asbestos should, where feasible, be separated from the soil and classified separately.

Samples of potential asbestos containing material were collected from WS113 between 1.00m and 1.20m and analysed for the presence of asbestos, the results of which are presented in Appendix M. Analysis confirmed that asbestos is not present within samples from WS113 both in the suspected visual asbestos and the surrounding soil. Asbestos was identified during laboratory screening in TP110 at 0.50m in Agricultural topsoil. Asbestos fibres were identified to be at levels of below <0.001 % composition. Analysis confirmed that percentage of asbestos fibres is less than 0.1% by weight and therefore the waste can be disposed of within a non-hazardous waste landfill

7.5 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 1st April 2016), standard rate landfill tax is £84.40 per tonne.

The lower rate of landfill tax applicable to less polluting wastes (i.e. 'inert' wastes) remains at £2.60 per tonne.

Material disposed of at a soil treatment centre will not be subject to landfill tax.

7.6 Groundwater

When there is an intention to discard groundwater, chemical test results will indicate the appropriate disposal options. This could include disposal to treatment facility, via consent (issued by the water authority) to foul sewer or via consent (issued by the EA) to a watercourse or land.

7.7 Recommendations

RSK recommends that consideration as to how potentially waste soils will be dealt with as part of this development is given as early in the project planning process as possible. Such planning can lead to cost savings where potentially waste soils are viewed as a resource and retained on-site as part of the development. We also recommend, where off-site disposal is being considered, that appropriate facilities are identified and discussions initiated to confirm suitability of the facility to take the material. Potentially, these may include soil treatment facilities as well as landfills.

RSK can provide specialist advice to assist in this process, which can be complex and subject to regular regulatory change.

As noted above, made ground soils at the site are indicated to not be hazardous, therefore WAC testing would be required in order to determine if the waste soils are inert or not. Additionally, based on the variability of the made ground soils, it is recommended that further testing be undertaken in order to fully categorise each type of made ground at the site.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Environmental

With respect to human health, the results of the GQRA indicate that relevant pollutant linkages are absent and as such risks to end users are unlikely to be present, associated with direct contact with soils at the site.

Given that asbestos fibres have been identified in a single location only, and that they have been identified at trace concentrations, risks to end users from the inhalation of asbestos fibres is considered negligible. As asbestos containing material has been identified during the investigation site workers should remain vigilant during any earthworks or groundworks and aware of the potential for ACM to be present.

Based on available monitoring data, groundwater is considered to flow north, towards the Tongwell Brook, which is located 126m north of the site. Testing of soil leachate and groundwater has not indicated the presence of any significant concentrations of contaminants and that the risks to controlled waters presented by the site are considered low to negligible.

Based on the GSVs the site has been characterised as CS1. The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation may not have established the 'worst-case' scenario and therefore further monitoring is required to adequately characterise the long-term ground gas regime.

It is recommended that further rounds of gas monitoring be undertaken at periods of low and ideally falling pressure in order to more confidently establish the ground gas regime on the site.

8.2 Reuse of materials and waste

Based on currently available testing, the majority of waste soils from the site are likely to be classified as not hazardous, however once volumes of waste material are known, further testing would likely be required in order to fully and robustly classify the waste soils from the site. Additionally, WAC analysis would be required in order to determine if soils are inert or not.

While only trace amounts of asbestos were noted during the site investigation, it would be considered prudent to be vigilant and inspect materials for the presence of asbestos throughout the works.

8.3 Geotechnical

The exploratory holes revealed that the site is underlain by a variable thickness of made ground comprising various types of backfill over Felmersham Member and Glacial Till, with Peterborough Member encountered at depth.

The natural strata deposits and Peterborough Members were encountered at depths of between 1.0m and 4.90m bgl, but generally below 3.0m bgl, although they were found to be shallower in the north east of the site.

Foundations would need to be deepened and be taken down through the Made Ground to varying depths of between 1.00 and 4.30m bgl into suitable strength strata. In doing this there are numerous practical considerations, which, would constrain and may potentially preclude the use of a traditional deepened spread foundation. Therefore, when considering the above issues, it is anticipated that the use of traditional deepened spread foundations may not be economic, thus it is anticipated that a piled solution will need to be considered for structural foundations.

Typical pile working loads vary from 262 kN on a 350mm diameter pile at 10 mbgl to 480 at 15 mbgl. If higher loads are required than a typical pile working load of 536 kN using a 600mm diameter at 10 mbgl pile increasing to 929 kN at 15 mbgl. A full breakdown the typical pile working loads is presented in Table 24.

When considering floor slabs for buildings of this size suspended floors acting upon the foundations are not normally economic due to the widths between spans and loads carried. Therefore, ground bearing floor slabs are the only real option. When taking into account the variable depths of uncompacted and unconsolidated fill present it is clear that ground improvement or piling of the variable made ground beneath the floor slabs would be necessary to support the slab and reduce the risks of differential settlement and bearing capacity failure from occurring. At this stage, based upon the information available it is suggested that ground bearing floor slabs would need to be supported on piles or would require ground improvement or a combination of compaction and surcharging to make them viable and avoid differential settlement risks.

From consideration of sulphate content results the Design Sulphate Class of DS-5 AC-5 may be assumed for design purposes for foundations.

One soakaway test was completed in TP138 in the southeast of the site due to access restrictions. This soakaway was undertaken in clayey silty sand and gravel of the Felmersham member but recorded no drop in water level during the test. It is therefore deemed that a soakaway drainage system will not be feasible on the site.

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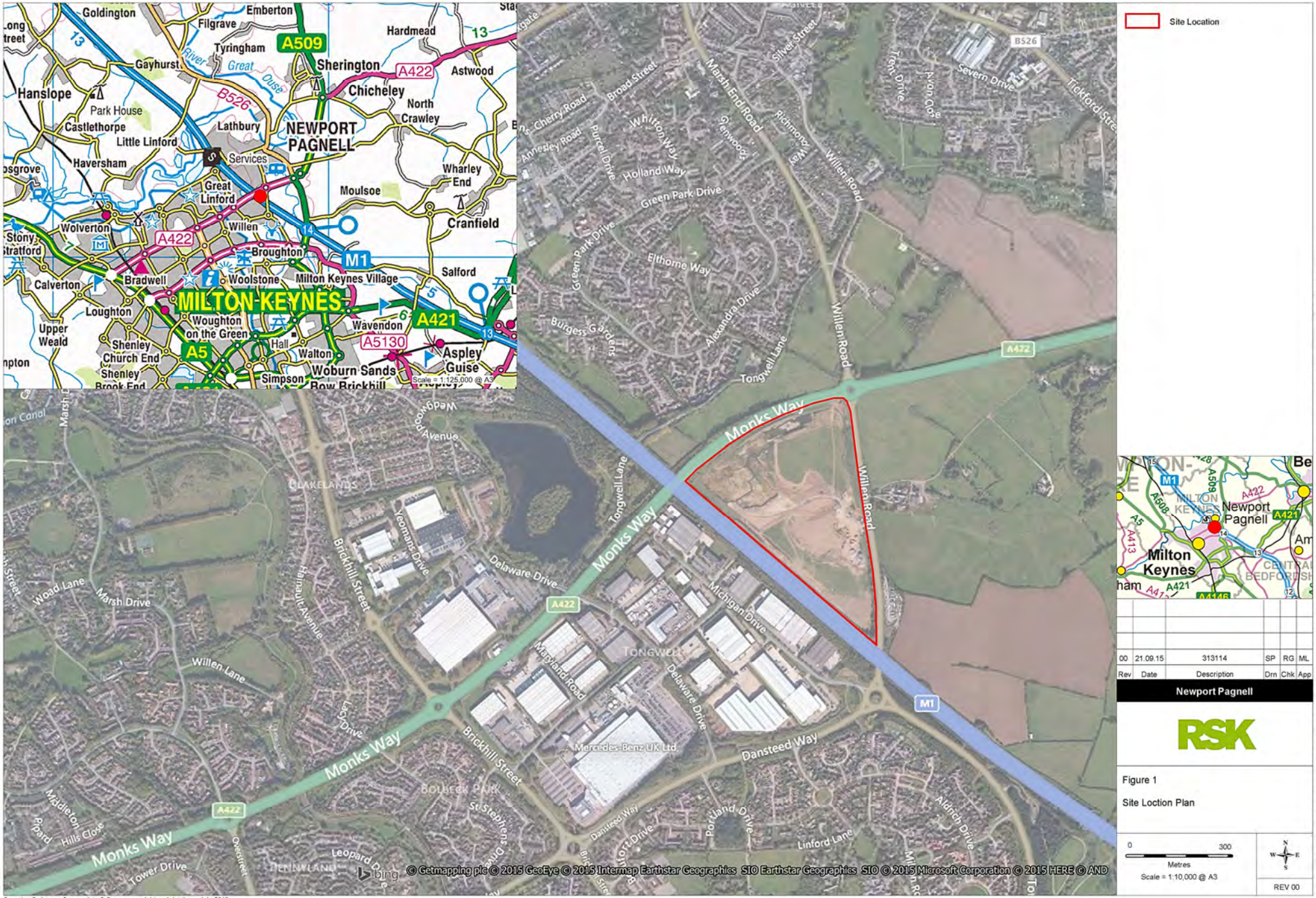
FIGURES



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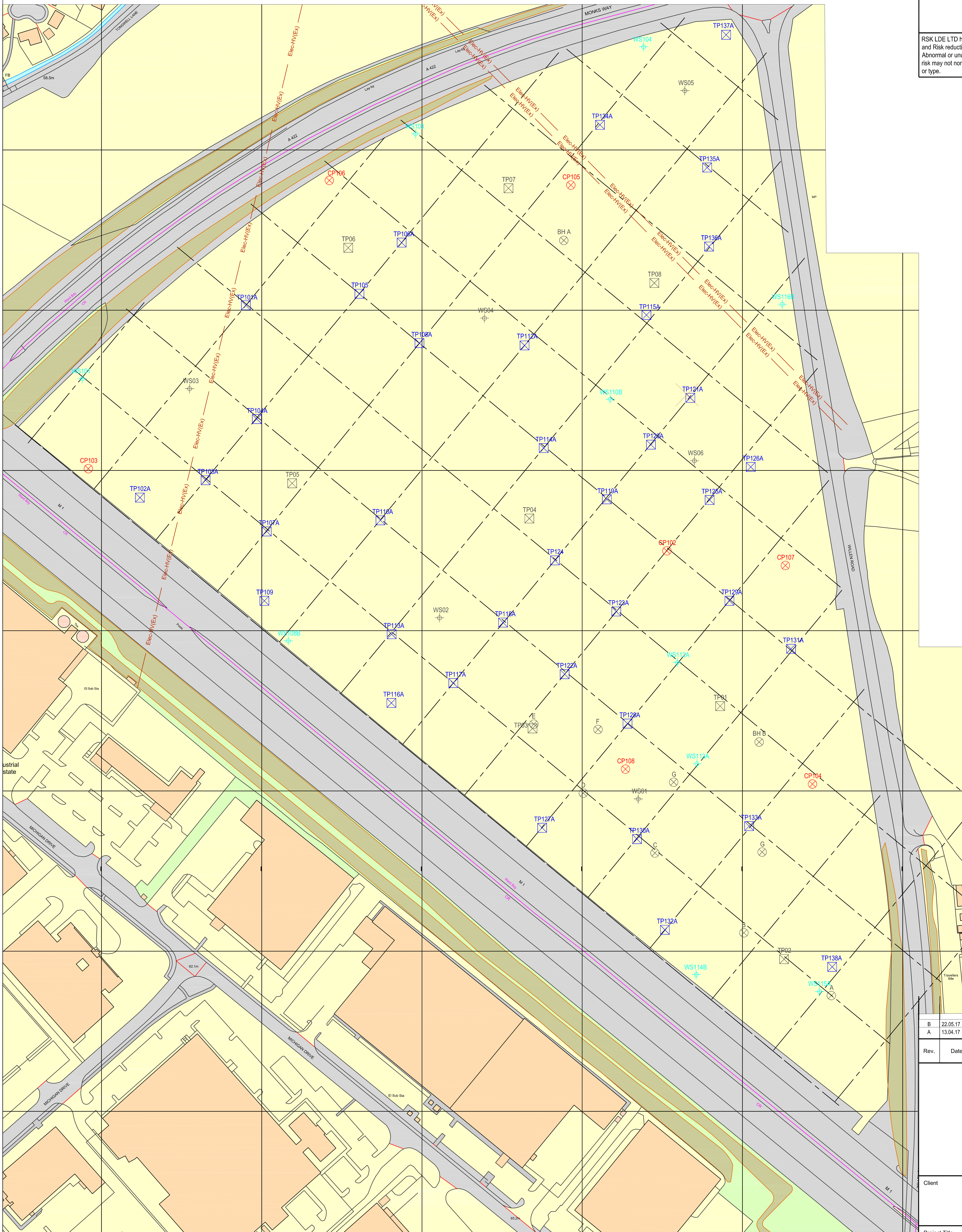
File Name : \\cv-nas1\Asbestos\Geoscience Data\Cov Ground and Environment\Jobs\313000 ONWARDS\313101 - 313199\313114 - Willen Road Newport Pagnell\10 Drawings\GIS\10 - Workspaces



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing.
Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.

Borehole Key:

- Existing Trial Pit
- Existing Borehole
- Existing Window Sample
- Proposed Trial Pit (TP101-136)
- Proposed Cable Percussion Borehole (CP 101-108)
- Proposed Window Sample (WS 101-116)

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
B	22.05.17	TP105A added	HG	TS	DB
A	13.04.17	AS BUILT	TS	DB	DB

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Client

Project Title

WILLEN ROAD, NEWPORT PAGNELL

Status: AS BUILT

Drawing Title

EXPLORATORY HOLE PLAN WITH OS MAP

Drawn	Date	Checked	Date	Approved	Date
HG	May 2017	TS	May 2017	DB	May 2017

Scale	Orig Size	Dimensions
1:1250	A1	

Project No.	Drawing File
313114	

Drawing No.	Rev.
313114-01-02	B

Scale 1:1250
0 25 50 75 100m

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 16th March 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

PHOTOGRAPHIC LOG

Photo no.	**Date:**
1	27/03/2017

Exploratory Position:

TP101

Description:

Photograph of overburden fill and mixed fill made ground

Photo No.	**Date:**
2	**27/03/2017**

Exploratory Position:

TP103

Description:

Photograph of Organic clay (dark grey) with overburden fill orange brown.

Photo No.	Date:	
3	26/05/2017	
Exploratory Position: TP123		
Description: Photograph of very soft orange brown quarry tailings		

Photo No.	Date:	
4	29/03/2017	
Exploratory Position: TP125		
Description: Photograph of glacial deposits at the base of TP125		

Photo No.	Date:	
5	31/03/2017	
Exploratory Position: **TP130**		
Description: Photograph of overburden Fill.		

Photo No.	Date:	
6	28/03/2017	
Exploratory Position: **TP135**		
Description: Photograph of 'other made ground (brown) with glacial deposits (grey) at the base		

Photo No.	Date:	
7	21/03/2017	
Exploratory Position: TP137		
Description: Photograph of the Felmersham member encountered in TP137		

Photo No.	Date:	
8	23/03/2017	
Exploratory Position: WS103		
Description: Photograph of the Kellaways Formation (dark grey) from 2.90 – 6.00m bgl in WS103		

Photo No.	Date:	
9	22/03/2017	
Exploratory Position: WS116		
Description: Photograph of the top of the Peterborough Member encountered in WS116 between 3.80 – 5.00m. Core length shown is 75cm of recovery from 4-5.0m bgl.		

Photo No.	Date:	
10	21/03/2017	
Direction Photo Taken: North		
Description: Photograph of water logged ground and showing the general site layout.		

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
GEOTECHNICAL AND GEOENVIRONMENTAL GROUND INVESTIGATION REPORT (2015)

Roxhill Developments Ltd, (Roxhill)

Willen Road, Newport Pagnell

Geotechnical and Geo-environmental ground investigation.

313114-01

OCTOBER 2015

RSK GENERAL NOTES

Project No.: 313114-01(01)

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CONTENTS

1 INTRODUCTION 5
1.1 Objective 5
1.2 Scope 5
1.3 Existing reports 6
1.4 Limitations 6
2 THE SITE 7
2.1 Site location and description 7
2.2 Proposed development 7
3 PRELIMINARY RISK ASSESSMENT (PRA) 8
3.1 Site walkover 8
3.2 Ground conditions 8
3.2.1 Geology 8
3.2.2 Radon 9
3.2.3 Mining and quarrying 10
3.2.4 Landfilling and land reclamation 10
3.2.5 Ground gas 11
3.3 Hydrogeology 11
3.3.1 Aquifer characteristics 11
3.3.2 Vulnerability of groundwater resources 11
3.3.3 Licensed groundwater abstraction 12
3.4 Hydrology 12
3.4.1 Surface watercourses 12
3.4.2 Surface water abstractions 12
3.4.3 Site drainage 13
3.4.4 Preliminary flood risk assessment 13
3.5 History of site and surrounding area 13
3.6 Sensitive land uses 15
3.7 Licences and permissions 15
3.8 Initial conceptual model 16
3.8.1 Summary of potential contaminant sources 16
3.8.2 Sensitive receptors 17
3.8.3 Summary of plausible pathways 17
3.8.4 Potentially complete pollutant linkages 17
4 SITE INVESTIGATION METHODOLOGY 21
4.1 Sampling strategy and methodology 21
4.1.1 Health and safety considerations 21
4.1.2 Investigation locations 21
4.1.3 Soil sampling, in-situ testing and laboratory analysis 22
4.1.4 Groundwater monitoring and levelling 23
4.1.5 Groundwater developing, sampling and analysis 23
4.1.6 Ground gas monitoring 23

5 GROUND CONDITIONS 25
5.1 Soil 25
5.1.1 Topsoil 26
5.1.2 Made ground 26
5.1.3 Felmersham Member 28
5.1.4 Glacial Deposits 28
5.1.5 Peterborough Member 29
5.1.6 Groundwater 30
5.1.7 Visual/olfactory evidence of soil and groundwater contamination 31
5.2 Ground gas regime 31
5.3 Refinement of the initial conceptual site model 32
5.3.1 Uncertainty 33
6 QUANTITATIVE RISK ASSESSMENT 34
6.1 Linkages for assessment 34
6.2 Methodology and results 35
6.2.1 Direct contact with impacted soil by future residents 35
6.2.2 Inhalation exposure of future residents to asbestos fibres 35
6.2.3 Impact of organic contaminants on potable water supply pipes 35
6.2.4 Leaching of contaminants to groundwater in principal aquifer and subsequent migration to surface watercourse 36
6.2.5 Migration of dissolved phase contaminants to wider secondary aquifer body 36
6.2.6 Ground gas 36
6.3 Environmental assessment conclusions 38
7 GEOTECHNICAL SITE ASSESSMENT 39
7.1 Engineering considerations 39
7.2 Geotechnical hazards 39
7.3 Foundations 41
7.3.1 General suitability 41
7.3.2 Deep spread foundations 43
7.3.3 Foundation works risk assessment 45
7.3.4 Floor slabs 45
7.3.5 Roads, hardstanding and drainage 46
7.3.6 Chemical attack on buried concrete 46
7.3.7 Soakaways 47
8 REUSE OF MATERIALS AND WASTE 48
8.1 Reuse of suitable materials 48
8.2 Treatment to meet suitable-for-use criteria 49
8.3 Reuse of waste materials 49
8.4 Wastes for landfill disposal 49
8.4.1 Waste acceptance criteria 50
8.4.2 Waste sampling plan 50
8.4.3 Preliminary waste assessment 50
8.4.4 Asbestos within waste soils 51
8.5 Landfill tax 51
8.6 Groundwater 52
8.7 Recommendations 52

9 CONCLUSIONS AND RECOMMENDATIONS 53
9.1 Environmental 53
9.2 Reuse of materials and waste 53
9.3 Geotechnical 54
BIBLIOGRAPHY 55

TABLES

Table 1: Site setting 7
Table 2: Geology at the site 8
Table 3: Surface water abstractions 13
Table 4: Summary of historical development 14
Table 5: Potential sources and types of contamination 16
Table 6: Risk estimation for potentially complete pollutant linkages 18
Table 7: Summary of geoenvironmental laboratory testing programme 22
Table 8: Summary of geotechnical laboratory testing programme 23
Table 9: General succession of strata encountered 25
Table 10: Summary of in-situ and laboratory test results for the made ground 26
Table 11: Summary of in-situ and laboratory test results for the Felmersham Member 28
Table 12: Summary of in-situ and laboratory test results for the Glacial Till 29
Table 13: Summary of soil parameters for the Peterborough Member 29
Table 14: Groundwater results during investigation 30
Table 15: Groundwater monitoring data (23rd September to the 1st October) 31
Table 16: Summary of ground gas monitoring results 32
Table 17: Linkages for generic quantitative risk assessment 34
Table 18: Summary of main potential geotechnical hazards that may affect site 39
Table 19: Design and construction of deep spread foundations 43
Table 20: Results of waste soils characterisation assessment (HASWASTE) 51

FIGURES

Figure 1 Site location plan
Figure 2 Exploratory hole location plan

APPENDICES

Appendix A	Service constraints
Appendix B	Summary of legislation and policy relating to contaminated land
Appendix C	Site photographs and walkover checklist
Appendix D	Risk assessment methodology
Appendix E	Desk study information
Appendix F	Exploratory hole records
Appendix G	Ground gas and groundwater monitoring data
Appendix H	Laboratory certificates for soil analysis
Appendix I	Laboratory certificates for groundwater analysis
Appendix J	Human health generic assessment criteria
Appendix K	Generic assessment criteria for controlled waters
Appendix L	Generic assessment criteria for potable water supply pipes
Appendix M	Comparison of laboratory data to GAC
Appendix N	Certificates of geotechnical analysis
Appendix O	Hazwaste table

1 INTRODUCTION

RSK Environment Limited (RSK) has been commissioned by Roxhill Developments Ltd (Roxhill) to carry out a geotechnical and geo-environmental ground investigation of the proposed commercial end use of the land off Willen Road, Newton Pagnell.

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

1.1 Objective

The objective of the work is to provide the client with a preliminary geotechnical and Geo-environmental ground investigation study.

This investigation has been commissioned in order to obtain and collate information pertaining to the ground conditions beneath the site; from which potential risks to human health and the environment can be assessed, an assessment of the potential waste implications of soil arisings can be made, and outline geotechnical soil parameters can be provided for preliminary design purposes.

1.2 Scope

The scope of the investigation and layout of this report has been designed with consideration of CLR11 (Environment Agency, 2004a) and BS 10175: 2011 (BSI, 2011) and guidance on land contamination reports issued by the Environment Agency (EA) (2010a).

The project was carried out to an agreed brief as set out in RSK's proposal (via email dated 12th August 2015). The scope of works for the assessment included:

Phase I – Preliminary Risk Assessment (PRA)

- A study of local geology and hydrogeology, including the provision of historical BGS boreholes.
- The identification of potential geological hazards, including Radon.
- A study of the land-use, development history and environmental data on and around the site and its surroundings from local authority correspondence, a GroundSure report and archival Ordnance Survey mapping.
- The identification of aquifer vulnerability rating beneath the site and local water abstraction points from Environment Agency records.
- A site walkover reconnaissance survey (at the time of the investigation).
- The identification of potential targets at risk from possible contamination.
- Production of a Preliminary Conceptual Site Model.

- A search of the LA planning portal and EA to try and obtain details of any minerals extraction permits or / any waste or landfill licences/permits relating to restoration of the site.

Phase 2

- Excavation of 8no number trial pits using a wheeled operated excavator to provisional depths of 4.5m.
- Logging of open excavations provided by the vendor (8 no).
- Sinking up to 6no window sample boreholes using a tracked drive in rig to provisional depths of 5m.
- Installation of 4no combined groundwater/gas monitoring wells to provisional depths of 5m.
- Two initial return visits to monitor groundwater/gas levels (NB; four visits is now the minimum required for a commercial development by Ciria C665 published 2007)
- Associated sampling and on site testing including.

1.3 Existing reports

No existing reports relating to ground conditions within the application area are known or have been made available for RSK for review.

1.4 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.

2 THE SITE

2.1 Site location and description

The site is located adjacent and to the east of the M1 motorway, off Willen Road, Newton Pagnell at NGR 487573, 242271, and currently comprises an area of 16 hectares of open disused land that is bound by post fences and semi mature shrubs and trees on all sides.

The surrounding land use is a mixture of semi-rural, residential and commercial/light industrial as detailed in Table 1 below.

Table 1: Site setting

To the north:	A244, with agricultural fields beyond
To the east:	Sand and Gravel quarry with agricultural fields beyond.
To the south:	Agricultural fields with commercial properties beyond.
To the west:	The M1, with commercial and residential properties beyond.

2.2 Proposed development

The site in question is being considered for redevelopment for a commercial end use (logistical hub site), however no specific development plans were available at the time of writing this report.

3 PRELIMINARY RISK ASSESSMENT (PRA)

3.1 Site walkover

The site was visited on 10th August 2015 to undertake a walkover inspection prior to the intrusive investigation. Photographs and the site walkover checklist are provided in Appendix C.

The site currently comprises an area of rough opened disused ground with hummocky terrain with open excavations present in the south and south west of the site, and stockpiles of natural soils in the west of the site, associated with the sites former use as a sand and gravel quarry. In addition, a compound area including a toilet block and various construction materials including concrete and pipework were noted adjacent to the stockpiles in the east of the site.

The site is bound to the north by the A422, to the east by Willen Road, with a sand and gravel quarry beyond, to the south by agricultural land and to the west by the M1 motorway.

Some evidence of made ground was noted during the walkover in the form of general brick and rubble, which had in part been used to form a compound area in the west of the site, and was also occasionally noted at surface across the site.

3.2 Ground conditions

3.2.1 Geology

Published records (British Geological Survey, 2015) for the area indicated the geology of the site to be characterised by the succession recorded in Table 2.

Table 2: Geology at the site

Geological unit	Description	Estimated thickness (m)
Superficial Deposits.		
Felmersham Member	Dense light brown fluviatile sand and gravel.	Approx 0-3m. Noted to cover the majority of the site on mapping.

Geological unit	Description	Estimated thickness (m)
Head Deposits	Firm brown very sandy silty clay with some to much angular to sub-rounded fine to coarse gravel.	<5m. Noted to cover the southern corner of the site.
Glaciolacustrine Deposits	Likely to be variably orange brown sand gravel and clay.	Unknown, possibly <5m.
Bedrock		
Kellaways Formation	Mudstone, grey, commonly silici-silty or silica-sandy, with beds of calcareous siltstone and sandstone.	Typically, 0-10m Noted to cover the site.
Peterborough Member	Brownish grey, fissile, organic rich mudstones, shelly fauna dominated by crushed aragonitic ammonites and bivalves. Subordinate beds of pale medium grey, blocky mudstone.	0-65m
Cornbrash Limestone	Hard, light grey limestone with clay partings.	6-10m.
Source: BGS online lexicon		

Several suitable BGS Borehole records were available within the site boundary. They identified three superficial deposits which are as follows: Pleistocene Glacial Till along the south western boundary; Head Deposits along the south eastern boundary; and the Felmersham Member dominating the majority of the site. Solid geology comprises the Kellaway Formation with the Cornbrash Limestone identified in the north western corner and the Peterborough Member identified in boreholes in the southern corner.

Exploratory holes undertaken as part of the development to widen the M1, adjacent to the site to the west, indicate variable levels of topsoil (between 0.2m and 0.7m).

The existing topography and history of development of the site suggests that, in addition to these natural strata, made ground should be expected were excavation of sand and gravel has been restored. It is also likely that there are quarry tailings present, which are the unwanted fines remaining from the washing of sand and gravel deposits. These are typically quite soft and generally present at the base of the quarry. As the quarry has been infilled quarry tailings maybe present beneath the infill material.

3.2.2 Radon

The environmental database report indicates that the site is not located within an ‘Affected Area’ as defined by the Documents of the National Radiological Protection Board (Radon Atlas of England and Wales, NRPB-W26-2002) and therefore the risk of significant ingress of radon into structures on site is considered low.

3.2.3 Mining and quarrying

Evidence has been sought to identify any mining and quarrying operations, past and present, which have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- an environmental database report
- old Ordnance Survey maps and plans (see Section 3.5)
- geological maps (see Section 3.2.1)

The GroundSure report (dated 24th August 2015) indicates that the site has previously been subject to the quarrying for sand and gravel resources and, it is understood that excavations reached approximate depths of 3.5bgl. The site has since been backfilled to near original ground levels with inert imported soils as detailed below in Section 3.2.4. Information regarding the backfill composition and depth has been requested from the Environment Agency based on the sites landfill license number, however, no response had been received by the time this report was produced.

3.2.4 Landfilling and land reclamation

Evidence has been sought to identify any landfilling or land reclamation operations, past and present, which have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- environmental database report
- old Ordnance Survey maps and plans (see Section 3.5)
- geological maps (see Section 3.2.1)

The GroundSure report (dated 24th August 2015), indicated that the site holds a waste disposal license, permitting the restoration of quarried excavations by landfill waste. Permission was granted by Milton Keynes Council in March 2003, the proposed restoration of the 2.5m excavations is said to include inert fill, in-situ overburden and landfill waste, for which 75% is natural waste and 25% is builders waste.

The GroundSure report (dated 24th August 2015), also identified two historical landfill sites within 1.5km of the study site. They are noted as,

- Pre-76, Newport Pagnell, 259m north east of the site at Grid reference 487900, 242800.
- Borrow Pit, Caldecote Lane, Newport Pagnell, 474m north east of the site at Grid reference 488100, 242900.

The report also identifies one historic waste treatment centre noted as a recycling works at Caldecote Farm, Willen Road, which is 72m east of the site at NGR 487852, 242277. Planning Permission was granted by Milton Keynes B.C. (06/01096/MN).

3.2.5 Ground gas

Given the anticipated ground conditions, the risk associated with ground gas is considered moderate in accordance with BS8576.

3.3 Hydrogeology

3.3.1 Aquifer characteristics

Based on the published geological map referred to above, the hydrogeology of the site is likely to be characterised by the presence of a semi-confined secondary A aquifer associated with the Kellaway Formation, overlain by the Felmersham Member, which is also a secondary A aquifer. There is the presence of unproductive strata comprising the Peterborough Member below the Kellaway Formation as well as the Glaciolacustrine Deposits, and an undifferentiated aquifer associated with the Head Deposits which are located in the south of the site only.

The anticipated depth to the groundwater table is not known although, if present, shallow groundwater in the site area is anticipated to migrate both vertically and horizontally the wider aquifer, and potentially, the two nearest surface water features, which are Tongwell Brook (126m north) and the River Ouzel (249m east).

It is also possible that localised perched water may also be present in the made ground.

The presence of low permeability clay at relatively shallow depths beneath the site, while restricting downwards migration, may increase the potential for lateral migration of shallow groundwater (and therefore mobile contamination, if present).

3.3.2 Vulnerability of groundwater resources

The site has been classified by the EA website to overlie a:

- secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers in the Kellaway Formation, the Cornbrash Limestone and the Felmersham Member.
- secondary undifferentiated aquifer: it has not been possible to attribute either a category A or B to a rock type. In most cases this means that it was previously designated as both minor and non-aquifer in different locations owing to the variable characteristics in the Head Deposits and Glaciolacustrine Deposits.

- ‘unproductive’ strata: low permeability with negligible significance for water supply or river base flow in the Peterborough Member.

3.3.3 Licensed groundwater abstraction

The environmental database (GroundSure report, 24th August 2015) report indicates that there is one groundwater abstraction license identified on site, abstracted for mineral washing purposes during the extraction of sand and gravel from 2006 to 2014.

Information available on the EA website indicates that the site does not lie within a currently designated groundwater Source Protection Zone.

3.4 Hydrology

3.4.1 Surface watercourses

The nearest identified surface feature to the site is Tongwell Brook located approximately 126m to the north of the site, flowing south west to north east. An additional surface feature, comprising tributaries to the River Ouzel is located 249m east of the site, with the River Ouzel itself located approximately 600m east of the site, flowing south to north.

These surface water features are likely to be recharged by both surface water runoff from the surrounding area adjacent to the site and shallow groundwater present within the granular superficial deposits and Kellaways Formation. Therefore, depending on groundwater flow direction, a linkage between the two surface water features and any ground or groundwater contamination beneath the site is therefore possible. Based on the local topography and geology, shallow groundwater is more likely to flow in an easterly or north easterly direction, towards the River Ouzel. However it is considered that the migration of contaminants via surface runoff and via the dry drainage ditch to controlled water receptors 100m to 250m from the site is highly unlikely.

No discharge consents have been recorded within 500m of the site.

3.4.2 Surface water abstractions

Surface water abstractions identified, using the environmental database (GroundSure report, 24th August 2015), within a 2km radius of the site are detailed in Table 3.

Table 3: Surface water abstractions

Reference	Distance and orientation from site	Comment
6/33/10/*S/0009	811m east	Spray Irrigation
6/33/10/*S/0008	909m north	General use
6/33/05/*S/0049	1609m north	Spray Irrigation
Notes:		

3.4.3 Site drainage

Surface water from the site appears to be discharged directly into the surrounding fields and ditches around the periphery.

3.4.4 Preliminary flood risk assessment

The indicative floodplain map for the area, published by the EA, shows that the site does not lay within a designated floodplain. The risk of flooding each year has been assessed by the EA as very low, i.e. 0.1% (1 in 1000) or less.

EA records show that there are 2 floodplain zones, 50m north and 184m west of the site, they are of low risk and do not require flood defences.

3.5 History of site and surrounding area

The history of the land-use and development of the site and surrounding area has been assessed based on the following sources:

- historical maps within the environmental database from 1886 - 2014
- internet search – Newton Pagnell Town Council
- web based aerial photography

Copies of OS and County Series maps are included in the environmental database report in Appendix D. Other details of the development history of the site are also included in Appendix D. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

The site appears clear of any development on the earliest maps available (circa, 1816), with open farmland dominating use. The site remains unchanged up to 2002, where a single-track road was introduced to the site off Willen Road. By 2012, the northern and central regions of the site show signs of excavation. From 2014, excavations, tracks and settling ponds were concentrated to the south, whilst northern excavations were restored, and covered with vegetation.

Land use within the vicinity of the site is relatively clear of development in the earliest maps; agricultural fields and outbuildings dominate use. The area remains unchanged until 1938, where agricultural land in the north was developed into residential housing because of the expansion of Newton Pagnell. From 1968, the maps highlight the development of the M1 along the western boundaries of the site. There is little further development until 2002, when agricultural fields to the north and west of the site were replaced by residential houses and commercial development, because of the expansion of Milton Keynes. Maps remain unchanged up to the present day. It is known however that additional quarrying activity has been undertaken east of the site from early 2015.

Table 4: Summary of historical development

Date	Land use/features on site	Land use/features in vicinity of site (of relevance to the assessment)
1816	The site is clear of development	Willen Road is located along the eastern boundary of the site with Caldecote farm 50m beyond it. Tongwell Farm is located 150m south west of the site. The River Ouzel is located 600m east of the site, flowing south to north.
1899	No significant change.	No significant change.
1924	No significant change.	No significant change.
1938	No significant change.	Allotment gardens, 100m north, and a sewage farm, 250m north have been developed, associated with Newton Pagnell.
1951	No significant change.	No significant change.
1958	No significant change.	No significant change.
1968	A drainage ditch is located adjacent to the southern half of the eastern boundary of the site.	As a result of the construction of the M1 in the 1960's, the motorway is adjacent to the western boundary of the site.
1971	The drainage ditch appears to extend into the centre of the site.	The allotment gardens previously located 100m north are now 250m north of the site, and the sewage farm has been redeveloped as a sewage works. An electricity sub-station is located 150m north west of the site.
2002	No significant change.	Farmland 150m north west has been replaced by residential houses while farmland beyond the motorway, 50m south west is now commercial developments. The majority of the sewage works to the north west has been replaced by a sports field and is now 450m north east.

2010	No significant change.	The sewage works north east of the site is no longer marked.
2012	Quarrying identified in central and northern regions of site, including excavations and tracks.	No significant change.
2015	Quarrying identified in the southern and central regions of the site, with the northern portion of the site now restored.	No significant change.

3.6 Sensitive land uses

The GroundSure report (dated 24th August 2015), indicates that DEFRA identified a surface water nitrate vulnerable zone; this covers the entirety of the site and the surrounding vicinity. This suggests that through the sites dominant agricultural land use, the area is designated as being at risk from agricultural nitrate pollution. A comprehensive evaluation of ecological receptors is outside the scope of this report.

3.7 Licences and permissions

Milton Keynes council approved planning permission for the development of sand and gravel extraction from site, March 2003. Permission was granted for the extraction of 270,000 tonnes of aggregate to depths of 2.3m, across a five-year development plant. The proposed restoration of the 2.3m excavations is said to involve inert fill, in-situ overburden and landfill waste, for which 75% is natural waste and 25% is builders waste. A copy of the application for planning permission is included in Appendix E. According to the Local Authority website, two permitted planning applications are related to this site, 06/01096/MIN and 06/00106/MIN, however no additional details of the permissions were available.

Milton Keynes County Council have no records of contamination in connection with the site. However, EA records identify how the site was periodically monitored from 2012 to September 2014, identifying 3 category 4 breaches of the Compliance Classification Scheme (CCS). CCS category 4 breaches have no potential to have an environmental impact.

The GroundSure report also identified an oils and fuel incident in May 2003 at NGR 487520, 242100. The incident was classified a category 4, (no impact). Contamination from the above incidents are unlikely to be a remaining risk to site and are likely to have degraded or dissipated by now.

3.8 Initial conceptual model

The information presented in Sections 2 and 3.1 to 3.7, has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 3.10.4. The risk classification has been estimated in accordance with information in Appendix E.

3.8.1 Summary of potential contaminant sources

Potential sources and contaminants of concern are summarised in Table 5.

Table 5: Potential sources and types of contamination

Potential sources	Contaminants of concern
On-site historical	
Former quarry or pit (2010-2014)	Unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), asbestos etc.). Possible soil gases including methane and carbon dioxide. Oil/fuels from on site transport, PAHs, PCB's, Dioxins & furans, chlorinated aliphatic hydrocarbons and chlorinated aromatic hydrocarbons.
On-site present day	
Made ground (i.e. fill material) known to comprised overburden soils and imported soils comprising 75% 'natural waste' and 25% construction waste	Unknown fill material (but potentially including heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs), asbestos etc.) and hazardous ground gases (methane and carbon dioxide)
Off-site	
Various commercial properties/warehouse uses, located beyond the motorway, adjacent to the south west boundary of the site.	Fuel oils, lubricating oils, heavy metals, polychlorinated biphenyls (PCBs), PAHs, solvents and other common industrial contaminants, asbestos,
Made ground associated with construction of the M1 adjacent to the south west of the site.	Fuel oils, lubricating oils, heavy metals, PAHs, propanone, PCBs, ethylene glycol, ash, sulphate, herbicides and asbestos

3.8.2 Sensitive receptors

Sensitive receptors at this site include:

- future site occupants
- adjacent site users
- potable water supply pipes and buildings
- groundwater beneath the site
- groundwater in vicinity of site

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures including CDM regulations.

3.8.3 Summary of plausible pathways

The plausible pathways are summarised below:

- direct contact (soil, dust and vegetable ingestion, dermal contact, dust and fibre inhalation)
- ground gas and soil gas inhalation
- vertical and lateral migration including leaching
- chemical attack of infrastructure (including water supply pipes) and buildings.

3.8.4 Potentially complete pollutant linkages

The outline conceptual model is an estimate of the risk associated with each linkage is summarised in Table 6. The risk classification has been undertaken in accordance with CIRIA C552 (Rudland et al., 2001), a summary of which is included in Appendix E.

Table 6: Risk estimation for potentially complete pollutant linkages

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
Made Ground associated with backfilling of Quarry on-site 2012-2014.	Future site occupants	Dermal contact, soil ingestion, inhalation of dust/vapours.	Likely	Medium	**Moderate.** Site use and history (i.e. quarry) suggests there is a moderate potential for significant concentrations of contaminants within site soils.
		Ground gas and soil gas migration and explosion or asphyxiation	Low likelihood	Severe	**Moderate.** The quarry appears to have been infilled within the last year with inert fill material, in-situ overburden and landfill waste (75% natural site waste, 25% builders waste). As a result, made ground is likely to be present but in accordance with an inert classification should have a low gassing potential
	Adjacent site users (residential and commercial end users)	Ground gas migration and explosion or asphyxiation	Low likelihood	Severe	**Moderate.** The potential for a contamination source is of a low likelihood as the infill material is meant to be inert.
	Buildings and infrastructure	Chemical attack	Likely	Mild	**Moderate/Low.** It is considered unlikely that naturally occurring pyritic conditions will be present onsite, however the made ground present may contain aggressive chemical conditions.
	Portable water supply	Chemical attack	Low likelihood	Medium	**Moderate/Low.** New water supply pipes will be required as part of the development and are likely to be in contact with made ground. It is considered to be of low likelihood.

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
	Surface water courses (126m north west and 249m east)	lateral migration including leaching in near surface soils and surface water runoff	Low likelihood	Medium	**Moderate/Low.** While shallow perched groundwater may be encountered at the site, migration of contaminants, if present, to the surface water receptor is considered low due to the distance to the receptors.
	Groundwater beneath the site (secondary A and undifferentiated)	Vertical and lateral migration including remobilization and leaching	Low likelihood	Medium	**Moderate/low.** Leaching of contaminants is of a low likelihood as the infill material is meant to be inert. However there is a potential for migration if contaminants are present due to the presence of high permeability sandstones (capable of supporting water supplies at a local scale) across the site.
Industrial/commercial units 50m south west.	Future site occupants	Ground gas and soil gas migration and explosion or asphyxiation	Low	Severe	**Moderate/Low.** The presence of significant made ground below the industrial and commercial site is low, however, should it be present risks to end users via ground gas migration exists.
Notes:					

The potential pollutant linkages with a risk of high to moderate/low that may drive site investigation works are:

1. Direct contact, ingestion and inhalation of contaminated made ground to proposed site users (adults commercial / industrial workers),

2. The accumulation of ground gases generated from made ground and possible tank leakages, as well as off site sources within buildings posing risks to proposed site users,

3. Chemical attack from contaminants in the made ground affecting potable water supply pipes,

4. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor, and

5. Migration of contaminated groundwater to wider groundwater body and nearby groundwater abstractions.

6. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to surface watercourses including Tongwell Brook and the River Ouzel.

4 SITE INVESTIGATION METHODOLOGY

RSK carried out intrusive investigation work and subsequent ground gas and groundwater monitoring between the 7th of September and the 1st of October 2015 to confirm the potential pollutant linkages identified in the outline conceptual model and to inform geotechnical constraints.

4.1 Sampling strategy and methodology

The techniques adopted for the intrusive investigation were chosen based on the objectives of the investigation, and the anticipated ground conditions on, the basis of the published geology discussed above.

Trial holes were excavated in order to facilitate inspection and logging of the shallow soils to enable the collection of representative samples for laboratory analysis.

Deeper window sampler boreholes were undertaken in order to provide information regarding the depth of fill material and undertake in-situ testing and to facilitate the installation of ground gas and groundwater monitoring wells.

4.1.1 Health and safety considerations

Prior to breaking ground, each exploratory location was surveyed to check for underground services using a Cable Avoidance Tool (CAT) and corresponding signal generator. Prior to the commencement of drilling activities, inspection pits were also excavated by hand using insulated digging tools, in order to confirm the absence of buried utility apparatus at each of the borehole locations.

4.1.2 Investigation locations

The following site work was carried out between 7th and 8th of September 2015:

- Drilling of six window sampler boreholes, sunk to depths of up to 5.00m bgl,
- Installation of four combined ground gas and groundwater monitoring standpipes,
- Excavation of eight trial pits to depths of up to 4.40m bgl, and
- Logging of eight existing excavations.

The investigation and the soil descriptions were carried out in general accordance with 'BS 5930:1999. Code of Practice for Site Investigations' (BSI, 1999). The exploratory hole records are presented in Appendix F.

The locations of the intrusive investigations are shown in Figure 2. The rationale for these locations was to obtain information across the site on a non-targeted basis in order to assess general site conditions as part of this preliminary site investigation.

The investigation points were located approximately by reference to physical features present on the site at the time of investigation and then recorded by hand held gps.

4.1.3 Soil sampling, in-situ testing and laboratory analysis

A programme of laboratory testing, scheduled by RSK as detailed below, was undertaken on selected samples of made ground and natural soils obtained during the investigation.

The details of the soil samples obtained during the intrusive investigation are recorded on the borehole records presented within Appendix F. The programme of chemical and geotechnical analysis undertaken on the soil samples as presented in Table 7 and Table 8 respectively.

Soils collected for laboratory analysis were stored in a variety of containers appropriate to the anticipated testing suite required. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

Table 7: Summary of geo-environmental laboratory testing programme

Analysis	No.	Rationale
Metals (As, Cd, tCr, Pb, Hg, Se, wsB, Cu, Ni, Zn)	8	Standard suite of laboratory testing, undertaken on representative samples of the made ground soils encountered, in order to facilitate an assessment of land quality, and potential risks to human health and the environment.
pH	11	
Asbestos Screen	8	
Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG)	8	
BTEX and MTBE	8	
Polycyclic Aromatic Hydrocarbons (PAH)	8	
Total Organic Carbon (TOC)	8	
Dissolved metals, inc calcium	2	Standard suite of laboratory testing undertaken on samples of groundwater, in order to facilitate an assessment of land quality and potential risks to human health and the environment.
Dissolved TPH CWG	2	
Dissolved BTEX and MTBE	2	
Dissolved PAH	2	
Electrical conductivity	2	
Hardness	2	
pH	2	
Notes:		

Table 8: Summary of geotechnical laboratory testing programme

Analysis	No.	Rationale
Plasticity Index and Moisture Content	9	Tests undertaken to classify the near surface strata on representative samples, to enable soil parameters to be estimated.
Moisture Content only	1	
Particle Size Distribution Tests	5	
4.5kg compaction	1	Physical testing to assess potential effects of compaction of soils.
Sulphate Characterisation (BRE SD1)	6	Chemical testing undertaken on soil samples in order to determine levels of sulphates and thus evaluate the possible impacts on buried concrete structures.
Notes:		

4.1.4 Groundwater monitoring and levelling

Depths to groundwater were recorded using an electronic dip meter on two occasions on the 23rd of September and the 1st of October 2015. The monitoring results are given in Section 5.2.

The groundwater monitoring data is given together with ground gas monitoring data in Appendix G.

4.1.5 Groundwater developing, sampling and analysis

Groundwater samples were taken using disposable bailers. Purging was undertaken comprising the removal of three well volumes. Sampling was then undertaken using a disposable bailer dedicated to each monitoring location to avoid the risk of cross contamination of samples.

The groundwater samples were collected in a containers appropriate to the anticipated testing suite required. The containers were filled to capacity and placed in a cool box to minimise volatilisation. Samples were transported directly to the testing laboratory under chain of custody documentation. It was noted that during sampling groundwater in WS04 and WS05 in the north of the site were purged dry and due to the very low rate of recharge, could not be sampled.

4.1.6 Ground gas monitoring

Due to the investigation being preliminary, only two monitoring rounds have been undertaken.

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO_2), methane (CH_4) and oxygen (O_2) in percentage by volume, while hydrogen sulphide (H_2S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded.

The atmospheric pressure before and during monitoring, together with the weather conditions, was recorded.

All monitoring results together with the temporal conditions are contained within Appendix G and discussed in Section 5.2.

5 GROUND CONDITIONS

The results of the intrusive 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 in Appendix F.

5.1 Soil

The exploratory holes revealed that the site is underlain by a variable thickness of made ground comprising various types of backfill over Felmersham Member and Glacial Deposits with Peterborough Member encountered at depth. This appears to confirm the general stratigraphical succession described within the initial conceptual model. For the purpose of discussion, the ground conditions are summarised in Table 9 and the strata discussed in subsequent subsections

Table 9: General succession of strata encountered

Strata	Exploratory holes encountered	Depth to top of stratum (m bgl)	Depth to base of stratum (m bgl)	Thickness (m)
Topsoil	TP02-08 & WS01-05	GL	0.30-0.90, generally 0.30-0.45	0.30-0.90, generally 0.30-0.45
Made Ground Mixed Fill	TP01, 04-08, WS02 & 05-06	GL-2.00	0.90-3.00	0.10-2.00, generally 0.90-2.00
Made Ground Organic Clay	TP01, 05-06, WS02-04 & 06	0.90-1.70	2.00-4.00	0.60-3.10
Made Ground Overburden Fill	TP02-03, 05, WS01-02, 04-05	0.30-2.40, generally 0.30-0.45	0.90-3.50	0.10-3.20, generally 0.60-3.20
Made Ground Possible Quarry Tailings	TP04-05	2.00-2.50	2.90-3.30	0.40-1.30
Made Ground Other	WS03-04	2.70-2.90	3.90-4.00	1.00-1.30
Felmersham Member	TP01, 03-04, 06-08 & WS01-02 & 04	1.30-3.9	1.90-4.45	0.10-1.40
Glacial Deposits	TP02-03, 05, WS01-02 & 05-06	1.00-3.50	1.90-4.45	0.20-1.45
Peterborough Member	TP01, 04, 07-08 & WS03-05	1.90-4.10	2.70-4.45	0.20-2.40

5.1.1 Topsoil

Topsoil was encountered across the site, with the exception of WS06 and TP01, which were situated within the compound area adjacent to the site entrance. The topsoil comprised brown, slightly gravelly, clayey sand, with rootlets throughout and a gravel content of flint. The Topsoil was encountered from surface to depths of between 0.30m to 0.45m, although it appeared to extend to a depth of 0.90m bgl in WS03.

5.1.2 Made ground

Made ground was encountered across the site from ground level, or below the topsoil to depths of between 1.00m and 4.30m bgl, being shallowest in the north corner of the site, and deepest towards the centre of the site.

A summary of the in-situ and laboratory test results for the made ground is presented in Table 10 the in-situ and laboratory test results can be found in Appendix N.

Table 10: Summary of in-situ and laboratory test results for the made ground

Soil parameters	No.	Range	Reference
Liquid limit (%)	4	30-56	Appendix N
Plasticity limit (%)		12-20	
Plasticity index (%)		18-36	
Modified plasticity index (%)		4.8-32	
Plasticity term		Low to high	
Volume change potential		Low to medium	NHBC
Moisture content (%)	4	11-46	Appendix N
Particle Size Distribution	3		
Cobbles		0%	
Gravel		26-44%	
Sand		41-46%	
Silt		4-25%	
Clay		6-20%	
Maximum dry density (Mg/m^3)	1	1.98	
Optimum moisture content (%		12	
SPT ‘N’ values	11	N=2 to N=23	Appendix F

The made ground was found to comprise several distinct layers which are described below.

5.1.2.1 *Mixed Fill*

Comprising generally firm, grey brown or brown, slightly sandy, gravelly clay, with a gravel content of chalk and brick, the stratum was encountered directly below the topsoil, with the exception of WS02 where it was encountered at 2.0m bgl. The stratum generally achieved thicknesses of between 0.90m and 2.00m however it was only encountered at a 0.10m thick band in WS05. The mixed fill extended to depths of between 0.90-3.00m bgl.

5.1.2.2 *Organic Clay*

The 'organic clay' comprised generally soft, or soft to firm, grey brown, mottled black, gravelly, silty clay, with a strong organic odour and a gravel content of flint, chalk, brick and occasional rotten timber and metal wire. The stratum was encountered below the 'mixed fill' (where present as noted in Table 9), with the exception of WS02, where it was encountered above it. The stratum was encountered from depths of between 0.90m and 1.70m bgl, to depths of between 2.00m and 4.00m bgl, achieving a thickness of between 0.60m and 3.10m.

5.1.2.3 *Overburden Fill*

'Overburden Fill', representing natural deposits stripped from above the sand and gravel resource and then replaced once extraction had ceased. It comprised orange brown, clayey, sand and gravel of flint, and was encountered below the topsoil from depths of between 0.30m and 0.45m bgl, extending to depths of between 0.90m and 3.50m bgl, achieving a thickness of between 0.60m and 3.20m, with the exception of a 0.10m thick band located at a depth of between 2.40m and 2.50m bgl in TP05.

5.1.2.4 *Possible Quarry Tailings*

A stratum comprising what is thought to be consistent with quarry tailings was encountered near the centre of the site in TP04 and TP05. The stratum comprised very soft, orange brown, silty clay. The stratum was encountered at the base of the made ground at depths of between 2.00m and 2.50m bgl, extending to depths of between 3.30m and 2.90m bgl, achieving a thickness of between 0.40m and 1.30m.

5.1.2.5 *Other Made Ground*

In addition to the above, a loose, dark grey, gravelly sand, with gravel of subangular, fine sized chalk was encountered at depths of between 2.90m and 3.90m bgl in WS03 in the north west of the site. Additionally, a possible made ground stratum of orange brown sand and gravel of subrounded fine to medium flint encountered at depths of between 2.70m and 4.00m bgl in WS04, just north of the centre of the site.

5.1.3 Felmersham Member

The Felmersham Member was encountered at depths of between 1.30m and 4.30m bgl and extended to depths of between 1.90m and 4.45m bgl, achieving a thickness of between 0.10m and 1.40m. The stratum was found to be thickest near the edges of the site, and thinnest, or not present near to the centre. The stratum typically comprised very loose to medium dense, orange brown, sand and gravel of fine to medium sized flint.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 11 and the in-situ and laboratory test results can be found in Appendices F and N respectively.

Table 11: Summary of in-situ and laboratory test results for the Felmersham Member

Soil parameters	No.	Range	Reference
Liquid limit (%)	1	34	Appendix N
Plasticity limit (%)		15	
Plasticity index (%)		19	
Modified plasticity index (%)		7.6	
Plasticity term	1	Very low	
Moisture content (%)	1	12	
Particle Size Distribution	2		
Cobbles		0%	
Gravel		45-50%	
Sand		37-44%	
Silt		2-7%	
Clay		4-11%	
SPT 'N' Values	3	N=2 to N=12	Appendix F
Density Term		Very loose to medium dense	

5.1.4 Glacial Deposits

While not noted to be present at the site on geological mapping, Glacial Deposits were noted within the wider vicinity of the site in all directions. Glacial Deposits appear to have been encountered on the site below made ground and Felmersham Member sand and gravels at depths of between 1.00m and 3.50m bgl. The stratum extended to depths of between 1.90m and 4.45m bgl, achieving a thickness of between 0.20m and 1.45m. Where encountered, the base of the stratum was only proven in one location, WS05, at a depth of 1.90m bgl.

The stratum generally comprised stiff, dark grey, slightly gravelly, slightly sandy, silty clay, with a gravelly content of fine to medium sized chalk.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 12 and the in-situ and laboratory test results can be found in Appendices F and N respectively.

Table 12: Summary of in-situ and laboratory test results for the Glacial Till

Soil parameters	No.	Range	Reference
Liquid limit (%)	2	21-37	Appendix N
Plasticity limit (%)		12-14	
Plasticity index (%)		9-23	
Modified plasticity index (%)		7.1-11.7	
Plasticity term		Low to intermediate	
Volume change potential		Very low to low	NHBC
Moisture content (%)	2	12-17	Appendix N
SPT 'N' values	5	N=9 to N=59	Appendix F
Undrained shear strength inferred from SPT 'N' values (kN/m^2)		40 to 265	
Undrained shear strength measured by shear vane testing (kN/m^2)	3	60 to 80	
Stiffness term		Firm to stiff	

5.1.5 Peterborough Member

The Peterborough Member was encountered below the superficial deposits, at depths of between 1.90m and 4.10m bgl. Where encountered, it was present to the base of exploratory holes at depths of between 2.70m and 4.45m bgl, achieving a thickness of at least 4.45m. The stratum was encountered at its shallowest in the north east corner of the site, and comprised a stiff dark grey silty clay.

A summary of the in-situ and laboratory test results in this stratum is presented in Table 13 or the in-situ and laboratory test results can be found in Appendices F and N respectively.

Table 13: Summary of soil parameters for the Peterborough Member

Soil parameters	No.	Range	Reference
Liquid limit (%)	2	40-43	Appendix N
Plasticity limit (%)		16	
Plasticity index (%)		24-27	
Modified plasticity index (%)		20-24	

Soil parameters	No.	Range	Reference
Plasticity term		Low to intermediate	
Volume change potential		Medium	NHBC
Moisture content (%)	3	18-29	Appendix N
SPT 'N' values	5	N=13 to N=47	Appendix F
Undrained shear strength inferred from SPT 'N' values (kN/m^2)		58 to 211	
Undrained shear strength measured by shear vane testing (kN/m^2)	5	60 to 80	
Stiffness term		Firm to very stiff	

5.1.6 Groundwater

Groundwater was encountered within both the made ground and the Felmersham Member, as detailed in Table **14** below.

Table 14: Groundwater results during investigation

BH/TP	Stratum	Strike (m bgl)	Remarks
WS01	Made ground (overburden fill)	1.60	n/a
WS02	Made ground (mixed fill)	2.50	n/a
WS03	Made ground (other)	2.90	n/a
TP01	Made ground (organic clay)	0.90	Seepage
TP04	Made ground (washout material)	2.10	Low flow
TP05	Made ground (washout material)	2.70	Low flow
TP07	Felmersham Member	2.80	Low flow

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations. Ongoing monitoring would be required to establish both the full range of conditions and any trends in groundwater levels.

The results of the subsequent groundwater monitoring and well surveying exercise are summarised in Table 15. During site works, two dual installation wells were identified. While the response zone cannot be accurately determined, the wells were monitored and the results presented with those installed as part of this investigation. They are also summarised below, noted as BH A and B.

Table 15: Groundwater monitoring data (23rd September to the 1st October)

Monitoring well	Response zone (m bgl)	Stratum	TOC elevation (m AOD)	Depth to water (m bgl)	Depth to water (m AOD)
WS01	1.00-3.00	MG (OF) & FM	61.39	1.42-1.43	59.97-59.96
WS02	1.00-3.00	MG (OF/OC/M)	60.70	1.62-1.65	59.08-59.05
WS04	1.00-3.00	MG (OF/OC/O)	59.28	0.78-0.90	58.50-58.38
WS05	2.00-3.00	PM	58.07	2.24-2.29	55.83-55.78
BH A (s)	Unknown, base at 2.39		59.70	1.84-1.86	57.86-57.84
BH A (d)	Unknown, base at 9.53		59.70	1.85-1.87	57.85-57.83
BH B (s)	Unknown, base at 1.66		61.13	0.89-1.14	60.24-59.99
BH B (d)	Unknown, base at 3.29		61.13	2.15-2.23	58.98-58.90
Notes: MG = made ground, OF = overburden fill, OC = organic clay, M = mixed, O = other FM = Felmersham Member, PM = Peterborough Member, (s) = shallow, (d) = deep BH A & B discovered on site installed by others historically.					

The findings reflect the perched groundwater table within the backfill and remaining Felmersham Member sand and gravel and appear to indicate a groundwater flow direction of north, towards the Tongwell Brook.

5.1.7 Visual/olfactory evidence of soil and groundwater contamination

No visual or olfactory evidence of contamination was encountered at any time during the site investigation.

5.2 Ground gas regime

The results of the ground gas monitoring and testing carried out are given in Appendix G. The minimum and maximum results are recorded in **Table 16**.

Table 16: Summary of ground gas monitoring results

Borehole	Response zone/strata	Probable source(s) of ground gas	Number of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow rate (l/hr)	Water level (m b TOC)	Atmospheric pressure (mbar)
WS01	1.00-3.00	MG (OF) & FM	2	<0.1	2.3-2.6	18.1-18.3	<0.1-0.1	1.42-1.43	1005-1026
WS02	1.00-3.00	MG (OF/OC/M)	2	<0.1	3.4-3.6	16.0-16.9	<0.1-0.1	1.62-1.65	1005-1026
WS04	1.00-3.00	MG (OF/OC/O)	2	<0.1	2.0-3.4	15.9-17.3	<0.1-0.3	0.78-0.90	1005-1026
WS05	2.00-3.00	PM	2	<0.1	0.3-3.3	15.1-20.4	<0.1-0.3	2.24-2.29	1005-1026
BH A (s)	Base 2.39	Unknown	2	<0.1	3.1-3.4	18.2-18.6	<0.1-0.1	1.84-1.86	1005-1026
BH A (d)	Base 9.53	Unknown	2	<0.1	0.1-0.2	20.7-20.8	<0.1-0.1	1.85-1.87	1005-1026
BH B (s)	Base 1.94	Unknown	2	<0.1	0.3-0.4	20.5	0.1	0.89-1.14	1005-1026
BH B (d)	Base 3.57	Unknown	2	<0.1	0.1	20.7-20.8	<0.1-0.1	2.15-2.23	1005-1026
Notes: MG = made ground, OF = overburden fill, OC = organic clay, M = mixed, O = other FM = Felmersham Member, PM = Peterborough Member, (s) = shallow, (d) = deep									

{Note: if it is possible to zone the site and/or identify separate sources of ground gas, the table should be split up accordingly, to enable the different ground gas regimes to be assessed individually}

Slightly elevated concentrations of carbon dioxide were noted in all four of the boreholes installed at the site, together with one of the four additional monitoring points. In addition, low flow rates were noted at a maximum of 0.3 l/hr during the monitoring. It should be noted that monitoring has only been undertaken during periods of high and steady pressures (1005 and 1026 mbar). Based on the monitoring to date, including frequency and temporal conditions at the time of monitoring, it is not thought sufficient to determine a worst case scenario for the site, for which additional monitoring, ideally during periods of low and / or falling atmospheric pressure would be required.

5.3 Refinement of the initial conceptual site model

The preliminary investigation has generally confirmed the anticipated ground conditions as set out in the preliminary conceptual model. The site is underlain by several types of made ground that have been placed in order to backfill the former quarry. Below the

made ground some Felmersham Member deposits still remain, which are in turn underlain by Glacial Deposits. Below the Glacial Deposits are the silty clays of the Peterborough Member.

Sources of potential contamination and ground gases have been identified, comprising organic backfill material which includes brick, wood and metals which has been placed at the site in variable thicknesses.

Groundwater has been encountered within the made ground and Felmersham Member, generally perched above the Glacial Till and Peterborough Member, at depths of between 0.78m and 2.29m bgl.

1. Direct contact, ingestion and inhalation of contaminated made ground to proposed site users (adults commercial / industrial workers),

2. Direct contact, ingestion and inhalation of asbestos fibres from made ground to proposed site users (adults commercial / industrial workers),

3. Chemical attack from contaminants in the made ground affecting potable water supply pipes and buildings,

4. Migration and leaching of contaminants both vertically and horizontally from the unsaturated made ground to groundwater receptor, and

5. Migration of contaminated groundwater to wider groundwater body and nearby groundwater abstractions.

6. Migration of contaminated groundwater to nearby Tongwell Brook, to the north of the site.

7. The accumulation of ground gases generated from made ground and possible tank leakages, as well as off site sources within buildings posing risks to proposed site users

5.3.1 Uncertainty

It should be noted that as part of this preliminary site investigation, only two rounds of ground gas monitoring have been undertaken, which typically would not be sufficient to robustly assess the worst case ground gas regime for the site. In addition, during the two monitoring events, atmospheric pressure was high and steady.

Based upon the variable nature and thickness of the backfill, the available frequency of exploratory holes, while acceptable to form a preliminary assessment of ground conditions, would benefit from additional locations in order to more robustly assess the ground conditions at the site.

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 5.3 presents the refined conceptual model, which identified the linkages that required assessment after the findings of the site investigation had been considered. These linkages together with the method of assessment are presented in Table 17.

Table 17: Linkages for generic quantitative risk assessment

Potentially relevant pollutant link	Assessment method
1. Direct contact with impacted soil by future residents	Human health GAC in Appendix J for a proposed commercial end use in line with the proposed end use.
2. Inhalation exposure of future residents to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
3. Contaminants permeating potable water supply pipes	Comparison of soil data to GAC in Appendix L for plastic water supply pipes using UKWIR (2010) guidance.
4. Leaching of soil contaminants and dissolved phase migration to the Secondary A aquifer of the Felmersham Member below the site and nearby surface water receptor	Comparison of soil and soil leachate data to Table 1 of Appendix K for a Secondary aquifer and river owing to linkages identified to the Secondary A aquifer within Felmersham Member and the freshwater receptor 126m north east of the site.
5. Migration of contaminants to wider Secondary A aquifer body	Qualitative assessment based on soil testing and groundwater testing results and monitoring visits.
6. Concentrations of methane and carbon dioxide in ground gas entering and accumulating in depressions and excavations that could affect workers, enclosed spaces or small rooms in new buildings, which could affect future residents. In the case of methane this could create a potentially explosive atmosphere, while death by asphyxiation could result from carbon dioxide.	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 al., 2007) owing to the development comprising buildings with a ground floor slab. In addition, the gas regime is considered within the context of a conceptual model as required by both aforementioned guidance documents and BS8576

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 residents

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 1.0%. The direct comparison table, which presents the chemical laboratory data set compared against the appropriate GAC, is included within Appendix M.

All samples are below the GAC and the results of the assessment indicate the strata encountered are suitable for a commercial end use.

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 within the areas investigated. It should however be noted that the made ground is variable and should, during the development of the site, contamination be encountered, further investigation may be required.

6.2.2 Inhalation exposure of future residents to asbestos fibres

The visual inspection at the laboratory identified no materials suspected of potentially containing asbestos and the scheduled laboratory screening for asbestos found no detectable asbestos fibres within the samples of made ground.

6.2.3 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 L 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 pollutant 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.

6.2.4 Leaching of contaminants to groundwater in principal aquifer and subsequent migration to surface watercourse

Soil samples were not analysed for leachable contaminants. However, based on the lack of any significantly elevated concentrations of contaminants with soil testing results, and the lack of any elevated concentrations of contaminants identified within groundwater testing, no significant risks from leaching have been identified within this preliminary investigation.

6.2.5 Migration of dissolved phase contaminants to wider secondary aquifer body

The analytical results show that the concentrations of all determinants are below their respective GAC indicating pollutant linkages associated with contaminants in the dissolved phase are incomplete and risks to controlled waters from contamination within the groundwater beneath the site are unlikely to exist.

Groundwater could not be obtained from WS04 or WS05 due to the very low rate of recharge after purging, and testing was not undertaken on groundwater within the existing boreholes at the site as the position of the well screen and as such the origin of the groundwater could not be confirmed.

Based on the available groundwater elevations, groundwater is likely to migrate in a northerly direction, at a hydraulic gradient of approximately 0.01, towards the Tongwell Brook, located 126m north of the site.

It is however noted that due to the lack of recharge, and lack of groundwater available within the northern half of the site, it has not been possible to assess the potential for groundwater contamination to be present in those areas. As such, potential pollutant linkages to the Tongwell Brook cannot be fully discounted at this stage and further works might be necessary in order to prove or disprove the presence of a pollutant linkage. These additional works may comprise the installation of additional groundwater monitoring wells to enable the testing of groundwater within the northern section of the site.

6.2.6 Ground gas

The results have been assessed in accordance with the guidance provided in BS8576 and *CIRIA Report C665*. In the assessment of risks and selection of appropriate mitigation measures, both reports highlight the importance of the conceptual model.

CIRIA C665 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.

The site is to be redeveloped with a regional distribution centre (RDC) and therefore falls under Situation A. Situation A relates to all development types except low-rise housing and, by combining the qualitative assessment of risk (see refined conceptual model in Section 5.3) 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 commercial buildings 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 3.6%. A maximum gas flow rate of 0.3 l/hr has been recorded. The calculated GSV for methane is 0.0003 l/hr and the GSV for carbon dioxide is 0.0108 l/hr. Based on the GSVs the site has been characterised as CS1.

For both types of development, CIRIA C665 provides details of the typical scope of protective measures to be adopted for the relevant site characterisation.

It should be noted that for low risk sites (Characteristic Situation 1/2), CIRIA C665 recommends a minimum thickness of gas resistant membrane of 2000 gauge, as the report considers that the standard unreinforced 1200 gauge membrane/DPM is unlikely to survive the construction process intact.

The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation has not established the ‘worst-case’ scenario and therefore further monitoring is required to characterise adequately the ground gas regime. Adequate monitoring should be carried out to enable the confident assessment of risk and subsequent design of an appropriate gas protection scheme(s) for the proposed development.

6.3 Environmental assessment conclusions

With respect to human health, the results of the GQRA indicate that relevant pollutant linkages are absent and as such risks to end users are unlikely to be present, associated with direct contact with soils at the site.

The limited available gas monitoring undertaken to date calculated GSV for methane is 0.0003 l/hr and the GSV for carbon dioxide is 0.0108 l/hr. Based on the GSVs the site has been characterised as CS1. The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation may not have established the 'worst-case' scenario and therefore further monitoring is required to adequately characterise the long term ground gas regime.

Based on available monitoring data, groundwater is considered to flow north, towards the Tongwell Brook, which is located 126m north of the site. Groundwater could only be obtained in the south of the site during this preliminary investigation, and while no soil or groundwater source of contamination was identified, there remains to potential for groundwater contamination to be present within areas of the site that have not currently been investigated.

It is recommended that further investigation of potential risks to end users and controlled waters is undertaken, including the installation of additional ground gas and groundwater monitoring wells together with additional monitoring of ground gases and groundwater, particularly in the north of the site, where available data is most limited. This would enable the refinement of potential risks as presented above, and allow the formulation of a robust risk assessment for any future development.

7 GEOTECHNICAL SITE ASSESSMENT

7.1 Engineering considerations

It is understood that the proposed development is likely to comprise the construction of distribution warehousing and associated infrastructure.

At this stage no specific information relating to building loads has been provided and therefore foundation loadings of 1000kN have been considered along with a ground floor loading of 50kN/m^2.

7.2 Geotechnical hazards

A summary of commonly occurring geotechnical hazards is given in Table 18 together with an assessment of whether the site may be affected by each of the stated hazards.

Table 18: Summary of main potential geotechnical hazards that may affect site

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Sudden lateral changes in ground conditions	✓			Variable depths and types of made ground identified beneath the site. Once building locations are known, further investigation is recommended beneath the proposed footprint.
Shrinkable clay soils	✓			Made ground identified as variably low to high volume change potential, while underlying natural strata is low to intermediate. Design of shallow foundations and floors shall need to take account potential volume change of soils.
Highly compressible and low bearing capacity soils, (including peat and	✓			The presence of very soft and soft silty clay deposits (washout material) and organic deposits will affect

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
soft clay)				ground engineering and foundation design and construction
Silt-rich soils susceptible to rapid loss of strength in wet conditions	✓			The presence of very soft and soft silty clay deposits (tailings material) will affect ground engineering and foundation design and construction
Running sand at and below water table		✓		None identified during the investigation but it is anticipated that deep excavations into sand and gravels and fill materials below perched groundwater tables could result in running sands and instability.
Karstic dissolution features (including 'swallow holes' in Chalk terrain)			✓	Geology beneath the site not affected.
Evaporite dissolution features and/or subsidence			✓	Geology beneath the site not affected.
Ground subject to or at risk from landslides			✓	Current topography and geology beneath the site does not suggest susceptibility to slope instability is present, the site being fairly flat.
Ground subject to peri-glacial valley cambering with gulls possibly present			✓	Current topography and geology beneath the site does not suggest susceptibility
Ground subject to or at risk from coastal or river erosion			✓	Topography does not suggest any significant risks.
High groundwater table (including waterlogged ground)		✓		Localised perched water identified during investigation which was undertaken during prolonged dry spell. May affect temporary and permanent works depending on weather conditions.

Hazard category (excluding contamination issues)	Hazard status based on investigation findings and proposed development			Engineering considerations if hazard affects site
	Found to be present on site	Could be present but not found	Unlikely to be present and/or affect site	
Rising groundwater table due to diminishing abstraction in urban area			✓	Unlikely to affect site due to depth to fact that the area is not urban and is unlikely that significant abstraction has been undertaken in the past.
Underground mining			✓	No underground mining will have taken place at the site.
Quarries	✓			Site was a former sand and gravel quarry and has been subsequently infilled.
Existing sub-structures (e.g. tunnels, foundations, basements, and adjacent sub-structures)			✓	The site is a former quarry, backfilled with overburden and imported soils, as such, underground structures are unlikely to be present or affect ground engineering and foundation design and construction
Filled and made ground (including embankments, infilled ponds and quarries)	✓			The site is a backfilled former quarry, therefore, this will affect ground engineering and foundation design and construction
Adverse ground chemistry (including expansive slags and weathering of sulphides to sulphates)		✓		No adverse ground chemistry identified in the natural soils found. Some could be present in areas of Made Ground in localised areas of the site.
Note: Seismicity is not included in the above table as this is not normally a design consideration in the UK.				

7.3 Foundations

7.3.1 General suitability

The exploratory holes revealed that the site is underlain by a variable thickness of made ground comprising various types of backfill over remaining thin deposits of Felmersham Member sand and gravel (where present) and Glacial Till, with Peterborough Member encountered at depth.

Given the presence of made ground of variable strength and depth, and generally thin localised bands of remaining Felmersham Member sand and gravel, any foundations would have to be taken down through any Made Ground and into the competent natural clay soils of the Glacial Till and Peterborough Member.

The Glacial Till and Peterborough Members were encountered at depths of between 1.0m and 4.30m bgl, but generally below 3.0m bgl, although they were found to be shallower in the north east of the site.

Foundations would need to be deepened and be taken down through the Made Ground to varying depths of between 1.00 and 4.30bgl into suitable strength strata. In doing this there are numerous practical considerations, which, would constrain and may potentially preclude the use of a traditional deepened spread foundation including:

- Instability is anticipated to occur when excavating to depth through uncompacted and unconsolidated fill materials, therefore it is likely that shoring would be required.
- Groundwater influx can be anticipated and this could cause instability and softening of the founding stratum prior to casting. Therefore it may be necessary to install cut off sheet piling or /and undertake dewatering to facilitate foundation construction. There would of course also be the issue of treating and disposing of the groundwater under licence.
- Disposal of significant volumes of arisings.

Therefore, when considering the above issues, it is anticipated that the use of traditional deepened spread foundations may not be economic, thus it is anticipated that a piled solution will need to be considered for structural foundations.

When considering floor slabs for buildings of this size suspended floors acting upon the foundations are not normally economic due to the widths between spans and loads carried. Therefore ground bearing floor slabs are the only real option. When taking into account the variable depths of uncompacted and unconsolidated fill present it is clear that ground improvement or piling of the variable made ground beneath the floor slabs would be necessary to support the slab and reduce the risks of differential settlement and bearing capacity failure from occurring.

Options for ground improvement might include:

- High Energy Impact Compaction
- Vibro replacement stone columns
- Excavate, stabilise/modification and recompaction exercise. stabilisation through
- Insitu soil mixing of near surface made ground deepened where required down to suitable strength natural deposits.

- Compaction and surcharge.

The use of High Energy Impact Compaction could be precluded by the presence of soft and wet silts and clays which, have been identified within exploratory holes and appear to relate the to the extensive tailing settlement ponds that were present. The clays are unlikely to improve with compaction alone due to high moisture contents and the silts could liquefy under vibration compaction so this calls into question whether the use of this technique would be effective.

The use of vibro replacement stone columns may also be precluded by the presence of the soft and wet silts and clays present within the buried tailings ponds and any buried organic matter as these deposits would not be improved by vertical vibration and could therefore result in significant stone takes potentially making this uneconomic or unfeasible.

Given the presence of saturated silts and clay fill and shallow perched water tables, it is anticipated that the volumes of cement or lime additives that would be needed to create improvement by means of insitu soil mixing techniques or exsitu excavate, treat and recompact techniques, are likely to make these options uneconomic. In addition, the presence of the shallow groundwater table would limit the practical depths of excavation, treat and recompact techniques. Stabilisation techniques affecting the Peterborough Member clays may also result in heave as lime is known to react with the naturally occurring high concentrations of sulphates, which are known to be present within these deposits.

For a surcharging solution it will be necessary to import a significant volume of overburden, place it and compact it in place and then monitor the settlement until it has reduced to a suitable level. It will then be necessary to remove the overburden from site. This would be costly and could take a significant duration.

Therefore, at this stage, based upon the information available it is suggested that ground bearing floor slabs would need to be supported on piles or would require a combination of compaction and surcharging to make them viable and avoid differential settlement risks.

7.3.2 Deep spread foundations

The outline recommendations for the design and construction of deep spread foundations in relation to the ground conditions are set out in Table 19.

Table 19: Design and construction of deep spread foundations

Design/construction considerations	Design/construction recommendations
Founding stratum	Stiff natural clay of Glacial Deposits or Stiff Peterborough Member Clays.
Depth	Foundations should be taken through any made ground and remaining Felmersham Member and into the stiff dark grey clays of the Glacial

Design/construction considerations	Design/construction recommendations
	Deposits and/or Peterborough Member. It is anticipated that foundation depths could vary between 1.0m and 4.30m bgl, but generally below 3.0m bgl, although they were found to be shallower in the north east of the site. Foundations should extend at least 0.1m into the founding stratum below any overlying made ground or to any greater depth required in respect of the special design considerations given below.
Special design considerations	Owing to the presence of shrinkable clay soils, foundations should be designed taking into account all the normal precautions, including minimum founding depths, to minimise the risk of future foundation movements in accordance with NHBC standards or similar. Minimum depths based upon clay shrinkability (Low to Medium) would be 0.90m bgl where ground is not within the zone of influence of existing or proposed trees or hedges.
Bearing capacity	Pad foundations with a width of 1.00m taken down to 4m depths on stiff Glacial Deposits or Peterborough Member (Cu 100kPa /SPT>20) at a depth of between 3.0m to 4.0m bgl may be designed using a net allowable bearing capacity of >150kN/m^2. Strip foundations with a width of 1.00m taken down to 4m depths on stiff Glacial Deposits or Stiff Peterborough Member clays(circa 100kPa /SPT>20) at a depth of between 3.0m to 4.0m bgl may be designed using a net allowable bearing capacity of 150kN/m^2. The allowable bearing capacity includes an overall safety factor of 3 against bearing capacity failure and with total settlements associated with the bearing pressure estimated to be less than 25mm.
Stability of excavations	In the event that excavations are to remain open for long periods and when considering the fact that the fill is not compacted and consolidated and that there is a potential for perched groundwater tables to be encountered it is very likely that the large pad or long strip foundation excavations would not retain their integrity and stability particularly where deeper foundations excavations are to be employed down to depths of around 4m bgl. Therefore consideration should be given to the use of trench support systems or battering and stepping back of trench and pad excavations.
Dewatering	Perched groundwater was generally encountered within the made ground and Felmersham Member sands and gravels sitting upon the less permeable clays of the Glacial Till and Peterborough Member clays. This groundwater has caused localised softening within the top of the underlying clays extending to about 1m into the clays. As such, perched groundwater ingress into open excavations extending down into the underlying clay may occur and should be avoided as it will cause softening and degradation of the founding soils, Dewatering or sheet piling may therefore be required to facilitate foundation excavation. The nature of the soils encountered suggests that pumping from open sumps should be sufficient to keep the excavations reasonably dry, however, sheet piling or box shoring, may also be required to reduce

Design/construction considerations	Design/construction recommendations
	groundwater ingress and maintain stability Pumping from open sumps in non-cohesive soils should be avoided as this can result in instability and general loosening of the soils at the base of the excavation. It is likely that dewatering in non-cohesive soils will require the use of well-pointing systems. Should mass ground improvement techniques such as soil mixing stabilisation be utilised the need for dewatering may not be required.
Construction considerations	All foundation excavations should be inspected, and any made ground and soft, organic or otherwise unsuitable materials removed and replaced with mass concrete.

Once the proposed development has been finalised it is recommended that additional ground investigation be undertaken under the building footprint in order to increase the available geotechnical data to assist in refining the foundation designs.

Should a piled foundation solution be preferred to the over depended traditional strip or pad foundation options discussed, additional ground investigation would be required in order to obtain information upon the deeper geology. At this time there is insufficient ground investigation data available to allow a piled foundation solution to be designed. Deep boreholes would need to be extended to depths in excess of and at least 5m below the anticipated depth of the toe of the piles to provide information and strength data for the calculation of pile capacities.

7.3.3 Foundation works risk assessment

It is anticipated that a foundation works risk assessment report will not be required for the development because no significant free-phase product was identified at the site, and concentrations of chemicals of potential concern (COPC) within made ground, natural soils and groundwater were typically below corresponding GAC.

7.3.4 Floor slabs

It is assumed that the design loading for the proposed ground floor slabs is 50kN/m^2.

The sub-grade soil conditions beneath the footprint of the proposed buildings comprise very soft to firm or loose variable made ground. As such, it is not possible to recommend a ground bearing floor slab could be adopted without some ground improvement.

Therefore, ground-bearing floor slabs can only be adopted if the formation is first treated by a ground improvement techniques or piling.

At this stage, based upon the information available and for the reasons outlined above in section 7.3.1 it is suggested that ground bearing floor slabs would need to be supported on piles.

7.3.5 Roads, hardstanding and drainage

In the 1m to 1.5m below the proposed finished ground level the exploratory holes have revealed a soil profile comprising very soft to firm and loose, variable made ground.

In pavement design terms, the groundwater conditions are anticipated to comprise a intermediate water table, i.e. between 300mm and 1000mm of the pavement formation level, based on current site levels.

At this stage, due to the variability of the made ground, and the lack of any in-situ California bearing ratio (CBR) testing, it is not possible to estimate a CBR value for the soils and groundwater conditions described above although it is anticipated that only very low CBR would be available.

The sub-grade soils at the site may be susceptible to improvement by rolling with conventional compaction plant or potentially the High Energy Impact Compaction rollers across the wider access highways, car parking and service yards however as detailed above in section 7.3.1 it is uncertain whether this would be very affective, particularly at depth.

Indeed it is likely that deeper and more robust forms of treatment will be required in the service yards and particularly at the loading/docking bay interface with the buildings and therefore more robust forms of ground improvement or improvements to greater depths might be needed in these areas such as vibro replacement, soil mixing or even soil stabilisation. The sub-grade soils can be regarded as frost-susceptible, based upon the criteria given in Appendix 1 of TRRL (1970) Report Road Note 29. When the sub-grade is frost-susceptible the thickness of sub-base must be sufficient to give a total thickness of non-frost-susceptible pavement construction over the soil of not less than 450mm.

7.3.6 Chemical attack on buried concrete

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 brownfield development. A suite of chemical analyses appropriate to this site classification was carried out on soil samples.

“Characteristic value” is the highest result, or mean of the two highest if you have 5 to 9 readings from one area. The maximum water-soluble sulphate content in soil of 0.327g/l has been taken as the characteristic value. As this value is below the limiting value of 3.0g/l consideration of magnesium is not required. Based on Table C2 in the BRE guidance, Result one for Design Sulphate Class for the site is DS-1.

Groundwater was not observed during the investigation, therefore, there is no second result for Design Sulphate Class based on groundwater considerations.

From consideration of results (one two and three) a Design Sulphate Class of DS-1, may be adopted for the site. Based on the shallow, variable groundwater table it has been

assumed that groundwater conditions are mobile. From consideration of the characteristic pH value, an Aggressive Chemical Environment for Concrete classification of AC-1 may be assumed for design purposes.

It should be appreciated that the Underlying Peterborough Member strata, not tested as part of this preliminary shallow investigation is a pyritic strata and is well known to have high naturally occurring concentrations of selenite (sulphates) within it. This would require an increase in concrete mix design classification to prevent sulphates affecting deep in ground concrete such as piles.

7.3.7 Soakaways

While soakaways have not been undertaken as part of this preliminary site investigation, it is unclear if they would be viable. While the sand and gravel of the Felmersham Member is present in variable thicknesses at the site, the majority of the site is underlain by either cohesive, clayey made ground, or clays of the Glacial Till and Peterborough Member and therefore it is suggested that soakaway drainage systems are unlikely to be feasible.

Should soakaway drainage be required to be considered, further investigation, including percolation testing would be required to assess the potential viability of soakaways within any new development at the site layout.

8 REUSE OF MATERIALS AND WASTE

8.1 Reuse of suitable materials

Under the Waste Framework Directive naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development.

In accordance with the definition provided in the Waste Framework Directive, materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Thus, soils that are not of clean and natural origin, i.e. made ground (whether contaminated or not) and other materials such as recycled aggregate, do not become waste until the aforementioned criteria are met.

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current re-use scenarios covered by the CoP comprise:

- Re-use on the site of origin (with or without treatment)
- Direct transfer of clean and natural soils between sites
- Use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed Soil Treatment Facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not currently permitted under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or re-used in line with the CoP. The MMP is likely to form part of the site waste management plan.

The site has been developed previously and the investigation has confirmed the presence of made ground. Therefore, before any excavation works begin on-site, an MMP will need to be prepared, reviewed by a QP; and a Declaration lodged with the EA.

As noted above, under the Waste Framework Directive naturally occurring soils are not considered waste and therefore arisings of clean natural soils, e.g. from foundation and drainage excavations, may be re-used on the site. However, it is important that these soils should be stockpiled separately and not become cross-contaminated with made ground / contaminated soils or construction wastes.

If it is proposed to import clean and naturally occurring soils direct from another site, the receiving site's MMP would need to be updated in advance of importation.

8.2 Treatment to meet suitable-for-use criteria

Where materials do not meet the suitable for use criteria it may be possible to treat them under an environmental permit (mobile treatment licence) to enable them to be reused onsite.

To enable the treatment options to be determined, an options appraisal and a remediation strategy document will be necessary to support discussion of the issues with regulators and third parties.

8.3 Reuse of waste materials

If material is discarded as waste then its reuse on site may still be possible. Waste soils and recycled aggregate can be reused on site under a standard rules environmental permit or a U1 waste exemption from the Environmental Permitting (England and Wales) Regulations 2010 provided that they are suitable for the proposed use, i.e. not cause harm to human health or the environment. However, it should be noted that these have strict limits on the quantity of material that can be reused.

8.4 Wastes for landfill disposal

Wastes require pre-treatment prior to disposal at landfill. Pre-treatment must be a physical, thermal, chemical or biological process (including sorting) that changes the characteristics of the waste to reduce its volume, reduce its hazardous nature, facilitate its handling and enhance its recovery.

The latest, edition of the EA's 'Technical Guidance WM3' (2015) Guidance on the classification and assessment of waste, requires that within a mixed waste* the separately identifiable wastes are assessed separately. Mixing of different types of

hazardous waste and hazardous waste with other waste substances is prohibited under the Waste Framework Directive. Wastes that have been mixed must be separated whenever possible.

It is best practice to provide your waste carrier (or the disposal site) with details of how the waste has been treated. Your waste carrier may provide a pre-treatment confirmation form or space on the waste transfer note to detail the pre-treatment.

The classification of waste soil is a two-stage process, the first being an assessment of whether the soil is considered hazardous or not following the guidance within Technical Guidance WM3. For off-site disposal to landfill the results of Waste Acceptance Criteria (WAC) testing must then be reviewed to establish if the soil is acceptable at the relevant class of landfill or requires pre-treatment to reduce specific hazardous properties.

8.4.1 Waste acceptance criteria

All inert, stable non-reactive hazardous and hazardous wastes have limit values (waste acceptance criteria) set out in legislation that must be met before that class of landfill can accept the waste. Currently, no WAC are in place for non-hazardous waste.

Soil and other materials that are found not to be hazardous may be classified as either non hazardous or inert. In order to determine whether they can be classed as inert the soil must be tested and found to be below the inert waste acceptance criteria.

8.4.2 Waste sampling plan

Technical Guidance WM3 sets out in Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. At this stage RSK consider that the level of soil sampling is not sufficient to fully categorise the material all of the material types at the site.

RSK recommends that a Sampling Plan be prepared to support any waste classifications and hazardous waste assessments, prior to development.

8.4.3 Preliminary waste assessment

Given the level of data obtained, scale of the development and variability of the site soils the following assessment should be considered indicative only and further assessment should be undertaken following the preparation of a Waste Sampling Plan.

Envirolab (an RSK company) has developed a waste soils characterisation assessment tool (HASWASTE), which follows the guidance within Technical Guidance WM3. The analytical results have been assessed using this tool for potential off-site disposal of materials in the future. The results are presented in Table 20.

Table 20: Results of waste soils characterisation assessment (HASWASTE)

Sample ref/location	Strata	Waste classification
WS02 at 1.80m bgl	MG – Organic Clay	Not hazardous
WS04 at 0.50m bgl	MG – Overburden Fill	Not hazardous
WS06 at 0.40m bgl	MG – Mixed Fill	Not hazardous
TP01 at 0.50m bgl	MG – Mixed Fill	Not hazardous
TP02 at 0.20m bgl	Topsoil	Not hazardous
TP04 at 0.60m bgl	MG – Mixed Fill	Not hazardous
TP05 at 0.50m bgl	MG – Mixed Fill	Not hazardous
TP07 at 0.20m bgl	Topsoil	Not hazardous
Notes:		

None of the samples were classified as hazardous waste. Therefore to determine whether waste might be classified as inert or non hazardous WAC testing will need to be undertaken.

8.4.4 Asbestos within waste soils

The latest, edition of Technical Guidance WM3, requires that within a mixed waste the separately identifiable wastes be assessed separately.

For instance where waste soil contains identifiable pieces of asbestos (visible to the naked eye) the asbestos should, where feasible, be separated from the soil and classified separately.

Samples were collected from site and analysed for the presence of asbestos, the results of which are presented in Appendix H. Analysis confirmed that asbestos is not present within any of the samples tested.

If identified, visible asbestos containing material should, where feasible, be separated from soils and classified as stable, non-reactive hazardous waste, which can then be disposed of within a stable non-reactive hazardous waste landfill or a special cell in a non-hazardous waste landfill.

8.5 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 April 2015), standard rate landfill tax is £82.60 per tonne and rising to £84.40 after the 1st April 2016.

The lower rate of landfill tax applicable to less polluting wastes (i.e. 'inert' wastes) remains at £2.60 per tonne.

Material disposed of at a soil treatment centre will not be subject to landfill tax.

8.6 Groundwater

When there is an intention to discard groundwater, chemical test results will indicate the appropriate disposal options. This could include disposal to treatment facility, via consent (issued by the water authority) to foul sewer or via consent (issued by the EA) to a watercourse or land.

8.7 Recommendations

RSK recommends that consideration as to how potentially waste soils will be dealt with as part of this development is given as early in the project planning process as possible. Such planning can lead to cost savings where potentially waste soils are viewed as a resource and retained on-site as part of the development. We also recommend, where off-site disposal is being considered, that appropriate facilities are identified and discussions initiated to confirm suitability of the facility to take the material. Potentially, these may include soil treatment facilities as well as landfills.

RSK can provide specialist advice to assist in this process, which can be complex and subject to regular regulatory change.

As noted above, made ground soils at the site are indicated to not be hazardous, therefore WAC testing would be required in order to determine if the waste soils are inert or not. Additionally, based on the variability of the made ground soils, it is recommended that further testing be undertaken in order to fully categorise each type of made ground at the site.

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Environmental

With respect to human health, the results of the GQRA indicate that relevant pollutant linkages are absent and as such risks to end users are unlikely to be present, associated with direct contact with soils at the site.

The limited available gas monitoring undertaken to date calculated GSV for methane is 0.0003 l/hr and the GSV for carbon dioxide is 0.0108 l/hr. Based on the GSVs the site has been characterised as CS1. The gas monitoring programme carried out to-date provides some evidence for an initial assessment of redevelopment requirements. However, it is considered that the monitoring undertaken during this investigation may not have established the 'worst-case' scenario and therefore further monitoring is required to adequately characterise the long term ground gas regime.

Based on the available groundwater elevations, groundwater is likely to migrate in a northerly direction, at a hydraulic gradient of approximately 0.01, towards the Tongwell Brook, located 126m north of the site.

Based on available monitoring data, groundwater is considered to flow north, towards the Tongwell Brook, which is located 126m north of the site. Groundwater could only be obtained in the south of the site during this preliminary investigation, and while no soil or groundwater source of contamination was identified, there remains to potential for groundwater contamination to be present within areas of the site that have not currently been investigated.

It is recommended that further investigation of potential risks to end users and controlled waters is undertaken, including the installation of additional ground gas and groundwater monitoring wells together with additional monitoring of ground gases and groundwater, particularly in the north of the site, where available data is most limited. This would enable the refinement of potential risks as presented above, and allow the formulation of a robust risk assessment for any future development.

9.2 Reuse of materials and waste

Based on currently available testing, the majority of waste soils from the site are likely to be classified as not hazardous, however once volumes of waste material are known, further testing would likely be required in order to fully and robustly classify the waste soils from the site. Additionally, WAC analysis would be required in order to determine if soils are inert or not.

9.3 Geotechnical

The exploratory holes revealed that the site is underlain by a variable thickness of made ground comprising various types of backfill over Felmersham Member and Glacial Till, with Peterborough Member encountered at depth.

The Glacial Till and Peterborough Members were encountered at depths of between 1.0m and 4.30m bgl, but generally below 3.0m bgl, although they were found to be shallower in the north east of the site.

Foundations would need to be deepened and be taken down through the Made Ground to varying depths of between 1.00 and 4.30bgl into suitable strength strata. In doing this there are numerous practical considerations, which, would constrain and may potentially preclude the use of a traditional deepened spread foundation. Therefore, when considering the above issues, it is anticipated that the use of traditional deepened spread foundations may not be economic, thus it is anticipated that a piled solution will need to be considered for structural foundations.

When considering floor slabs for buildings of this size suspended floors acting upon the foundations are not normally economic due to the widths between spans and loads carried. Therefore, ground bearing floor slabs are the only real option. When taking into account the variable depths of uncompacted and unconsolidated fill present it is clear that ground improvement or piling of the variable made ground beneath the floor slabs would be necessary to support the slab and reduce the risks of differential settlement and bearing capacity failure from occurring. At this stage, based upon the information available it is suggested that ground bearing floor slabs would need to be supported on piles or would require a combination of compaction and surcharging to make them viable and avoid differential settlement risks.

Once the proposed development layout has been finalised it is recommended that additional ground investigation is undertaken under the building footprint in order to increase the available geotechnical data and refine foundation design. Should a piled foundation solution be preferred to the strip or pad options discussed, additional deeper boreholes would be required in order to obtain information for deeper foundation design.

From consideration of sulphate content results the Design Sulphate Class of **DS-1 AC-1** may be assumed for design purposes for foundations.

While soakaways have not been undertaken as part of this preliminary site investigation, it is unclear if they would be viable. While the sand and gravel of the Felmersham Member is present in variable thicknesses at the site, the majority of the site is underlain by either cohesive, clayey made ground, or clays of the Glacial Till and Peterborough Member and therefore it is suggested that soakaway drainage systems are unlikely to be feasible.

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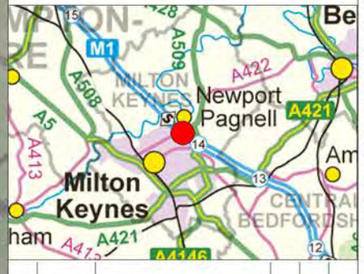
FIGURES

Site Location

Scale = 1:125,000 @ A3



Rev	Date	Description	Drn	Chk	App
00	21.09.15	313114	SP	RG	ML

Newport Pagnell

RSK

Figure 1

Site Loction Plan

0 300

Metres

Scale = 1:10,000 @ A3

N W E S

REV 00

File Name : \\cv-nas1\AsbestosGeoscience Data\Cov Ground and Environment\Jobs\313000 ONWARDS\313101 - 313199\313114 - Willen Road Newport Pagnell\10 Drawings\GIS\10 - Workspaces

Site boundary

Trial Pit (TP)

Window Sample (WS)

Indicative location of existing Boreholes (BH)

Indicative location of existing Excavations (A-H)

Rev	Date	Description	Drn	Chk	App
00	21.09.15	313114	SP	RG	ML

Newport Pagnell

RSK

Figure 2

Exploratory Location Plan

0 90

metres

Scale = 1:3,000 @ A3

N W E S

REV 00

File Name : \\cv-nas1\AsbestosGeoscience Data\Cov Ground and Environment\Jobs\313000 ONWARDS\313101 - 313199\313114 - Willen Road Newport Pagnell\10 Drawings\GIS\10 - Workspaces

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 12th August 2015.. 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 AND WALKOVER CHECKLIST

PHOTOGRAPHIC LOG		
Photo no. **1**	**Date:** **10.08.2015**	
Direction photo taken: Pit identified in south eastern corner of site.		
Description: Sand and gravels overlie clay material. Water settling on boundary above impermeable member.		

Photo No. **2**	**Date:** **10.08.2015**	
Direction photo taken: Facing North East from centre of site.		
Description: Field with hummocky terrain, hedged field boundaries and copses of trees.		

Photo No.	Date:	
3	10.08.2015	
Direction Photo Taken: Facing East, taken from south east corner of site.		
Description: Field, hedged field boundaries and copses of trees. Spoils and hummocky terrain highlighting previous land use.		

Photo No.	Date:	
4	10.08.2015	
Direction Photo Taken: Facing south from a central location along Willen Road entrance.		
Description: Site entrance on eastern margin of site, off Willen Road.		

Photo No.	Date:	
5	10.08.2015	
Direction Photo Taken: Facing north across the site from a central position in the south of the site.		
Description: Open field, hedge field boundaries, M1 and present logistics hub site along western margin.		

WALKOVER SURVEY CHECKLIST: GEOSCIENCES

SITE NAME: Willen Road, Newport Pagnell

Mark locations of features described on a map and give them a reference number.

Describe features in as much detail as possible. Continue on the back of the checklist if necessary, using the feature letter for reference. Take photos of site and relevant features in immediate surrounding area.

The walkover survey can also provide information for the environmental consultant in planning the site investigation.

Features	Description
a) Describe materials exposed in nearby road or railway cuttings, in pits and quarries and natural exposures of soils and rocks near to the site. *This will give an indication of the geology beneath the site*	Pits in the southern regions of the site and trial holes along the line adjacent to the M1, expose 3.5 metres of geology; sands and gravels overlie clay materials. In the southern region, topsoil has been stripped and stockpiled in bunds around the edges of the site. Overburden soils and imported Oxford Clay materials have been used to restore the majority of the site.
b) Describe surrounding properties/land use and name occupiers. Type of boundary demarcation (if any) on each side. *This will identify any potential sources of contamination from adjacent sites and any sensitive receptors*	The M1 stretches along the western limits of the site, whilst in the north the A422 lies adjacent to the site. Post and rail fences, hedges and drainage ditches are present forming the boundary. Open farmlands, fields and out buildings are identified to the east of the site. The site is separated in the east by a mix of boundaries including post fences, hedges, ditches and Willen Road. To the north beyond the A422, lies an active quarry site were sand and gravel resources are currently being extracted.
c) Describe present land use. Are there areas of hardstanding (if yes describe location, types and condition)? *Especially crops, for consideration of appropriate timing for further investigation, compensation and reinstatement. Also note hardstanding, obstructions etc. Note any old buildings/ivy covered trees as these may be used by owls or bats*	The site is approximately 16 ha of disused ground. Field margins are present and are defined by hedgerows punctuated by a variety of trees and post fencing. Temporary rail fences are currently in use at the entrance to the site (see photo 2 and 5). Main site access is from the east along a concrete track.

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: Willen Road, Newport Pagnell

Features	Description
d) Describe the site in terms of ground slopes and changes in slope. Is there any evidence of subsidence or landslip/slope erosion?	The site is relatively flat land in the northern regions with hummocky terrain, pits and spoils present in the southern regions of the site, highlighting previous excavation.
e) Describe the types and condition of surface vegetation. .	At the time of walkover in August, pits in the south exposing surface geology, were boggy with surface water settling on the impermeable clay member. Wetland vegetation present. Across the site, vegetation is unhealthy with nettles and invasive weeds dominating. Trees only identified around the periphery marking the boundary to the site.
f) Note the number, location, height and species of trees and hedges.	Trees and hedges are predominantly broad leaved.
g) Describe any evidence of animal activity.	None noted.
h) Describe any damage to existing structures on site or adjacent to the site	No structures on site.
i) Note the remains of structures that have been demolished. Look for evidence of remnants of any historical structures.	None Noted

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: Willen Road, Newport Pagnell

Features	Description
j) Note any abrupt changes in ground level. Is there evidence of Made Ground/fill on site	The site is relatively flat in the northern regions with hummocky terrain, pits and spoils present in the southern regions of the site, excavated during quarrying.
k) Note any surface hollows.	Pits and trial holes were identified in the southern regions along the line adjacent to the M1.
l) In areas of country underlain by coal or other minerals note any hummocky ground.	None noted.
m) Note any evidence of gas from nearby landfill sites	None noted.
n) Are there any evidence of gas protection measures (gas membrane, gravel filled trenches, venting pipes, cowls etc)	None noted.
o) Note the location of streams, culverts, ponds, seepages and sinks and signs of previous flooding. Note direction of flow. Note where the stream is accessible for sampling. May need to take dimensions of stream.	None noted on site.
p) All surface waters should be examined for evidence of contamination.	Surface water identified in pits and trial holes is discoloured due to the content of dissolved sediments.

Features	Description
q) Note site drainage. Are there any drain covers/soakaways (if yes describe locations). Are there any outfalls to surface watercourses? Are there any interceptors/lagoons/effluent treatment plants?	None identified. However, ditches are present around the edges of the site allowing for likely drainage.
r) Describe storage of fuels and chemicals. Are there any drums/containers (if yes, describe quantity, full/empty, stored on hardstanding/softstanding, bunded)?	None noted.
s) Note any discoloured ground. *This may provide evidence of contamination.*	None noted.
t) Accidents: In the event of a large spillage would runoff affect any vulnerable watercourses/culverts?	None noted.
u) Waste: Are there any waste skips on site? Are waste storage facilities adequate? Is there any litter/fly-tipped material?	None noted.
v) Are there any electricity substations on or adjacent to site?	No buried service easements are known to exist on site and only overhead HV was noted to be present crossing the eastern part of the site.
w) Identify any old structures, pipework etc. wherever possible and, if safe, inspect for evidence of stored waste.	None noted.
x) Examine surrounding areas for evidence of contamination which could migrate onto the site.	None Noted
y) Note the presence of any underground structures, services, mine workings, tunnels etc	None noted.
z) Note any anecdotal information in past uses of the site.	None noted.

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: Willen Road, Newport Pagnell

Features	Description
aa) Description of buildings on site. Is there any evidence of asbestos construction materials, e.g. roofing, insulation materials. Do any of the buildings have basements? Do any of the buildings have a boiler room? (if yes describe fuel type and storage arrangements)	None noted.
bb) Identify potential access routes to the site for plant for the site investigation	Access to the site has been identified off Willen Road, facing west.
cc) Evidence of buried services (water, gas, electricity, telephone, cable, television, pipelines)	Overhead services have been identified along the edges of Willen Road and the A422, which are adjacent to this site.

Walkover survey completed

Name

Date

Notes:

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
DESK STUDY INFORMATION

MILTON KEYNES COUNCIL

APPLICATION FOR PLANNING PERMISSION
MINERAL DEVELOPMENT AND/OR LANDFILLING

TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)
TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT PROCEDURE) ORDER 1995

SIX completed copies of this form, plus the associated plans, statements, sections, drawings notices and certificates, and the required fee should be submitted to: Environment PO Box No 112, Civic Offices, 1 Saxon Gate East, Central Milton Keynes MK9 3HQ	**For Office Use Only** Application No: Date Received:

1. Applicant (in block capitals)

Name GFXH PROPERTIES LTD

Address 98 HIGH STREET

NEWPORT PAGNELL, BUCKS.

Postcode MK16 8EJ Tel No [redacted]

Agent (if any) to whom correspondence should be sent (in block capitals)

Name DAVID JARVIS ASSOCIATES LTD

Address 1 TENNYSON STREET,

SWINDON

Postcode SN1 5DT Te[redacted]

2. Particulars of proposal

(a) Full address or location of the land to be developed	Site area (hectares)
LAND AT CALDECOTE FARM, OFF WILLEN ROAD, NEWPORT PAGNELL, BUCKS.	19.2

(b) Briefly describe the proposed development

CONSTRUCTION OF SITE ACCESS. EXTRACTION OF SAND AND GRAVEL. RESTORATION TO AGRICULTURE USING IMPORTED INERT FILL AND IN SITU OVERBURDEN AND SOILS.

(c) Give particulars of the applicant's interest in the site (e.g. owner, lessee, prospective purchaser etc)

LESSEE.

(d) What is the present use of the land?

AGRICULTURE.

(e) What is the intended afteruse for which the site will be prepared following the proposed development?

AGRICULTURE

(f) Excluding aftercare, for how long will the development take place (years/months)?

5 YEARS

(g) State the proposed days and hours of operation

Weekdays	7 a.m. to	6 p.m.
Saturday	7 a.m. to	1 p.m.
Sunday	— a.m. to	— p.m.
Bank or Public Holidays	— a.m. to	— p.m.

(h) State the average depth (in metres) of topsoil, subsoil and other overburden on site

topsoil	0·26 metre(s)
subsoil	0·94 metre(s)
other overburden	— metre(s)

(i) Will the proposal involve the importation of additional top or sub soil? (Yes/No)

NO

Does the proposal involve the erection of plant or buildings? Yes/No
If yes please remember to answer the questions in section 4

YES

3. Mineral Extraction

(a) Describe the minerals to be extracted and what they will be suitable for? (give the approximate (percentage) proportions of each material)

SAND AND GRAVEL, SUITABLE FOR GENERAL CONSTRUCTION PURPOSES INCLUDING READY MIXED CONCRETE

(b) For how long do you expect mineral extraction to take place?

3 Years 7 Months

(c) describe briefly how the mineral will be worked (e.g. wet or dry, dredger, dragline, backhoe etc)

WORKED DRY (DEWATERED) USING A BACK ACTOR.

(d) How much material will be removed from the site?
(Please give your answer in both tonnes and cubic metres)

168,750 cubic metres 270,000 tonnes

(e) What is the expected maximum annual output?

75,000 tonnes

What is the expected maximum depth of the working below surface level?

3·5 metres

(f)		State Yes or No
	Will excavations extend below the local water table?	YES
	Will explosives be used on site?	NO
	Will restoration involve the importation of landfill material? If yes please remember to answer the questions in Section 5.	YES

4. Plant and Buildings

(a) Are the minerals to be treated on the site before their removal? (Yes/No) YES

(b) Will use be made of plant authorised under earlier permissions? If yes, give its location.

NO

(c) Describe briefly all the plant, structures and buildings to be erected on site including the output of the plant.

MOBILE SCREENING AND WASH PLANT, WEIGHBRIDGE AND ASSOCIATED OFFICE.
75,000 TONNES PER ANNUM

(d)	In respect of the proposed plant, buildings and structures, are any of the following aspects to be reserved for detailed approval?	State Yes or No
	Siting	NO
	Design	NO
	External Appearance	NO

(e) **Give details and quantities in cubic metres of any minerals or other materials to be imported to the site for storage and/or processing**

N/A

(f) Does the application involve the use or storage of any hazardous substances? If yes state what it is and in what quantities.

FUEL OIL - STORED ABOVE GROUND IN BUNDED TANKS.

(g) How will waste water from processing plant, foul sewage and other water either present on, or draining into the site, be disposed of?

1. PLANT WASTE WATER CONTROLLED BY A RE-CIRCULATION SYSTEM. SURPLUS DISCHARGED TO SEWER.
2. FOUL SEWAGE TO SEPTIC TANK.

5. Landfill

(a) What sort of material will be used to landfill the site?	Estimated approximate proportion by volume
Naturally occurring excavated material (e.g. soils etc)	75 %
Builders Waste (of a non putrescible nature)	25 %
Industrial and Commercial waste	0 %
Household refuse	0 %
Other waste (Please describe the waste in box "b" below)	0 %

(b) Describe the waste if it falls within the "Other waste" category above.

(c) Are liquid wastes to be deposited? (Yes or No) NO

(d) What will be the expected maximum depth of filling material?	What is your estimate of the capacity of the void to be filled?
2.3 metres	168,750 cubic metres

(e) For how long do you expect landfilling to take place? 3 Years 7 Months

(f) How much uncompacted material do you intend to import to fill the above void? (This figure will be greater than your answer in 5(d) if compaction is anticipated) 168,750 cubic metres

6. Traffic and Transport

(a) Give details of the anticipated average and maximum number of lorry movements to and from the site EACH DAY
(N.B. one round trip = two movements)

	Average daily movements	Maximum daily movements
Mineral transport lorries	29	32
Landfill transport lorries (Not skip lorries)	17	20
Skip lorries	23	25
Other lorries	0	0
Total	69	77

(b) What is the anticipated typical size of the lorries when unladen?

Mineral transport lorries	20 tonnes
Landfill transport lorries (Not skip lorries)	20 tonnes
Skip lorries	5 tonnes
Other lorries (e.g. builders lorries)	N/A tonnes

(c) What are the main locations to which waste material will be dispatched? (Please estimate approximate proportions)

(a) N/A	%
(b)	%
(c)	%
(d)	%

(d) Describe the route to be used by lorries between the site and a main road (i.e. 'A' class road or motorway) and if the return route is different, please give details.

FROM SITE ACCESS ONTO THE A509.

(e) What are the main locations from which waste material will be received? (Please estimate approximate proportions)

(a) LOCAL MARKET (25 MILE RADIUS)	100 %
(b)	%
(c)	%
(d)	%

(f) Does the proposal involve the construction of a new access or alteration to an existing access to or from a public highway? (Yes or No) YES - ALTERATION OF EXISTING FIELD ACCESS.

(h) What measures will be taken to remove the mud from the wheels of lorries before they enter the public highway?

SITE BASED WHEEL CLEANING FACILITY AND SURFACED INTERNAL HAUL ROAD.

(i) If transportation by any means other than lorries is envisaged, please give details

3 SITE STAFF - BY CAR.

LIST HERE THE PLANS, DRAWINGS, SECTIONS AND DOCUMENTS WHICH ARE TO FORM PART OF THIS APPLICATION. (Please ensure each plan, drawing, and section is clearly titled and numbered. Any intended for illustrative purposes only, and therefore not forming part of the application, should be clearly labelled to this effect).

Number	Title
	SEE SUPPORTING STATEMENT,
	ENVIRONMENTAL STATEMENT
	& NON-TECHNICAL SUMMARY.

I/We hereby apply for planning permission to carry out the development described in this application and on the attached plans, drawings, sections, and documents.

Date 7.3.03

Signed [redacted]

On behalf of GFXH PROPERTIES LTD

NOTE: Signature also required on certificate section overleaf.

NOTE: This application is for planning permission only and does NOT convey any consent which may be required under building regulations, or the legislation relating to statutory undertakers equipment, rights of way, listed buildings, advertisements, water and pollution control, mines and quarries safety legislation, etc.

Town and Country Planning (General Development Procedure) Order 1995

CERTIFICATE UNDER ARTICLE 7

Certificate A(a)

I certify that:

at the beginning of the period of 21 days ending with the date of the accompanying application/appeal* nobody, except the applicant/appellant*, was the owner of any part of the land to which the application/appeal relates.

Certificate B(a)

I certify that:

~~I have~~/The applicant has/~~The appellant has~~* given the required notice to everyone else who, at the beginning of the period of 21 days ending with the date of the accompanying application/~~appeal~~, was the owner(a) of any part of the land to which the application/~~appeal~~* related, as listed below.

Owner's(b) name	Address at which notice was served	Date on which notice was served
MR. J. MORGAN AND MRS SAUNDERS	CALDECOTE FARM WILLEN ROAD NEWPORT PAGNELL MK16 OJJ	7.3.03

Agricultural Holdings Certificate (a)

~~None of the land to which the * application/appeal relates constitutes or forms part of an agricultural holding.~~

or *~~I have~~/the applicant has/the applicant has given the requisite notice to every person other than *~~myself~~/himself who, 21 days before the date of the *application/~~appeal~~, was a tenant of any agricultural holding any part of which was comprised in the land to which the *application/~~appeal~~ relates.

If you are the sole agricultural tenant enter "None"	Name of tenant	Address	Date of service of notice
	MR. J. MORGAN	CALDECOTE FARM WILLEN ROAD NEWPORT PAGNELL MK16 OJJ	7-3.03

Date 7.3.03

Signed [redacted]

On behalf of GFHX PROPERTIES LTD

*delete where inappropriate

(a) This Certificate is for use with applications & appeals for planning permission (Articles 7 & 9(1) of the Order). One of the certificates A or B must be completed, together with the Agricultural Holdings Certificate.

(b) 'Owner' means a person having a freehold interest or a leasehold interest the unexpired term of which is not less than Seven years.

MILTON KEYNES COUNCIL

ENVIRONMENT DIRECTORATE
TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)
TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT PROCEDURE) 1995

Application no: 03/00422/MIN

To: GFXH Properties Ltd
C/o David Jarvis Associates Ltd
1 Tennyson Street
Swindon
SN1 5DT

IN PURSUANCE of their powers under the above mentioned Act and Orders the Milton Keynes Council as Local Planning Authority hereby **Permit** the

CONSTRUCTION OF SITE ACCESS, EXTRACTION OF SAND AND GRAVEL, RESTORATION TO AGRICULTURE USING IMPORTED INERT FILL AND IN SITU OVERBURDEN AND SOILS

At Land At Caldecote Farm, Willen Road, Newport Pagnell

in accordance with your application, valid on 14.03.2003 and the plans and particulars accompanying it subject to the following condition(s) and reason(s):

(1) The development hereby permitted must be begun before the expiration of five years from the date of this permission.

Reason: To prevent the accumulation of planning permissions; to enable the Local Planning Authority to review the suitability of the development in the light of altered circumstances; and to comply with section 90(1) of the Town and Country Planning Act 1990.

(2) No materials shall be deposited on the site other than inert waste.

Reason: To specify the materials to be tipped in the interests of the general amenity of the area.

(3) Prior to the commencement of each phase, the boundary as identified on the submitted application plan no.3 dated 7 March 2003, shall be clearly identified by the insertion in the ground of wooden stakes of minimum one metre height at approximately 20 metre intervals, or by other suitable boundary identification markers or fencing as may be approved in writing by the Mineral Planning Authority.

Reason: To delimit the boundary of mineral extraction operations and ensure the safety of users of the locality.

Environment, PO Box No 125, Civic Offices, 1 Saxon Gate East, Central Milton Keynes MK9 3ZJ
Development Control Enquiries Direct Line (01908) 252358
Tel: (01908) 691691 Fax: (01908) 252211 Hays DX 31406
www.mkweb.co.uk/development-control

(4) Except in emergencies to maintain safe quarry working (which shall be notified to the Mineral Planning Authority as soon as practicable) or unless the MPA has agreed otherwise in writing:-

(a) no operations, other than water pumping, servicing, environmental monitoring, maintenance and testing of plant shall be carried out at the site and no heavy vehicles shall enter or leave the site outside of the following times:-

07.30 hours and 17:30 hours Monday to Friday
07.30 hours and 13:30 hours Saturday

(b) No operations, other than those excluded above shall be carried out on bank or public holidays.

Reason: To protect the amenities of local residents

(5) The working, restoration and aftercare of the site shall be carried out only in accordance with the working programme and phasing plans, 3, 4 5 and 6 dated 7 March 2003.

Reason: To enable the Mineral Planning Authority to adequately control the development and to minimise its impact on the amenities of the local area.

(6) The extraction and infilling operations shall occur in no more than 3 phases at any one time as identified on plan no. 3 dated 7 March 2003.

Reason: To ensure the proper restoration of the site within a reasonable time in a progressive and orderly manner in the interests of local amenity

(7) An annual topographical survey of the site shall be prepared and submitted to the Mineral Local Plan by 31 October each year, or such date as maybe agreed with the Mineral Local Plan. The survey shall indicate the areas where extraction has taken place, the levels of landfilling and the locations of any subsoil topsoil bunds/stores.

Reason: To ensure the proper restoration of the site within a reasonable time in a progressive and orderly manner in the interests of local amenity.

(8) No part of the development shall commence until such time as the new means of access to Willen Road has been laid out and constructed in accordance with details to be submitted to and approved in writing by the Local Planning Authority.

Reason: In order to ensure a satisfactory standard of access to the proposed development in the interest of road safety and convenience.

(9) Within one month of the new access referred to in Condition 8 above being brought into use all other access points from the application site to the public highway shall be stopped up by means of removing any surfacing and kerbing, reinstating verges and boundary hedges/fences. Details of replacement boundary treatments shall be submitted to the Local Planning Authority for approval prior to works commencing.

Reason: In order to restrict the number of points at which traffic may enter and leave the public highway.

(10) Prior to the commencement of the operations hereby permitted, wheel cleaning equipment shall be installed to the satisfaction of the Mineral Planning Authority. No commercial vehicles shall enter the public highway unless their wheels and chassis have been cleaned using this equipment to prevent material being deposited on the highway.

Reason: In the interests of highway safety and to prevent mud and dust falling on the highway.

(11) Upon completion of the restoration operations, the vehicular access and haul route shall be reinstated in accordance with a scheme to be submitted to and agreed in writing by the Mineral Planning Authority.

Reason: To ensure that the site is satisfactorily restored and in the interests of highway safety

(12) Heavy Goods Vehicle movements associated with the development shall not exceed 77 per day and no loaded lorries shall leave the site unsheeted.

Reason: In the interests of highway safety and safeguarding the local environment.

(13) (a) Before mineral extraction operations are commenced in each phase of the development, all available topsoil shall be stripped and stored separately for reinstatement.

(b) Before mineral extraction operations are commenced in each phase of the development, all available subsoil shall be stripped and stored separately for ultimate replacement.

(c) All operations referred to in (a) and (b) of this Condition shall be undertaken during suitable dry weather conditions. During periods of unsettled weather conditions the operations shall be undertaken in stages with breaks during wet spells.

d) In any event no soil stripping operations should be undertaken during the months October to April inclusive unless otherwise agreed in writing by the Mineral Planning Authority in consultation with the DEFRA. The Mineral Planning Authority shall be notified in writing 7 working days before any soil stripping operations commence.

MILTON KEYNES COUNCIL

ENVIRONMENT DIRECTORATE
TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)
TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT PROCEDURE) 1995

Reason: To enable the reinstatement of in situ soils once extraction has finished so as to return the land to its original agricultural characteristics.

(14) (a) Except as may otherwise be agreed in writing by the Mineral Planning Authority, topsoil, subsoil and overburden storage bunds other shall be placed at the locations indicated on the submitted plan 4 dated March 2003,

(b) Topsoil storage shall be confined to bunds not exceeding 3 metres in height formed with minimum of compaction to form stability.

(c) Subsoil shall be confined to bunds not exceeding 5 metres in height formed with minimum of compaction to form stability.

(d) The stored materials shall be sown with grass seed and sprayed with herbicides to prevent weed accumulation.

Reason: To safeguard the visual amenities of the vicinity and enable satisfactory restoration to agricultural use.

(15) None of the hereby approved development shall take place until the site has been evaluated by an archaeological contractor to a scheme agreed in writing with the Council's Archaeological Officer in order to establish the areas of archaeological significance. No development shall take place until there has been secured the implementation of a mitigation scheme, or a programme of archaeological work and publication, in accordance with a written scheme of investigation, which has been submitted in respect of the area of archaeological significance and approved in writing by the Council's Archaeological Officer.

Reason: To ensure that archaeological matters are adequately considered pursuant to PPG16.

(16) No development shall take place until a scheme (Dust Management Scheme) for the control and mitigation of dust including the use of water spray facilities and water bowsers in periods of dry weather has been submitted to and approved by the Mineral Planning Authority. The Dust Management Scheme shall be implemented in accordance with the agreed scheme and be complied with at all times.

Reason: To protect the amenities of the locality from the effects of any dust arising from the development.

(17) The LAeq (60 mins) specific noise levels associated with the development shall not at the nearest noise sensitive properties exceed an increase in 10 dB(A) above the background noise levels agreed by the Mineral Planning Authority. In any circumstance the operational specific noise level shall not exceed 55 dB.

Environment, PO Box No 125, Civic Offices, 1 Saxon Gate East, Central Milton Keynes MK9 3ZJ
Development Control Enquiries Direct Line (01908) 252358
Tel: (01908) 691691 Fax: (01908) 252211 Hays DX 31406
www.mkweb.co.uk/development-control

Should the agreed maximum specific noise levels be exceeded the operator shall immediately implement remedial measures to rectify the situation and the Mineral Planning Authority shall be notified in writing of the remedial measures undertaken within TWO DAYS.

If the levels continue to exceed the agreed maximum specific noise level and subsequent written notice is given by the Mineral Planning Authority then all operations on site shall cease within TWO DAYS of such a written notice. No operations shall re-commence on site until a programme of remedial action has been agreed in writing by the Mineral Planning Authority.

Reasons: To ensure that operations on site are carried out so as to minimise the noise disturbance to local residents and to pre-determined levels of noise above which an unreasonable degree of disturbance is being caused.

(18) All vehicles, plant and machinery operated within the site shall be maintained in accordance with the manufacturer's specification at all times, and shall be fitted with and use effective silencers.

Reason: To minimise the adverse impact of noise generated by the operations on the local community.

(19) All fixed and mobile buildings, machinery and foundations shall be removed at such time or times as the Mineral Planning Authority may determine that they are no longer required either for the purpose for which they were installed or for the rehabilitation of the site.

Reason: To ensure that the Mineral Planning Authority retains control of the location, erection, appearance and removal of fixed and mobile plant, machinery, buildings and foundations in the interests of amenity.

(20) All buildings, plant, fixed machinery and other fixed structures shall be finished and maintained in materials and colour, or colours, as may be approved in writing by the Mineral Planning Authority.

Reason: To ensure that the Mineral Planning Authority retains control of the location, erection, appearance and removal of fixed and mobile plant, machinery, buildings and foundations in the interests of amenity.

(21) Where the land is to be returned to agricultural use:-

(a) During suitable weather and ground conditions, all stored overburden and subsoil shall be carefully and evenly replaced. The subsoil layer shall be graded and ripped prior to the final cover of topsoil being replaced and any stones or other materials likely to impede subsequent cultivation shall be picked and buried to a depth of not less than one metre.

The surface shall have an even fall with natural drainage to the perimeter of the site without backfalls or ponding and the levels shall conform to those specified in the Environmental Statement all to the satisfaction of the Mineral Planning Authority.

(b) The topsoil stored in accordance with this permission shall be carefully and evenly re-spread and the restored areas shall be prepared and sown as soon as practicable with an appropriate grass seed mixture to establish a long term ley, all to the satisfaction of the Minerals Planning Authority. The topsoil quality shall conform with the relevant British Standard

(c) In any event, no soil replacement operations should be undertaken during the months October to April inclusive, unless otherwise agreed in writing by the Mineral Planning Authority in consultation with DEFRA.

Reason: To specify the conditions and timing of soil reinstatement in the interests of proper restoration, so as to return the land to its original agricultural quality.

(22) The post-settlement contours of the restored area shall accord with the submitted scheme.

Reason: To safeguard the environment and visual amenities of the area.

(23) The site shall be landscaped in accordance with a scheme to be submitted to and approved in writing by the Mineral Planning Authority prior to the commencement of any operations hereby approved. Such a scheme shall retain trees and shrubs, where possible to screen the site and provide for greater bio-diversity and shall be implemented in a phased manner. Planting shall be undertaken in the first planting season following restoration of each extraction phase. Any trees or shrubs planted in accordance with the approved scheme which fail within 5 years of planting shall be replaced during the following planting season with others of similar size and species.

Reason: To improve the appearance and bio-diversity of the site in the interests of visual amenity and nature conservation.

(24) Any ditches, fences, hedges, gates, field drains and water courses and supplies disturbed during the mineral extraction and waste disposal operations shall be made good where necessary and any further ditches, fences, hedges, gates, field drains and water courses and supplies shall be provided on restoration for good husbandry, all to the satisfaction of the Minerals Planning Authority..

Reason: To safeguard the visual amenities and agricultural characteristics of the area.

(25) In the event of a cessation of winning and working of minerals prior to the achievement of the completion of the approved scheme, which in the opinion of the Minerals Planning Authority constitutes a permanent cessation within the terms of paragraph 3 of Schedule 9 of the Town and Country Planning Act 1990, a revised scheme, to include details of reclamation and aftercare, shall be submitted in writing for approval to the Minerals Planning Authority, within 3 months of the cessation of winning and working. The approved revised scheme shall be fully implemented within 1 year of the written approval unless otherwise agreed in writing with the Minerals Planning Authority.

Reason: To enable the Minerals Planning Authority to adequately control the development and to ensure that the land is restored to a condition capable of beneficial use.

(26) Prior to the commencement of any development, a scheme for the provision and implementation of pollution control shall be submitted and agreed in writing with the Mineral Planning Authority. The works/scheme shall be constructed and completed in accordance with the approved plans/specification at such time(s) as may be specified in the approved scheme.

Reason: To ensure a satisfactory method of pollution control.

(27) Prior to the commencement of the development hereby approved details of the infilling materials, storm water disposal and dewatering of the site shall be submitted to and approved in writing by the Mineral Planning Authority.

Reason: To ensure existing groundwater flows in the vicinity of the site are not significantly disturbed, ensure adequate site drainage and to ensure that there will be no adverse effects on water bodies in the vicinity.

(28) The outline strategy for agricultural aftercare as submitted with the application shall be adhered to. This will include such steps, as may be necessary to bring each phase of the land reclaimed to the required standard for use for agriculture which shall be, at least, to the same quality as existed prior to extraction. The strategy shall be subject to review at an annual site meeting. No later than November 30th of each year during the five year aftercare period a detailed programme for aftercare of the restored land shall be submitted to the Minerals Planning Authority. No later than 4 weeks following the annual aftercare meeting a detailed programme, as revised and amended by the Mineral Planning Authority in consultation with DEFRA, shall be submitted to the Mineral Planning Authority.

MILTON KEYNES COUNCIL

ENVIRONMENT DIRECTORATE
TOWN AND COUNTRY PLANNING ACT 1990 (AS AMENDED)
TOWN AND COUNTRY PLANNING (GENERAL DEVELOPMENT PROCEDURE) 1995

Reason: To comply with the requirements of Schedule 5 of the Town & Country Planning Act 1990. To ensure that the reclaimed land is correctly husbanded and to bring the land to the standard required for agricultural use and to ensure that the aftercare provisions are revised to take account of any problems identified at the annual aftercare meeting.

(29) This permission shall be for a period of 5 years from the date of commencement of work on site, which shall be notified to the Mineral Planning Authority in writing. This period includes restoration of the site in accordance with the conditions but excludes aftercare. In the event that no such notification is given within 4 weeks of such commencement, the works shall be deemed to have started on the date of this decision notice. In the event of the use of the site terminating prior to 5 years, full restoration shall be completed in accordance with the conditions within the following six months or such other time as may be agreed in writing by the Mineral Planning Authority.

Reason: To ensure that the restoration of the land is achieved within a reasonable timescale and to enable the Mineral Planning Authority to review the situation in light of altered circumstances and to comply with the requirements of Schedule 5, Part 1 of the Town and Country Planning Act 1990.

INFORMATIVES

1) Anglian Water's apparatus must be protected at all times, if at any stage of this development existing or proposed apparatus is affected a diversion of the apparatus may be required to be carried out in accordance with Anglian Water's policy.

2) No storm water discharge will be allowed into a watercourse under the Buckingham and River Ouzel Internal Drainage Boards control without the prior consent of the board.

3) The subsequent landfill will require a Waste Management Licence.

Your attention is drawn to the attached notes.

[redacted]

Date: 9th July 2003

for HEAD OF PLANNING AND TRANSPORT
For and on behalf of the Council

Environment, PO Box No 125, Civic Offices, 1 Saxon Gate East, Central Milton Keynes MK9 3ZJ
Development Control Enquiries Direct Line (01908) 252358
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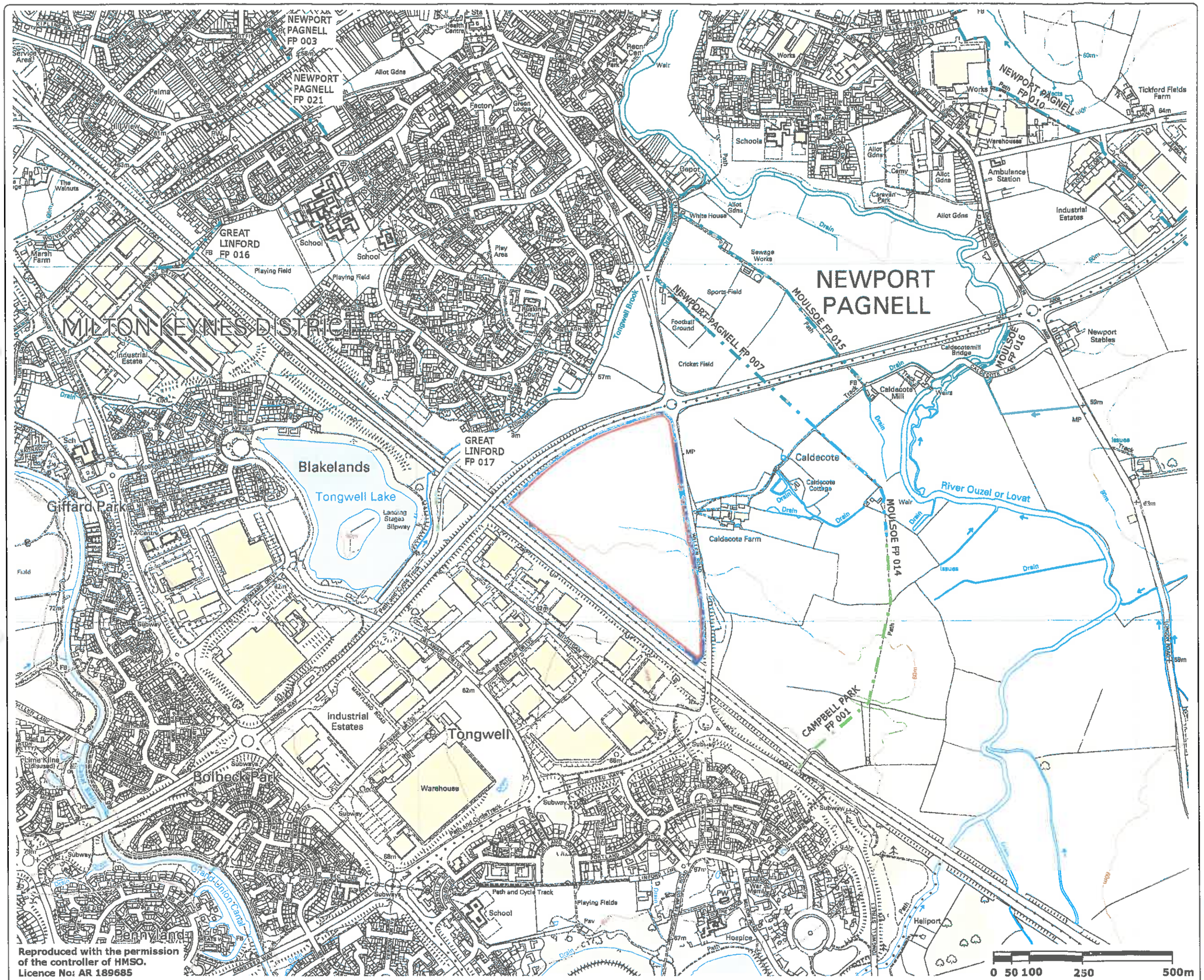


KEY

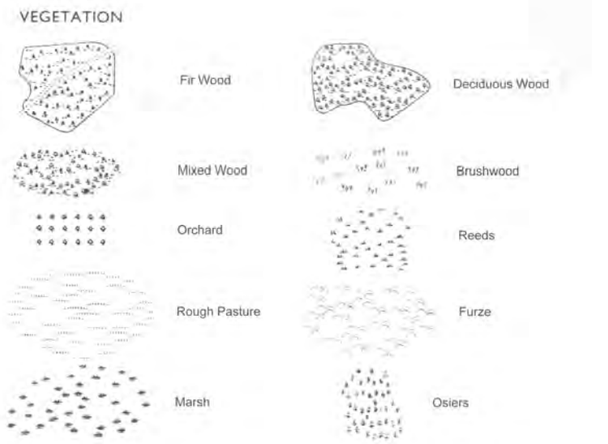
- BOUNDARY: APPLICATION SITE
- BOUNDARY: LAND IN THE CONTROL OF GFX HARTIGAN LTD
- PUBLIC RIGHT OF WAY: FOOTPATH

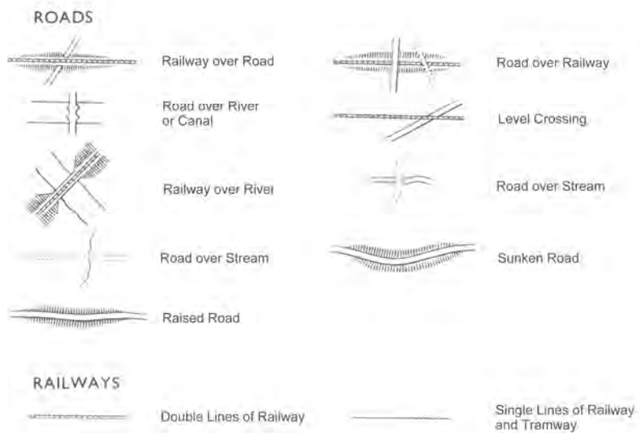
N

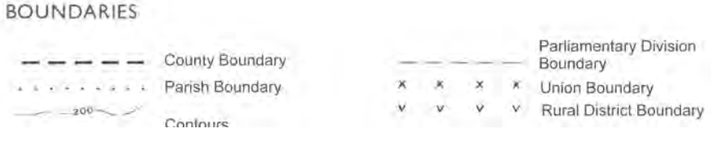
LOCATION	CALDECOTE
TITLE	APPLICATION SITE
SCALE	1:10,000
PLAN NO.	2
DATE	MARCH 03
DRAWN	
REVISED	
SURVEYED	

GFX HARTIGAN

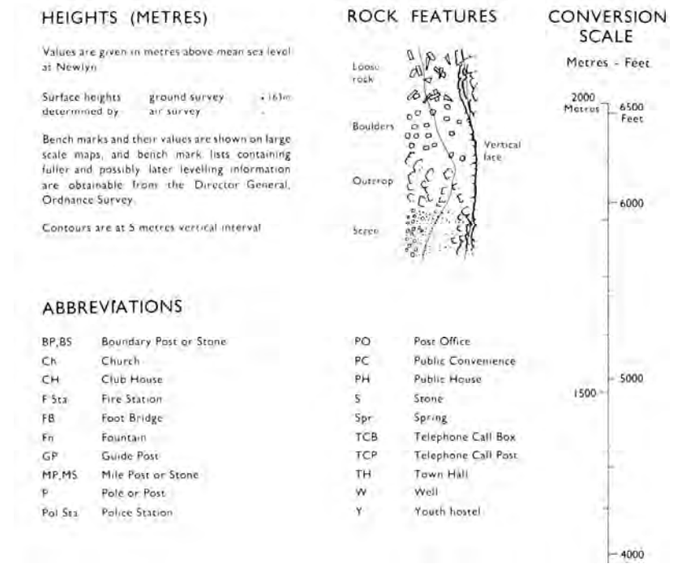
County Series 1:10,560 scale

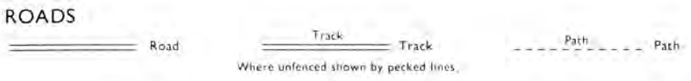


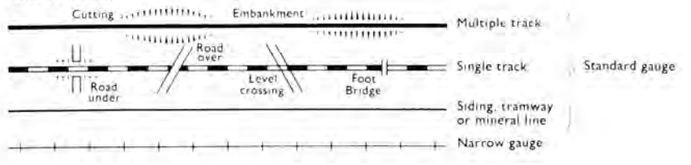


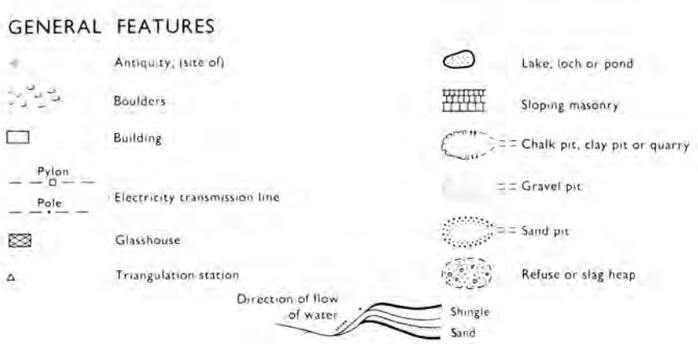


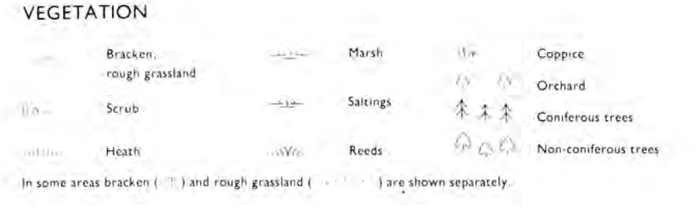
National Grid 1:10,000 scale











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Historical Map Pack Legend

County Series & National Grid

1:10,560 scale

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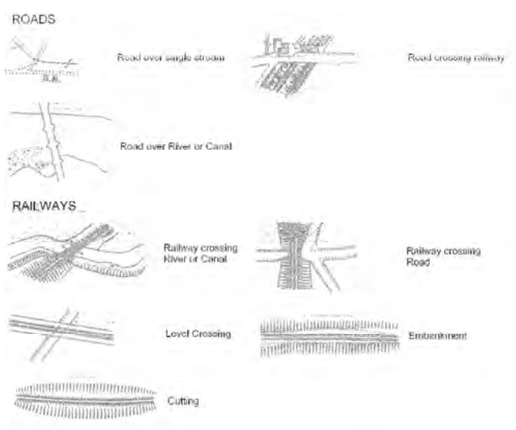
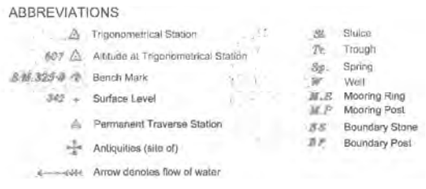
Technical Helpline

Tel 08444159000

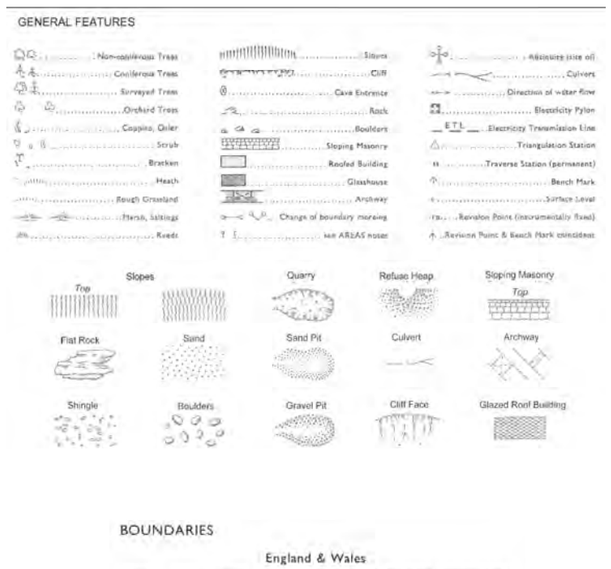
groundsureinsight@groundsure.com
www.groundsure.com

County Series 1:2,500 scale





National Grid 1:2,500 / 1:1,250 scale



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Historical Map Pack Legend

County Series

1:1,250 scale

~

County Series & National Grid

1:2,500 scale

Information present on these legends is sourced from the same Ordnance Survey mapping as the maps used in this product.

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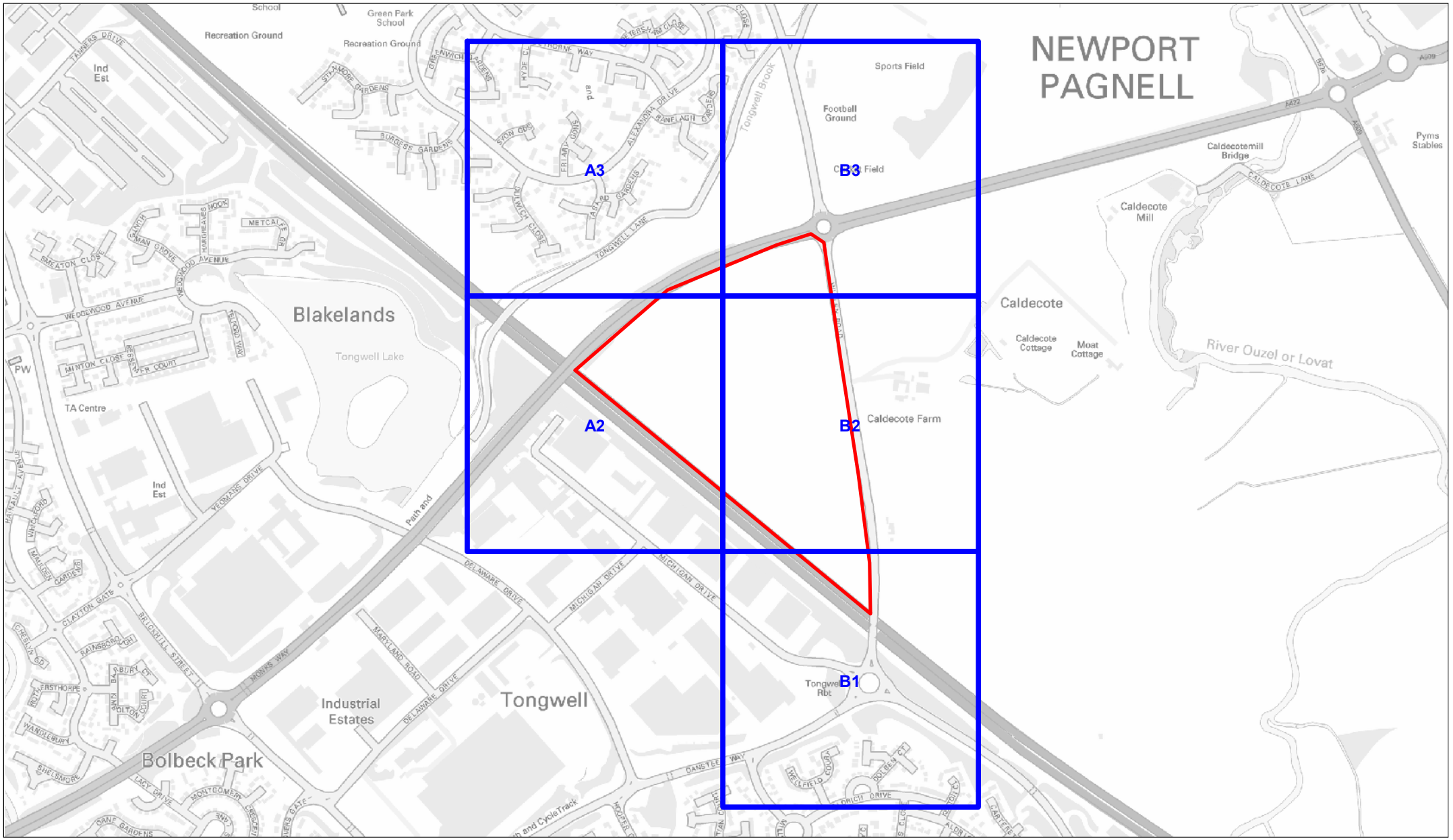
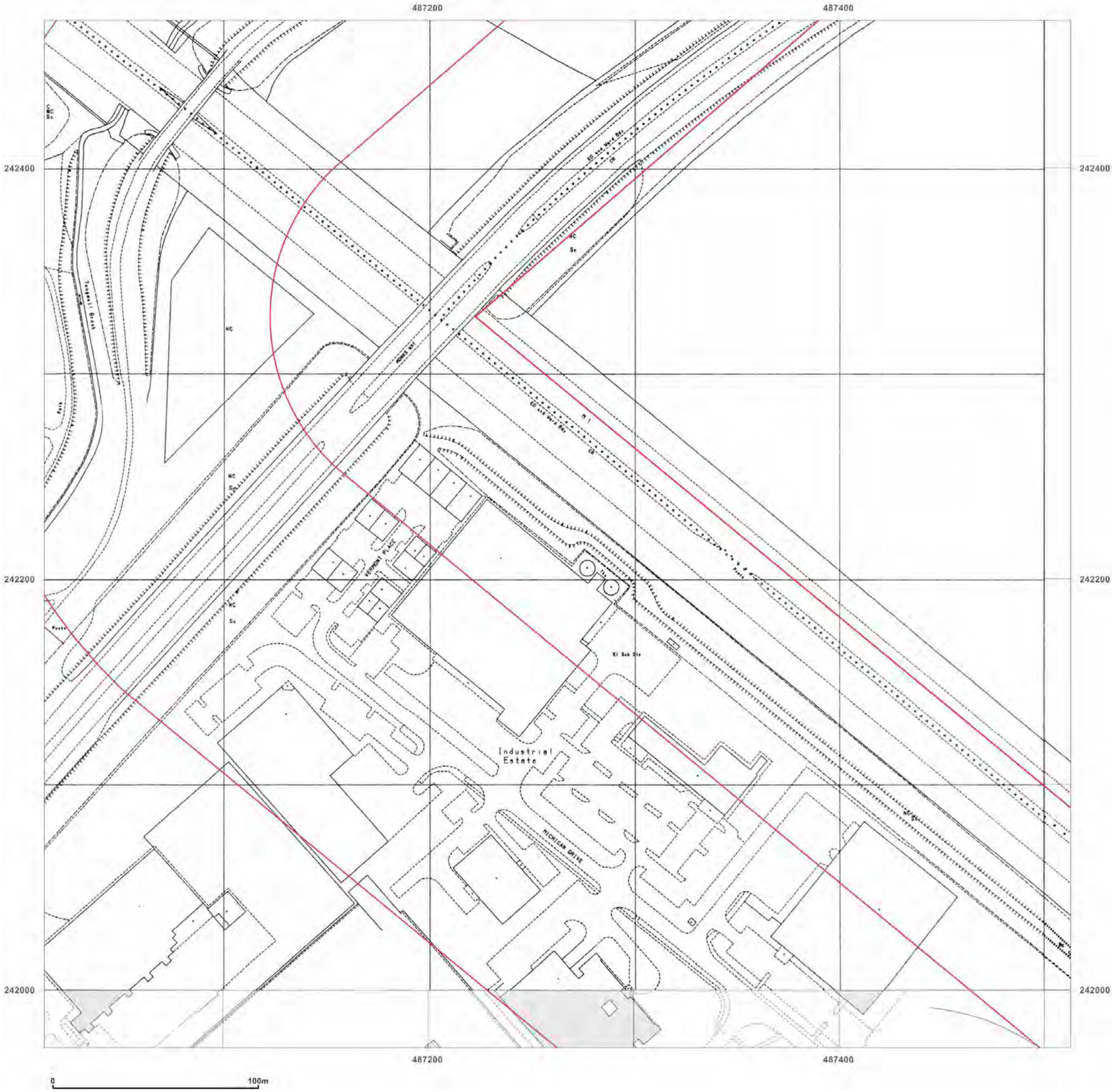

NEWPORT
PAGNELL
A3
B3
A2
B2
B1
Blakelands
Tongwell Lake
Tongwell
Industrial
Estates
Bolbeck Park
Caldecote
Caldecote Farm
Caldecote
Cottage
Moat
Cottage
Caldecote
Mill
Caldecotemill
Bridge
River Ouzel or Lovat
Sports Field
Football
Ground
Tongwell Brook
Recreation Ground
Green Park
School
TA Centre
Ind
Est
Tongwell
Rbt
A422
A509
Pyms
Stables



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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_1250Scale_A2
Grid Ref: 487263, 242222

Map Name: National Grid

Map date: **1991-1992**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1969 Revised 1969 Edition N/A Copyright 1991 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveyed 1990 Revised 1990 Edition N/A Copyright 1991 Levelled N/A	Surveyed 1990 Revised 1990 Edition N/A Copyright 1991 Levelled N/A

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_1250Scale_A3
Grid Ref: 487263, 242722

Map Name: National Grid

Map date: **1989-1992**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1989 Revised 1989 Edition N/A Copyright 1989 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A

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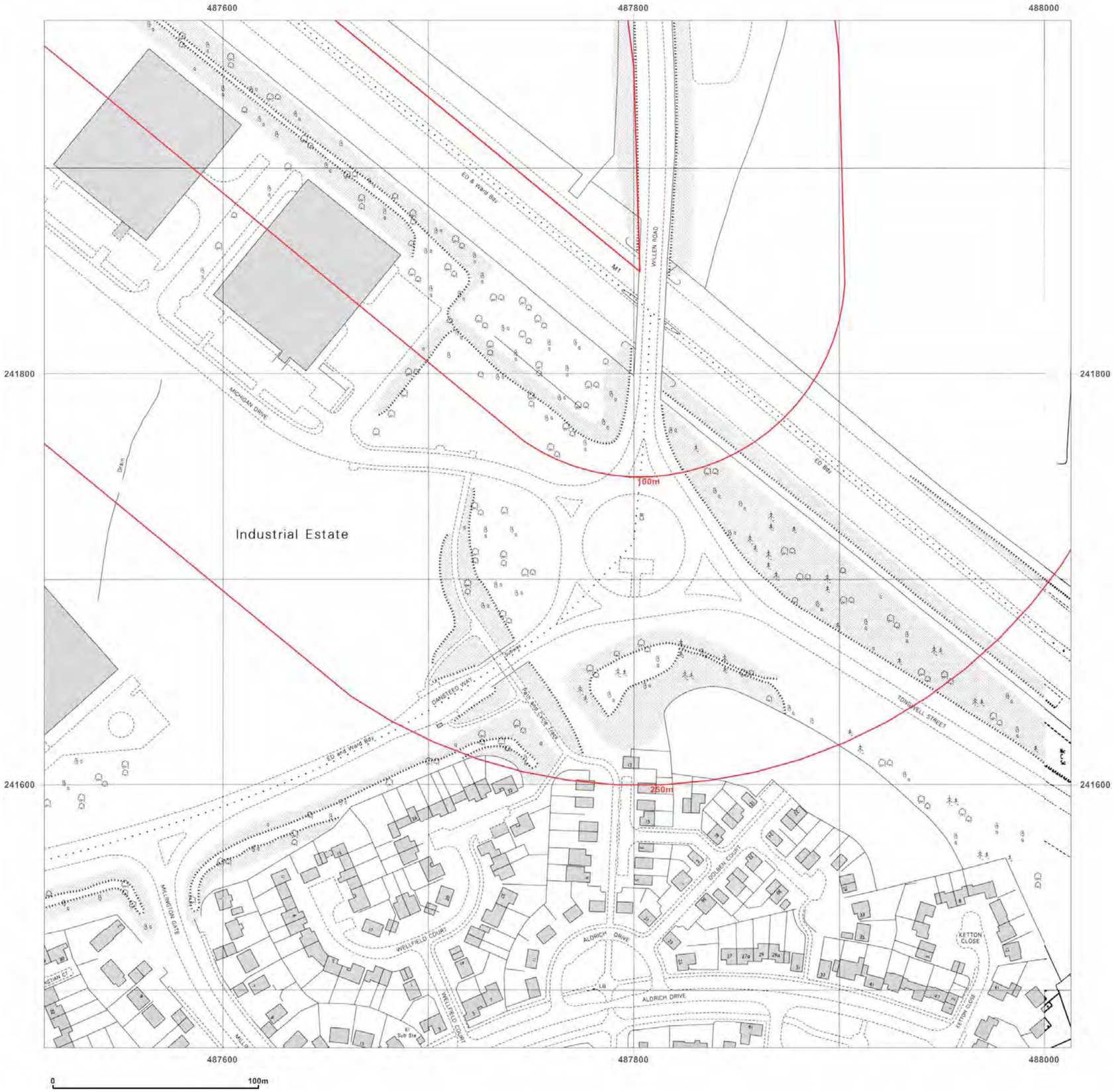

emapsite™

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_1250Scale_B1
Grid Ref: 487763, 241722

Map Name: National Grid

Map date: **1991-1992**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1990	Surveyed N/A
Revised 1990	Revised N/A
Edition N/A	Edition N/A
Copyright 1991	Copyright 1992
Levelled N/A	Levelled N/A
Surveyed 1990	Surveyed 1969
Revised 1990	Revised 1969
Edition N/A	Edition N/A
Copyright 1991	Copyright 1991
Levelled N/A	Levelled N/A

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_1250Scale_B1
Grid Ref: 487763, 241722

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

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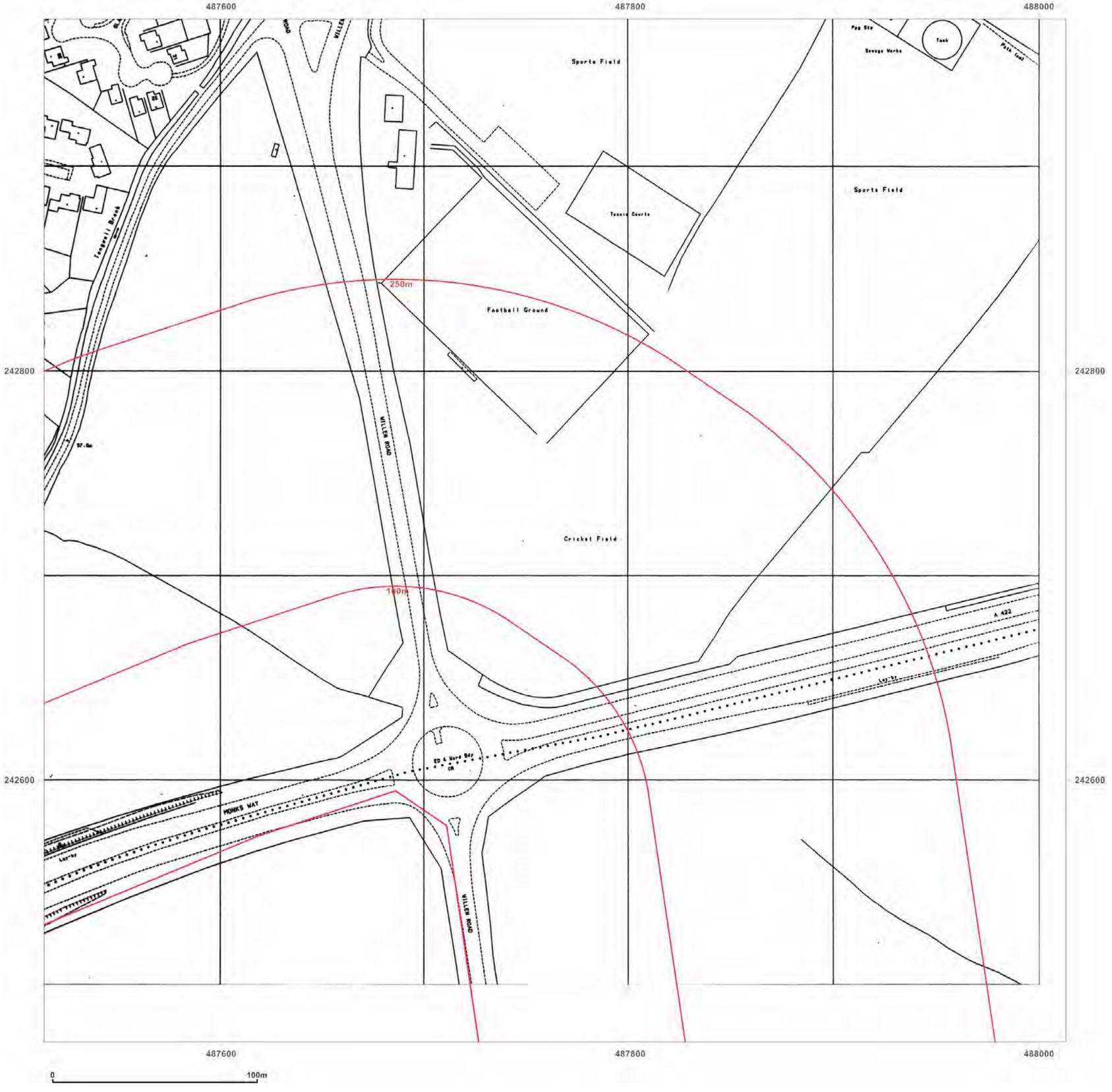

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_1250Scale_B3
Grid Ref: 487763, 242722

Map Name: National Grid

Map date: **1992**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1969
Revised 1969
Edition N/A
Copyright 1992
Levelled N/A

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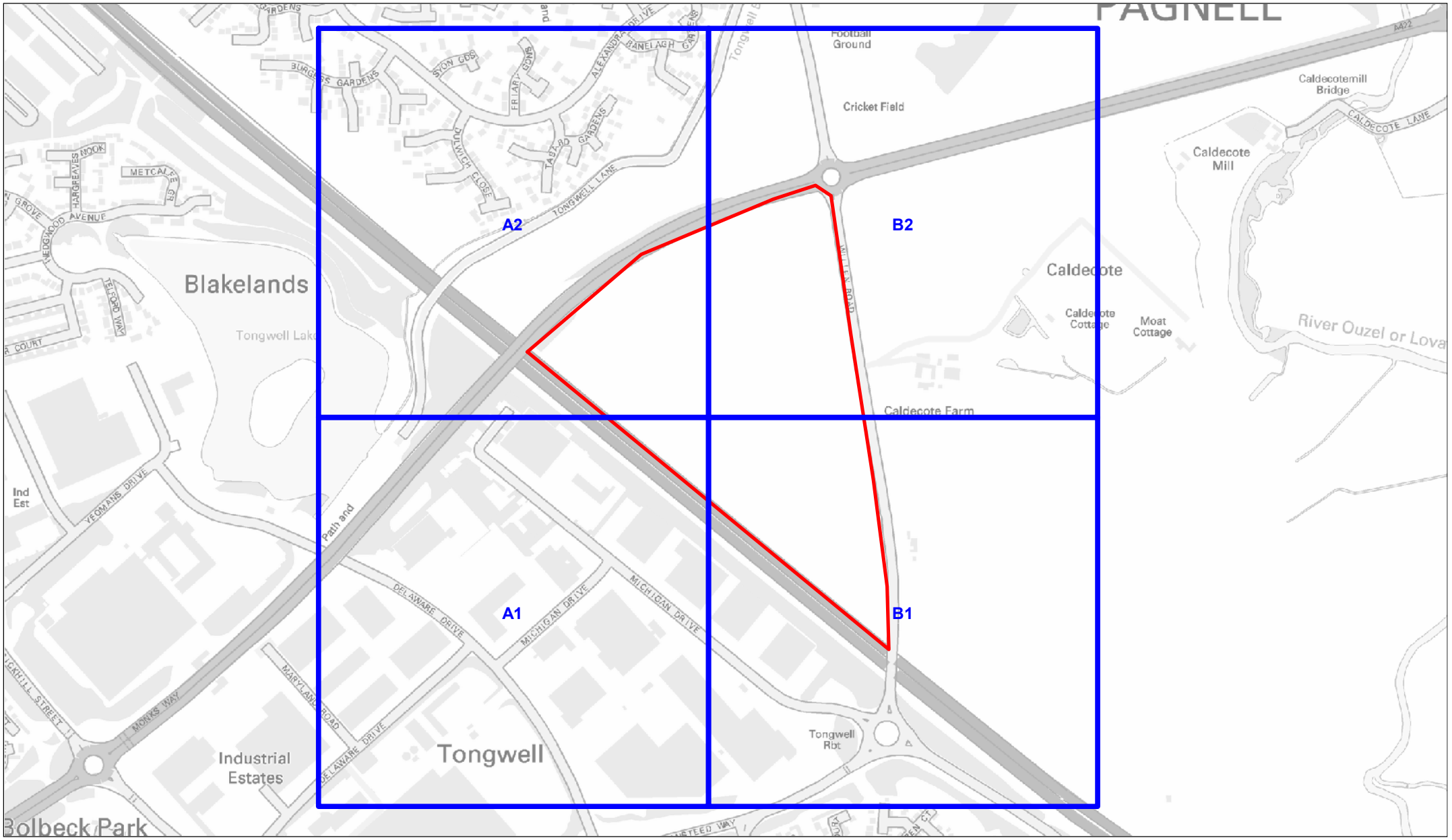
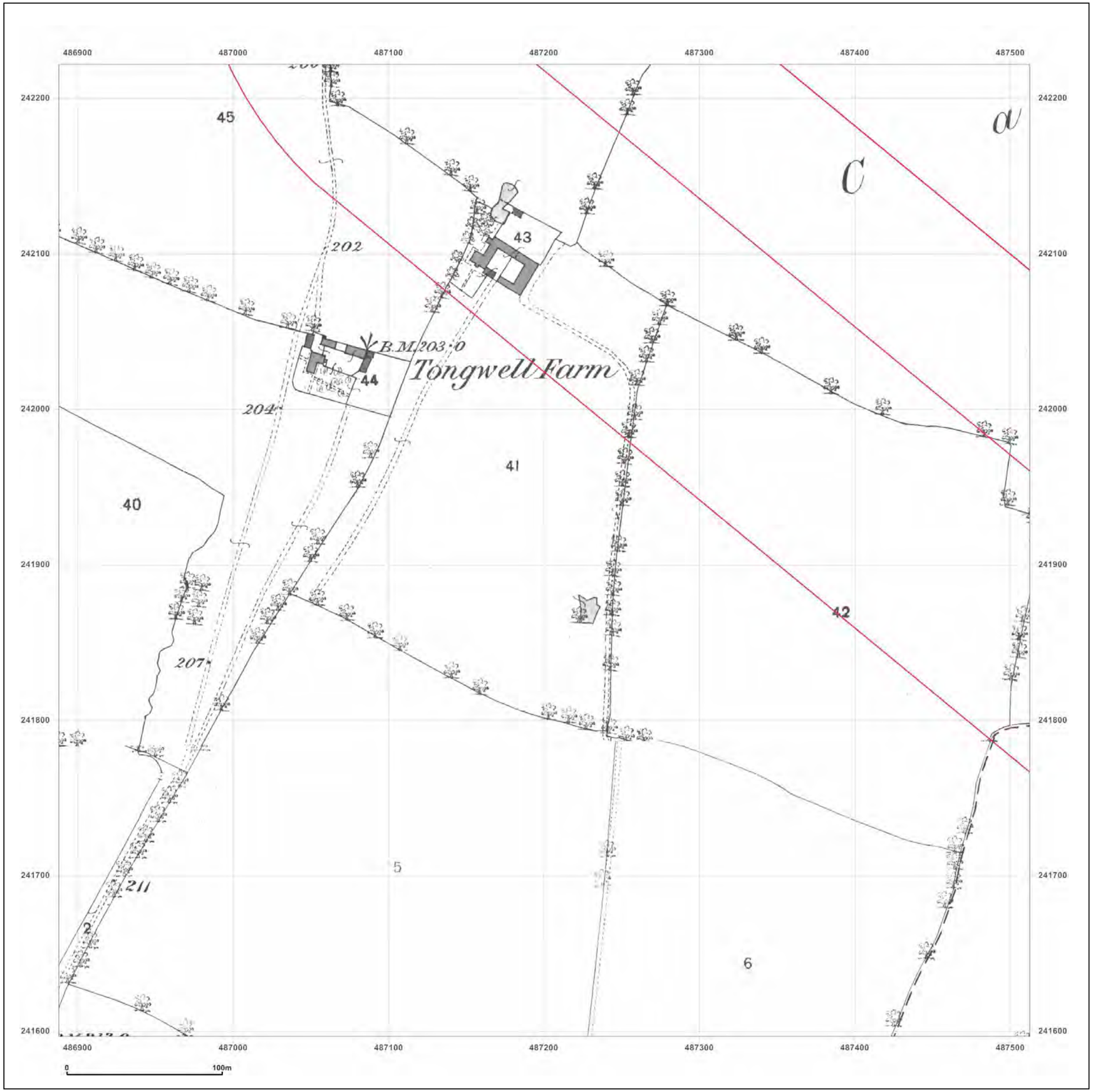

A2
B2
A1
B1
Blakelands
Tongwell
Industrial Estates
Caldecote
Caldecote Farm
Caldecote Cottage
Moat Cottage
Caldecote Mill
Caldecotemill Bridge
Cricket Field
Football Ground
Tongwell Rbt
Bolbeck Park
River Ouzel or Lova
TONGWELL LANE
MILTON ROAD
CALDECOTE LANE
A422
DELAWARE DRIVE
MICHIGAN DRIVE
MARYLAND ROAD
MORKS WAY
YEOMANS DRIVE
TELFORD WAY
METCALFE RD
HARGREAVES NOOK
HEDGWOOD AVENUE
GROVE
BURGESS GARDENS
STON GDS
FRIARY GDNS
DULWICH CLOSE
TASSARD GARDENS
ALEXANDRA DRIVE
RANELAGH GDNS
Ind Est
Path and



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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A1
Grid Ref: 487200, 241909

Map Name: County Series

Map date: **1881**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
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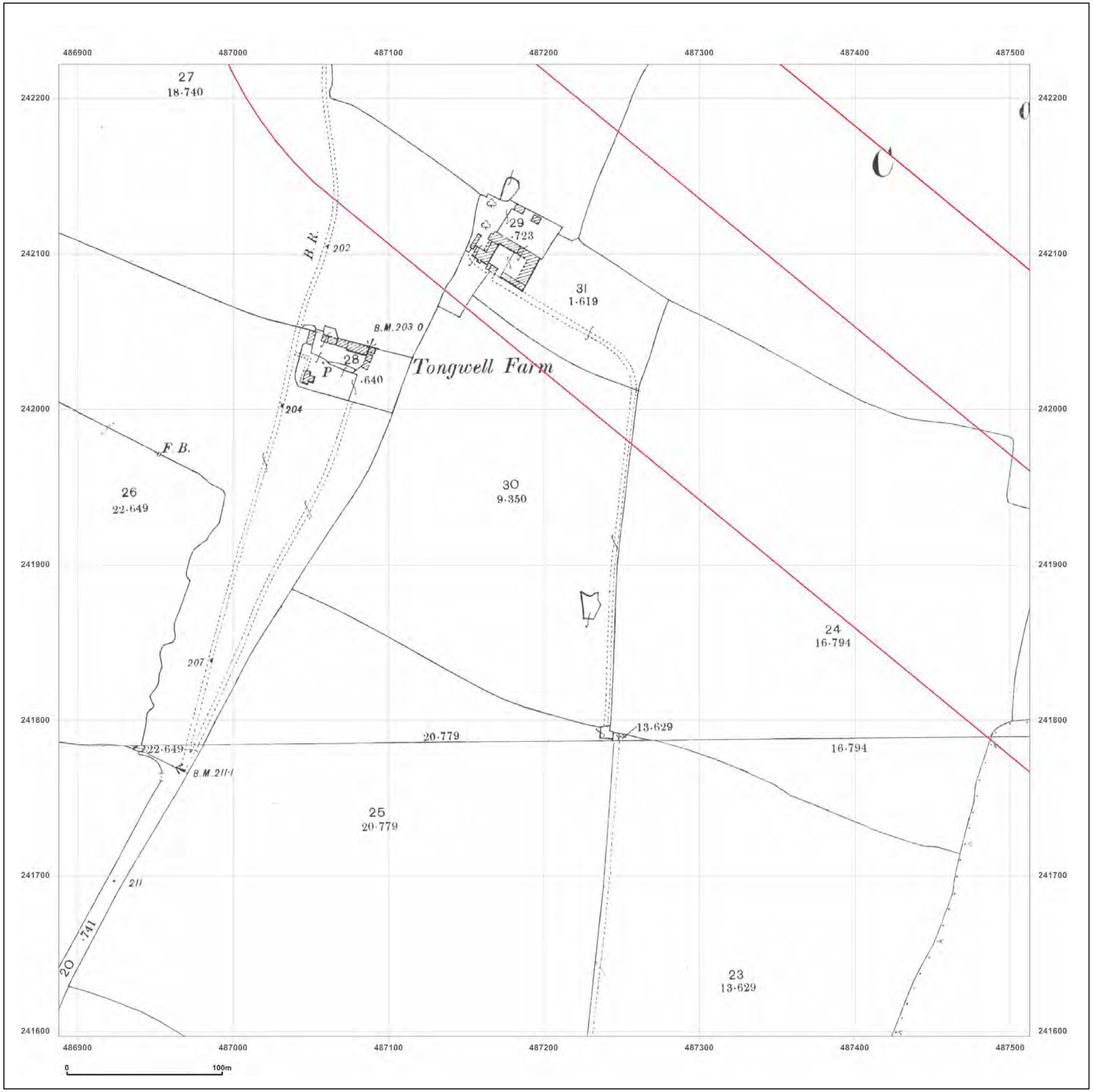
Production date: 24 August 2015

To view map legend click here *Legend*



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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A1
Grid Ref: 487200, 241909

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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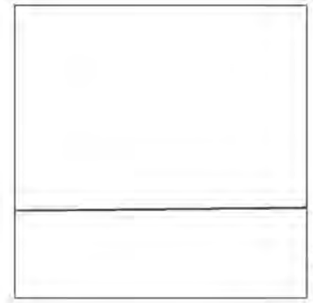
Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
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Production date: 24 August 2015

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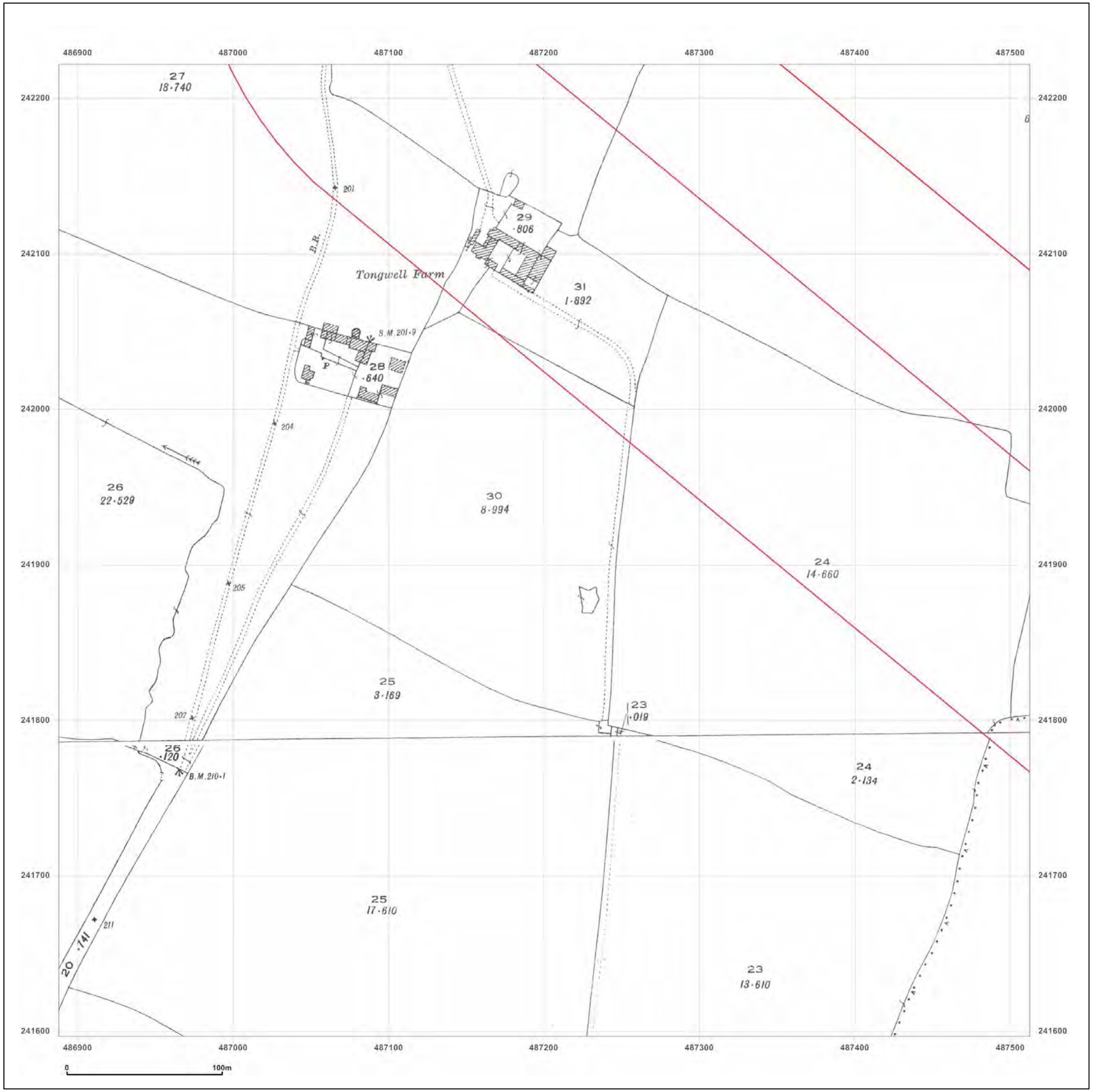

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A1
Grid Ref: 487200, 241909

Map Name: County Series

Map date: **1925**

Scale: 1:2,500

Printed at: 1:2,500

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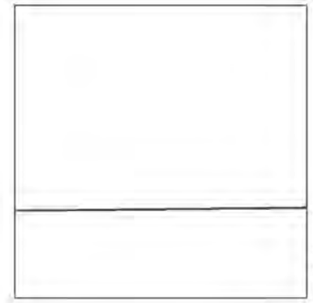
Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A

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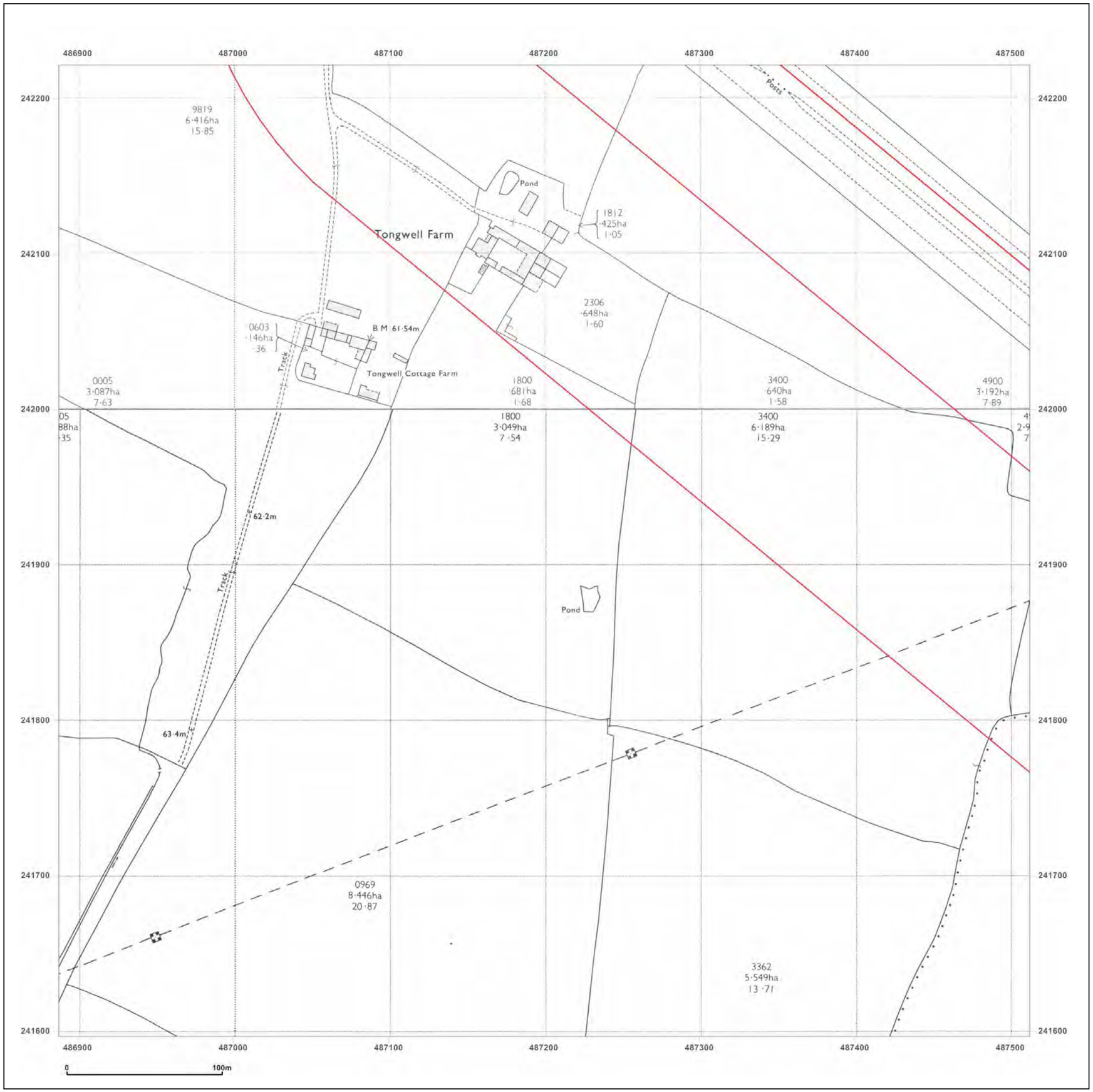

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A1
Grid Ref: 487200, 241909

Map Name: National Grid

Map date: **1969**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1957

Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1957

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A1
Grid Ref: 487200, 241909

Map Name: National Grid

Map date: **1985**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1957
Revised 1985
Edition N/A
Copyright 1985
Levelled 1957

Surveyed 1982
Revised 1985
Edition N/A
Copyright 1985
Levelled 1982

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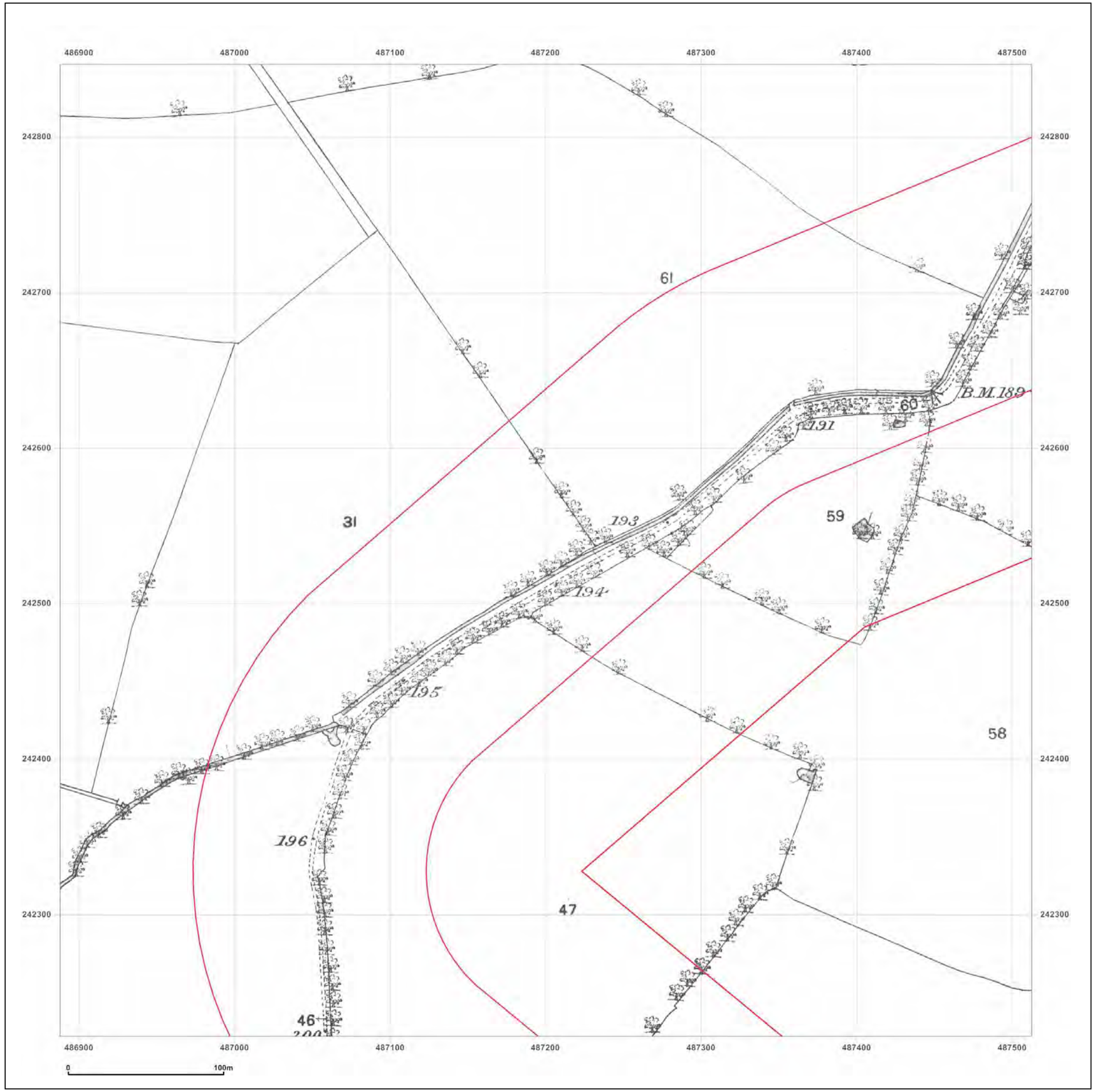

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A2
Grid Ref: 487200, 242534

Map Name: County Series

Map date: **1881**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

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Production date: 24 August 2015

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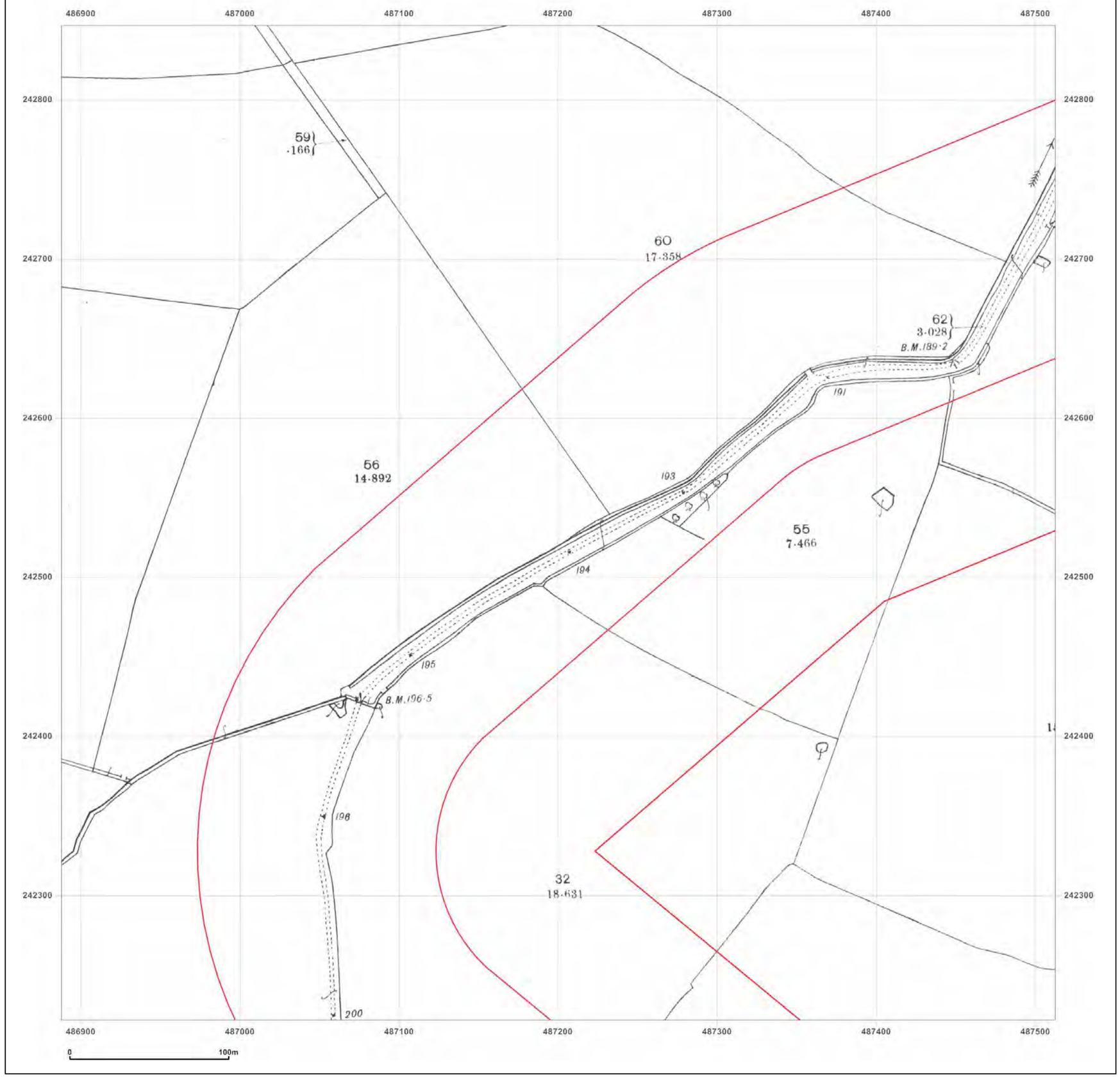

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A2
Grid Ref: 487200, 242534

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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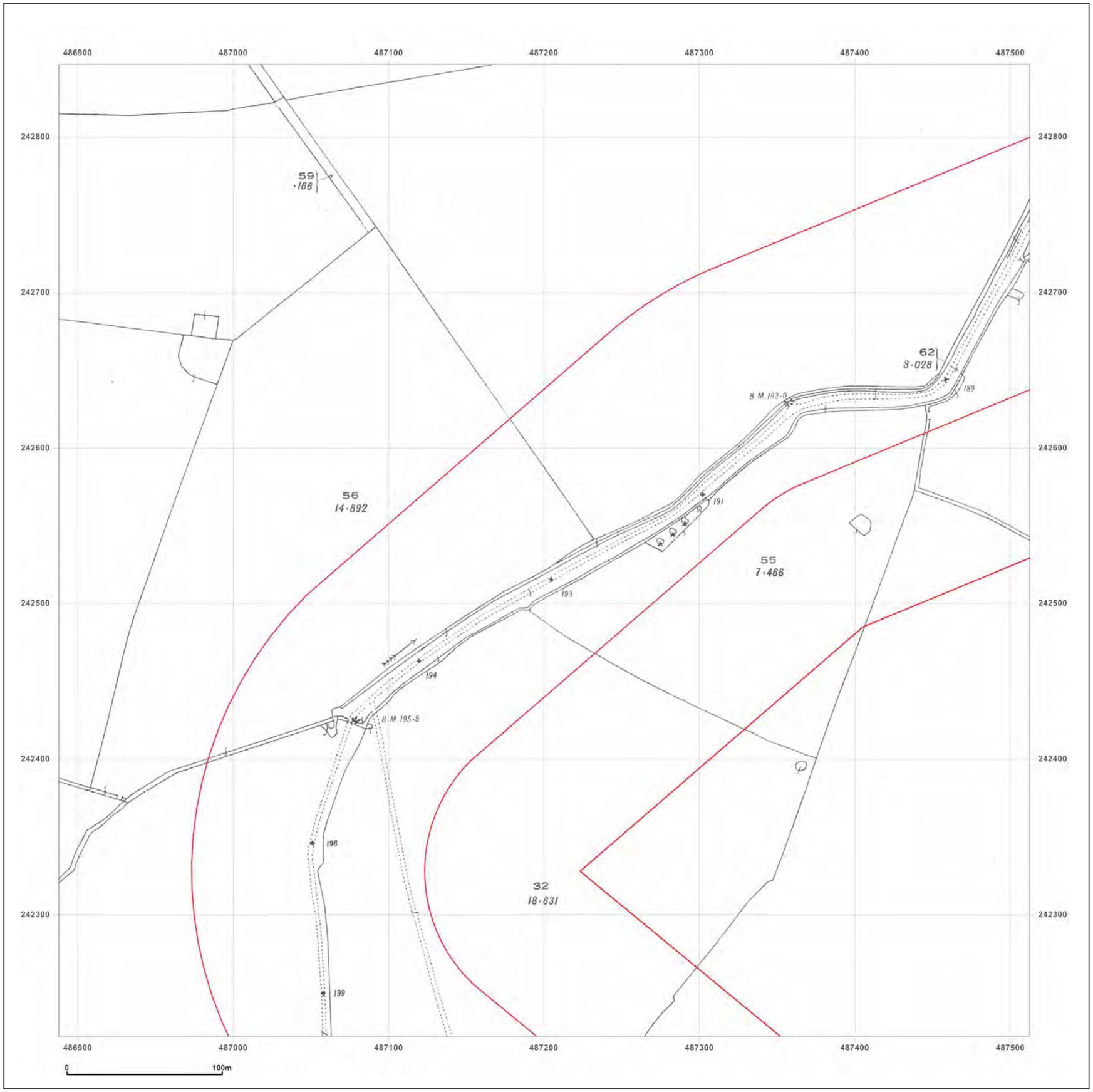
Production date: 24 August 2015

To view map legend click here *Legend*



emapsite™

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A2
Grid Ref: 487200, 242534

Map Name: County Series
Map date: **1925**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A

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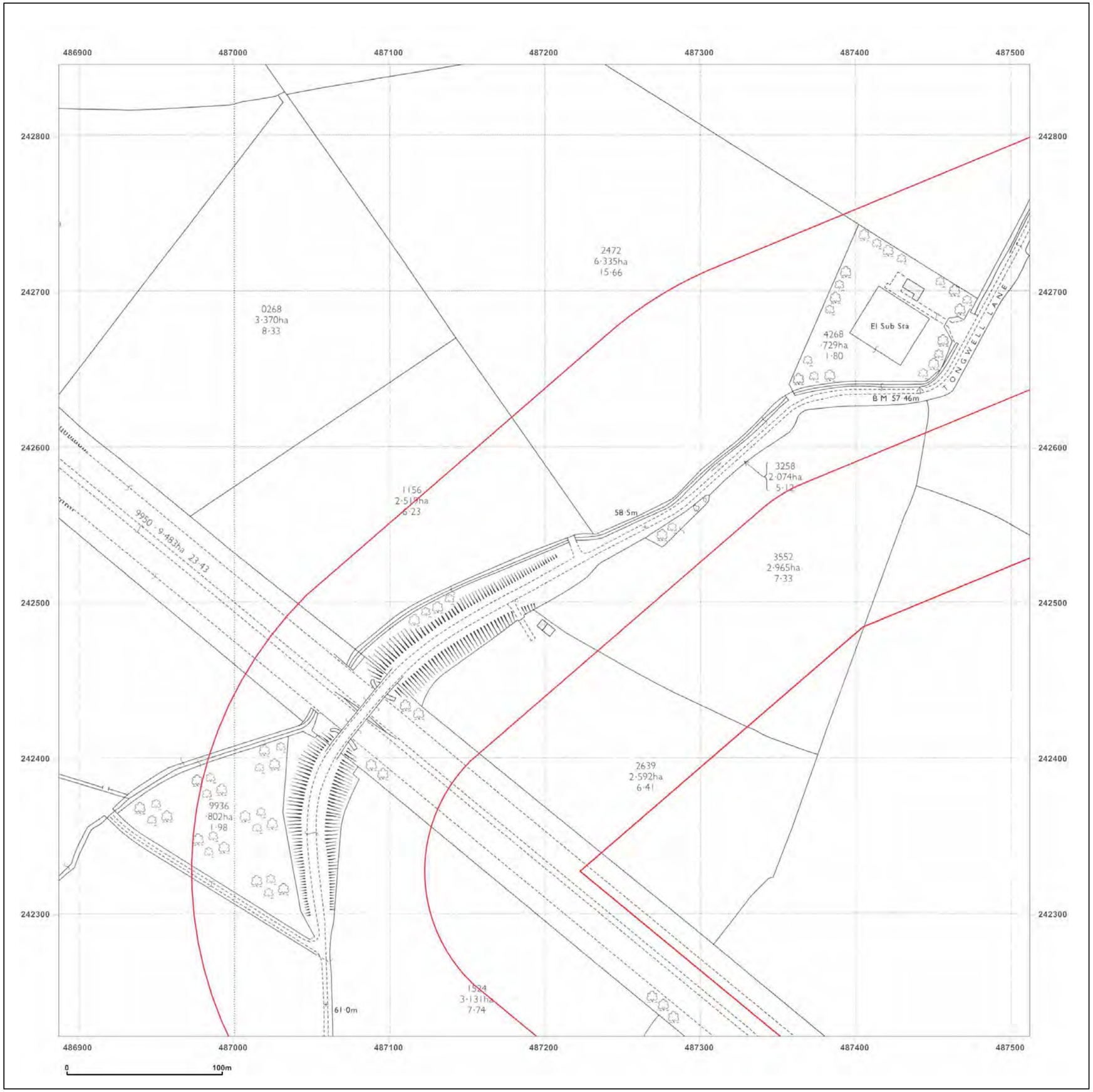
Production date: 24 August 2015

To view map legend click here *Legend*



emapsite™

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A2
Grid Ref: 487200, 242534

Map Name: National Grid

Map date: **1969**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1957

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Production date: 24 August 2015

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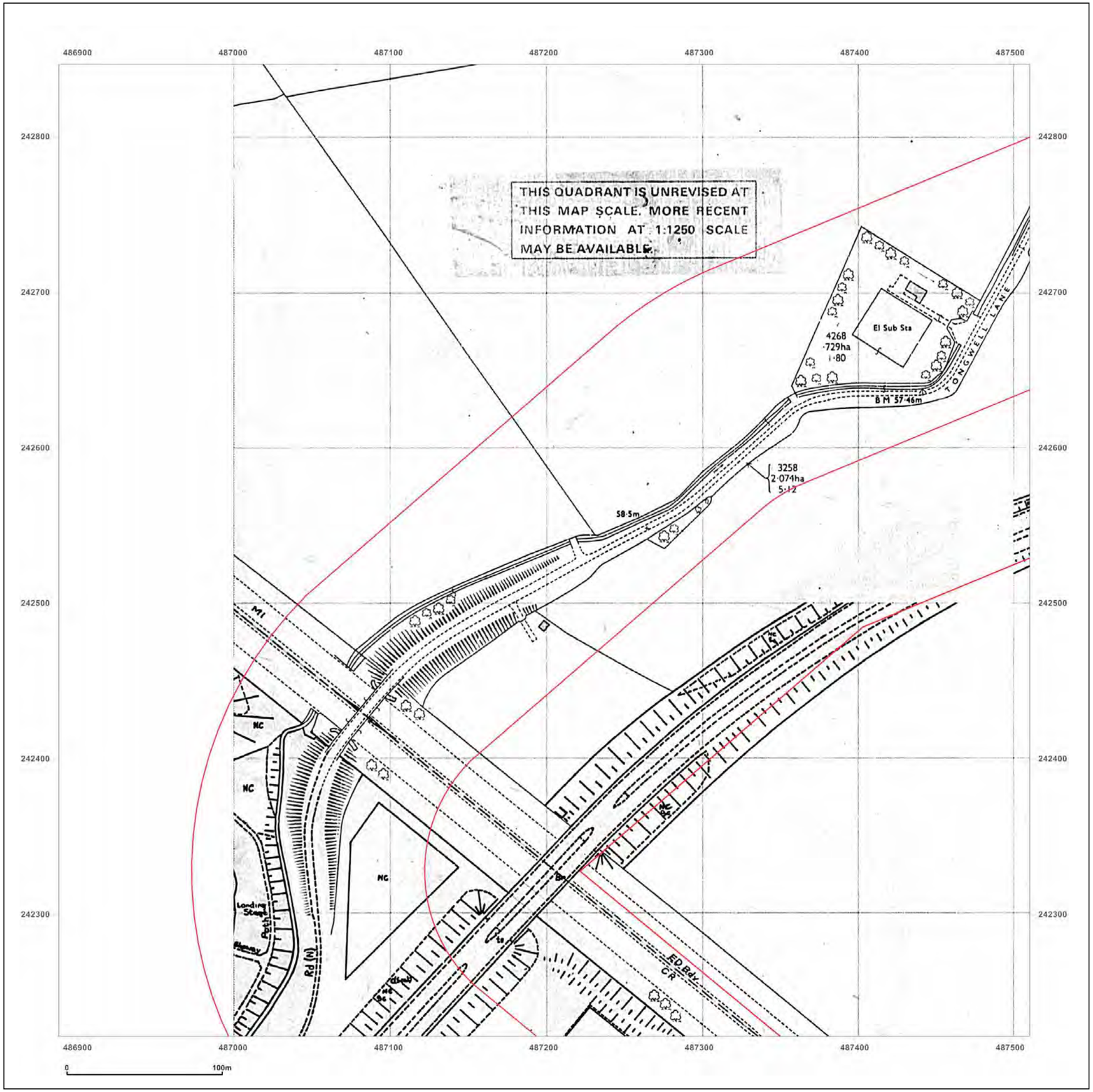

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_A2
Grid Ref: 487200, 242534

Map Name: National Grid
Map date: **1985**
Scale: 1:2,500
Printed at: 1:2,500

N
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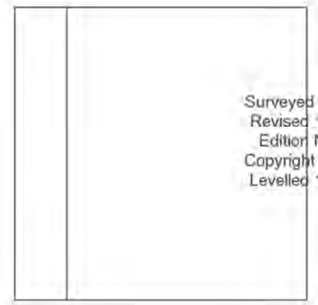

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Production date: 24 August 2015

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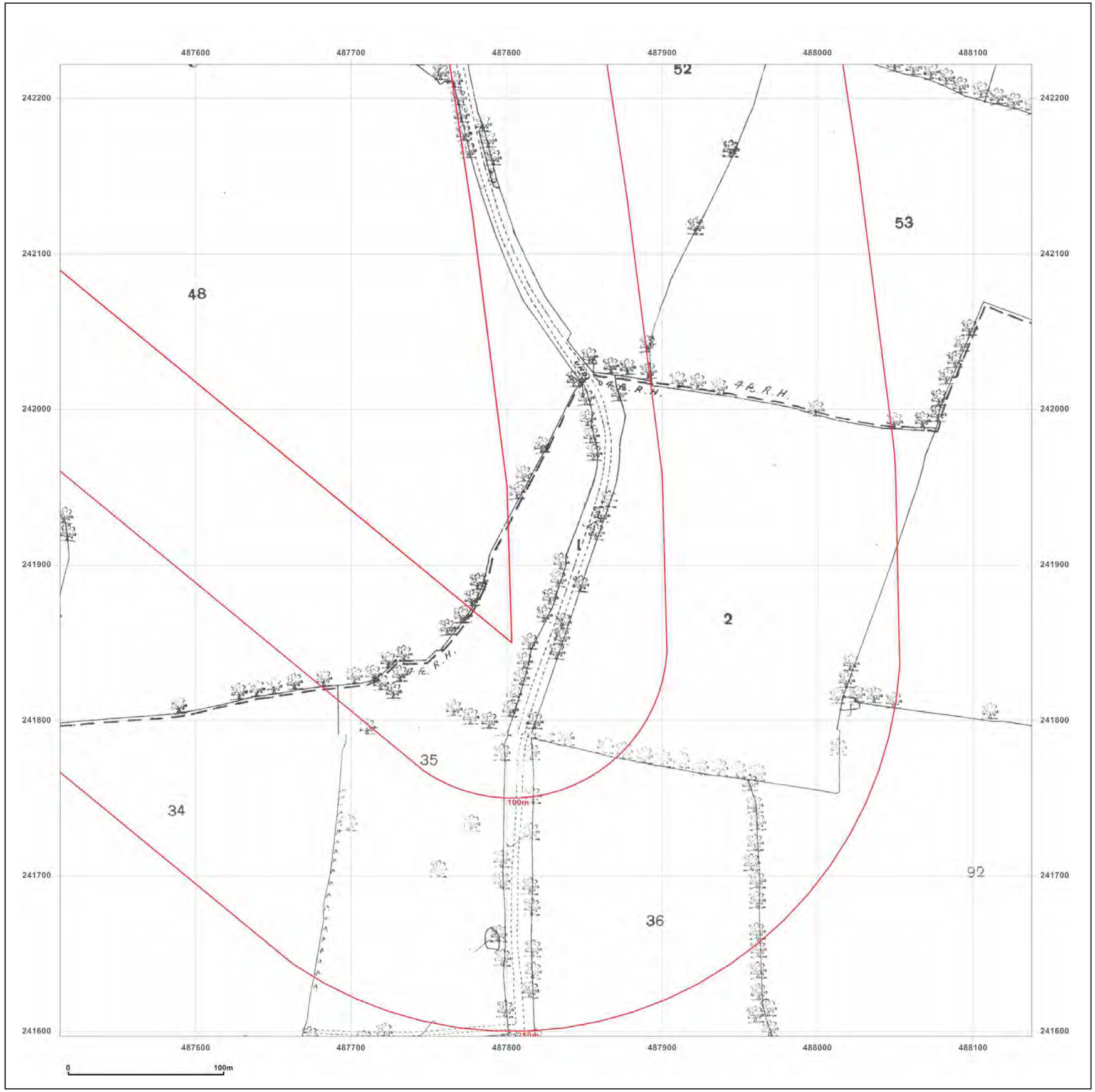

emapsite™

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B1
Grid Ref: 487825, 241909

Map Name: County Series

Map date: **1881**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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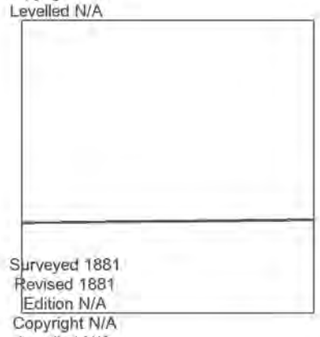
Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

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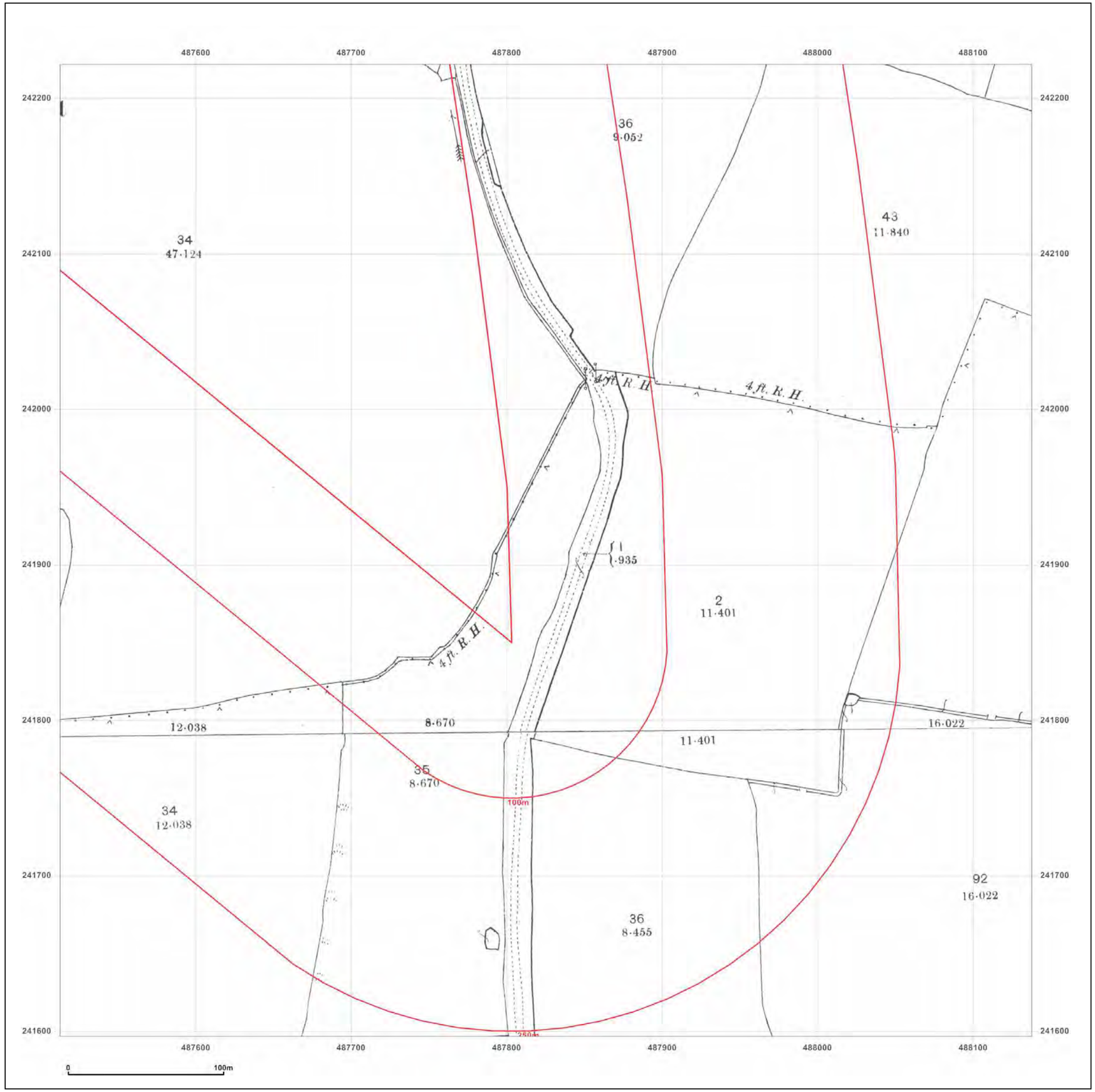

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B1
Grid Ref: 487825, 241909

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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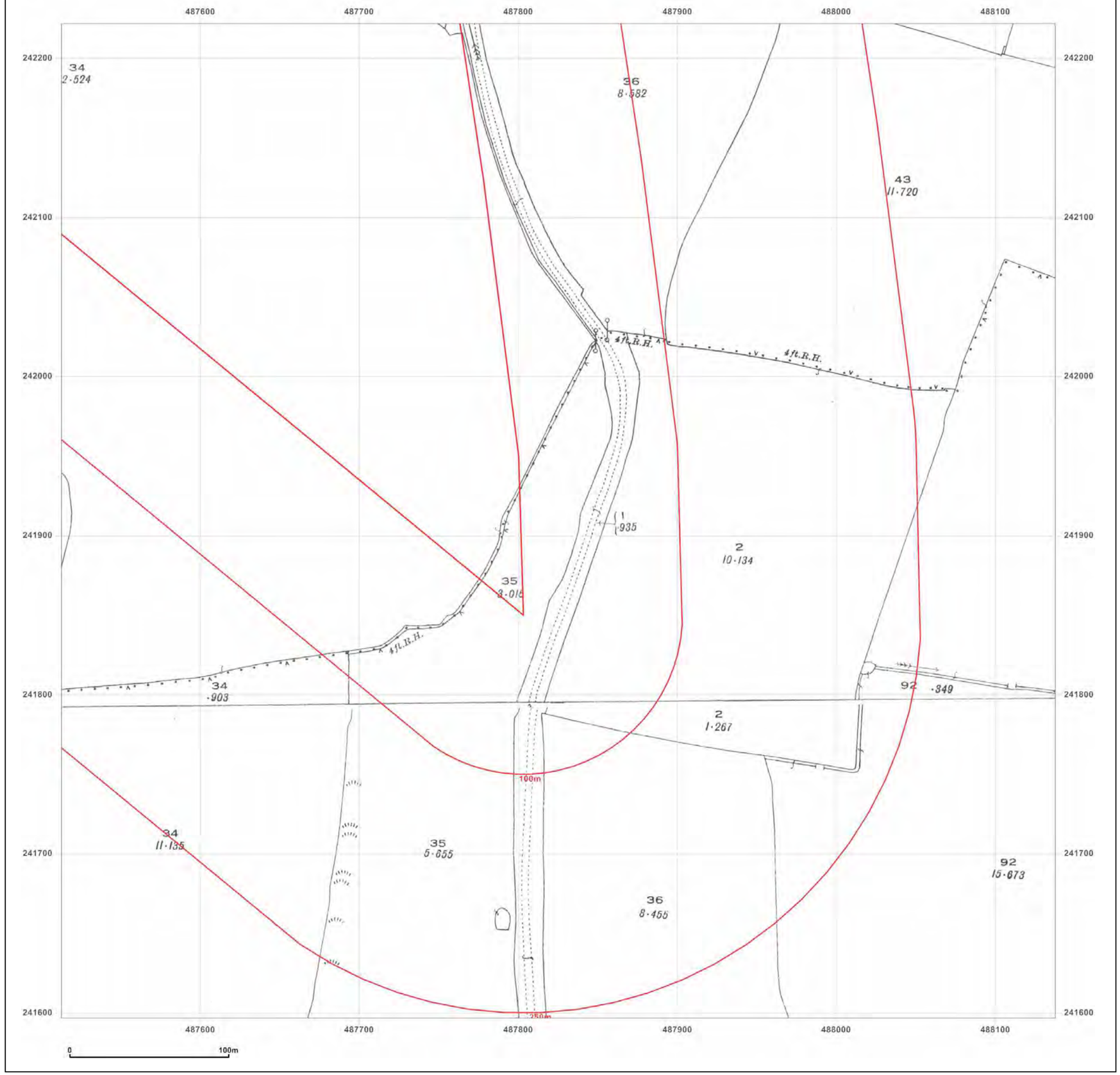

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B1
Grid Ref: 487825, 241909

Map Name: County Series

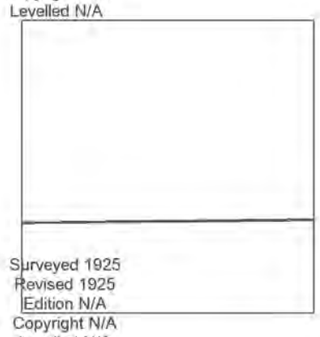
Map date: **1925**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A

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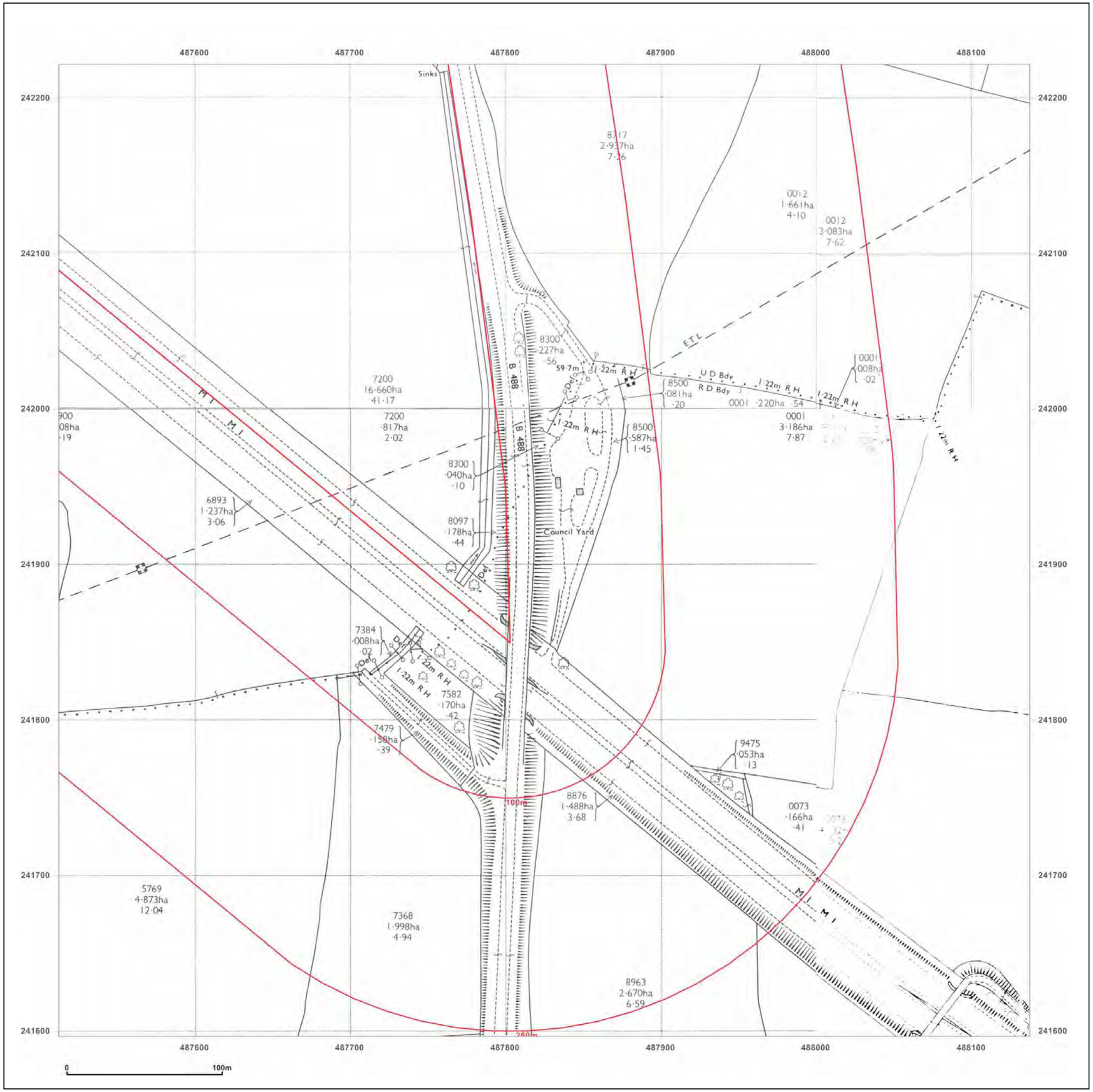

emapsite™

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B1
Grid Ref: 487825, 241909

Map Name: National Grid

Map date: **1969-1970**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1957

Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1959

Surveyed 1969
Revised 1969
Edition N/A
Copyright 1970
Levelled 1957

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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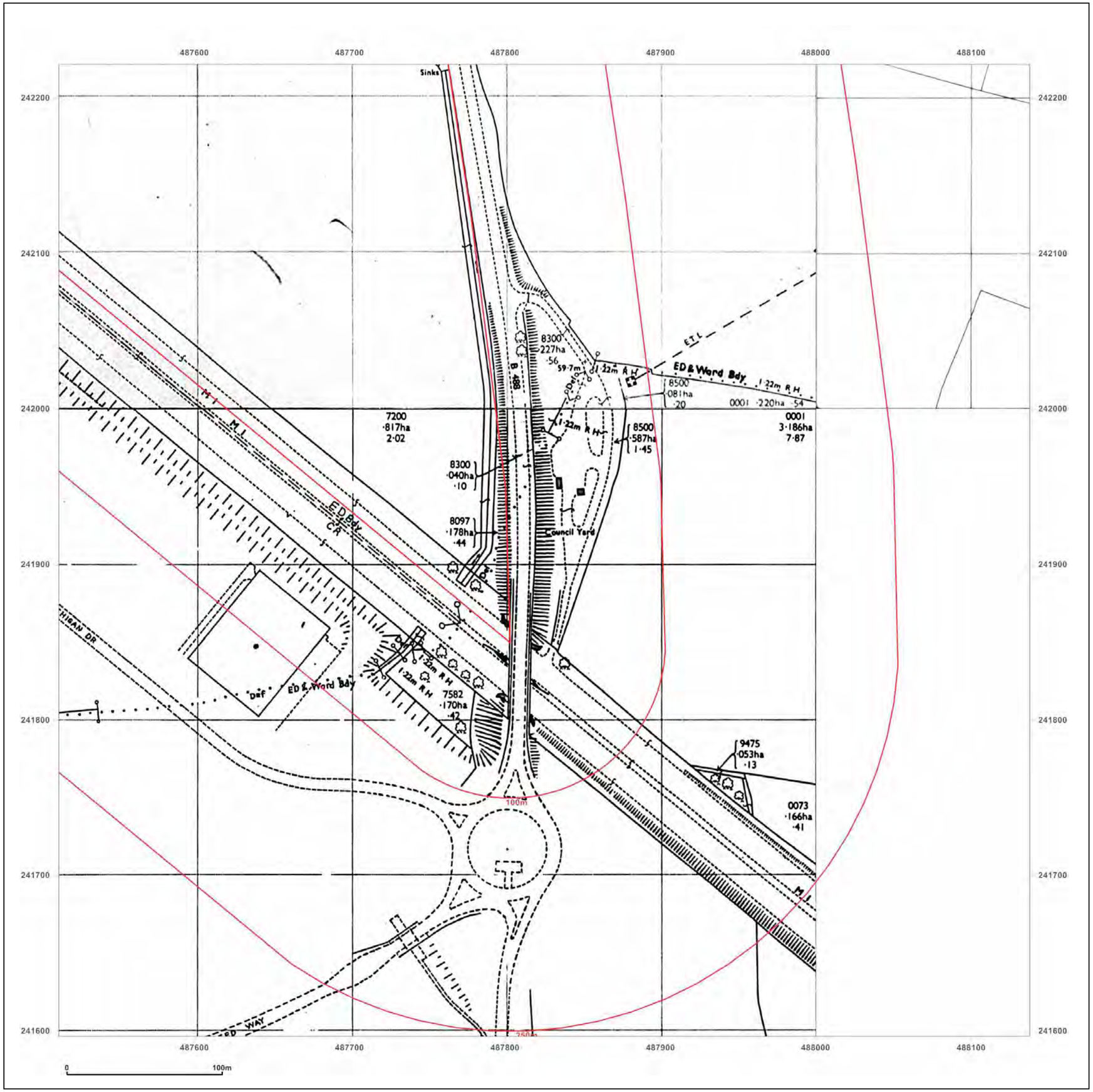

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B1
Grid Ref: 487825, 241909

Map Name: National Grid
Map date: **1985-1990**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
S

Surveyed 1957
Revised 1985
Edition N/A
Copyright 1985
Levelled 1957

Surveyed 1990
Revised 1990
Edition N/A
Copyright 1990
Levelled N/A

Surveyed 1982
Revised 1985
Edition N/A
Copyright 1985
Levelled 1982

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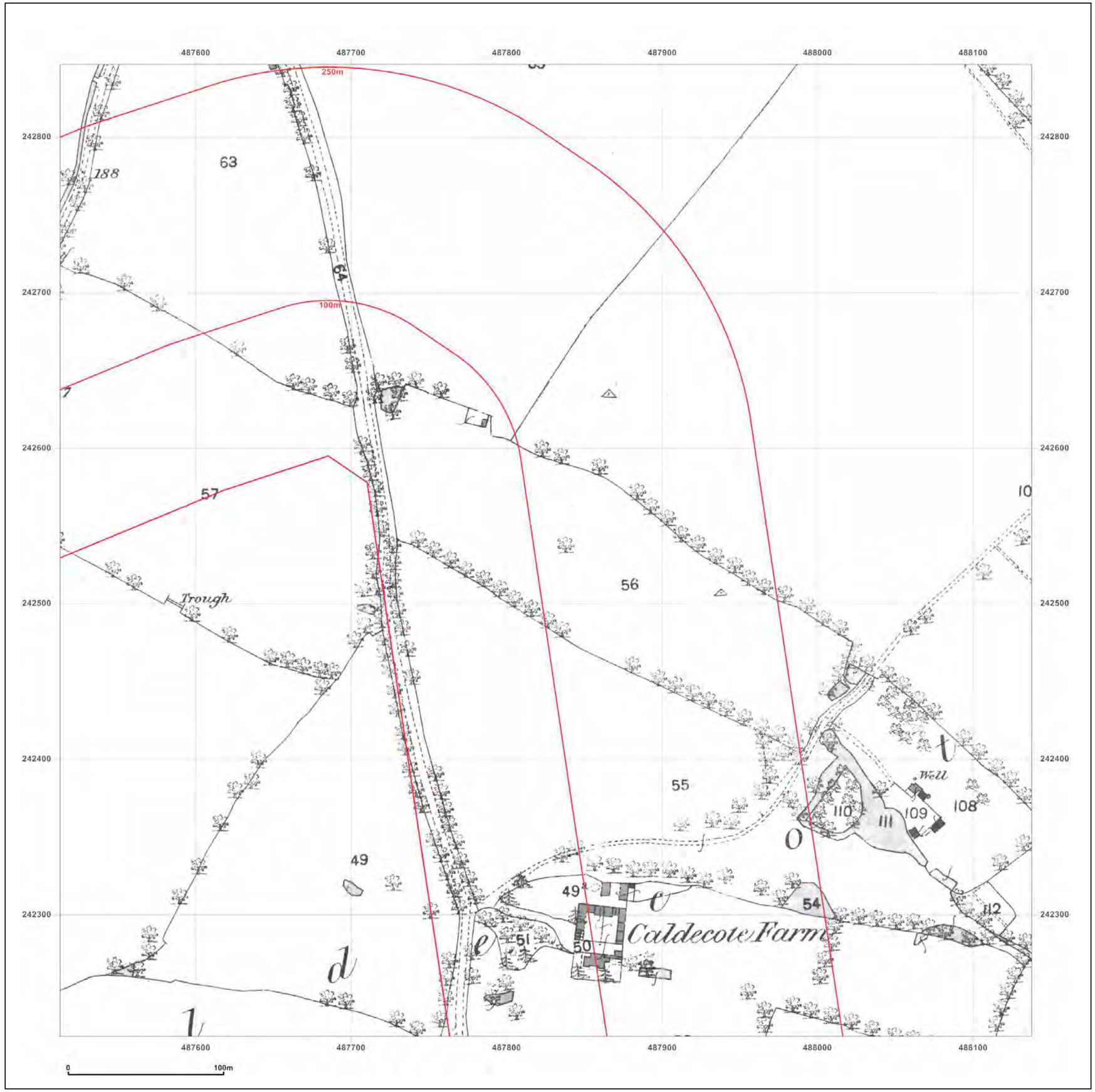

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B2
Grid Ref: 487825, 242534

Map Name: County Series

Map date: **1881**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1881
Revised 1881
Edition N/A
Copyright N/A
Levelled N/A

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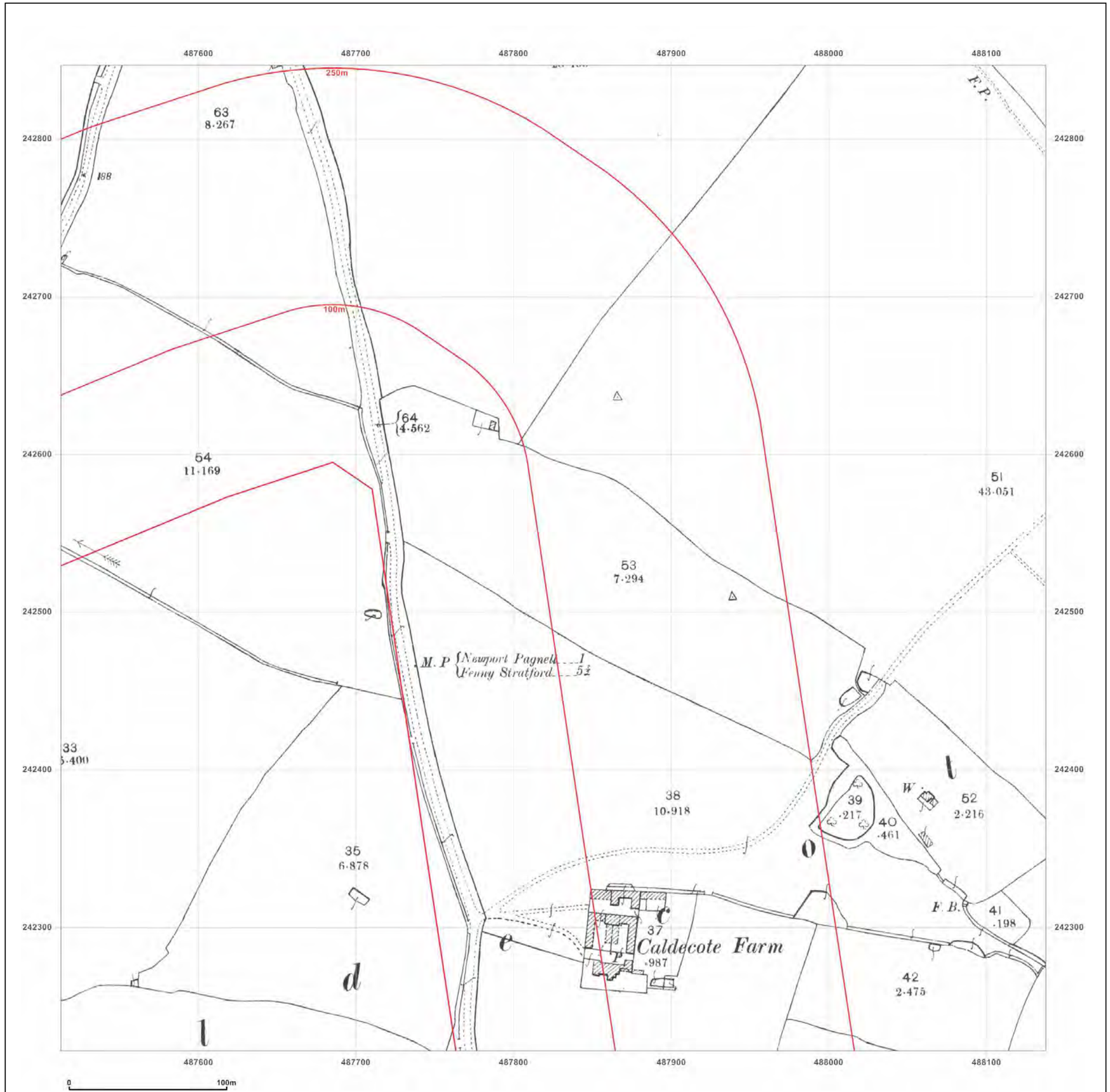

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B2
Grid Ref: 487825, 242534

Map Name: County Series

Map date: **1900**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1900
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

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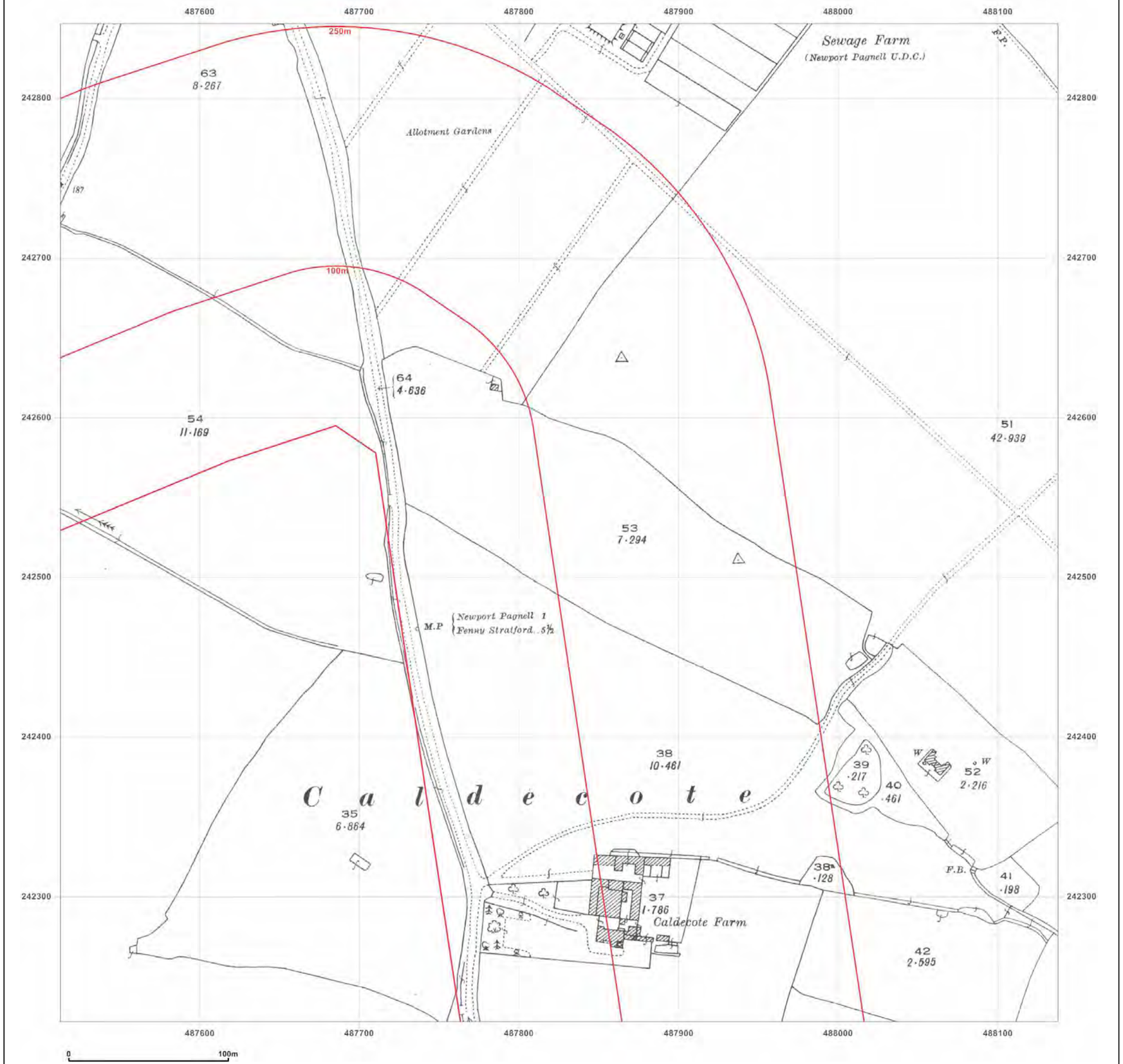

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B2
Grid Ref: 487825, 242534

Map Name: County Series

Map date: **1925**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S

Surveyed 1925
Revised 1925
Edition N/A
Copyright N/A
Levelled N/A

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B2
Grid Ref: 487825, 242534

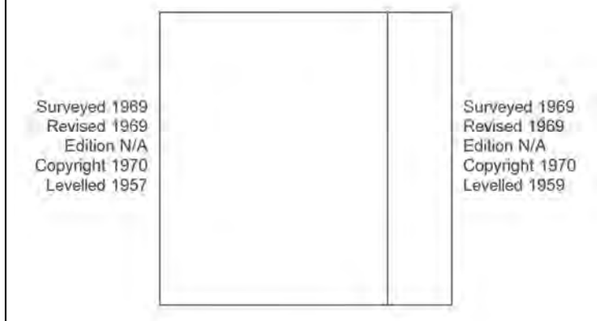
Map Name: National Grid

Map date: **1969**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S



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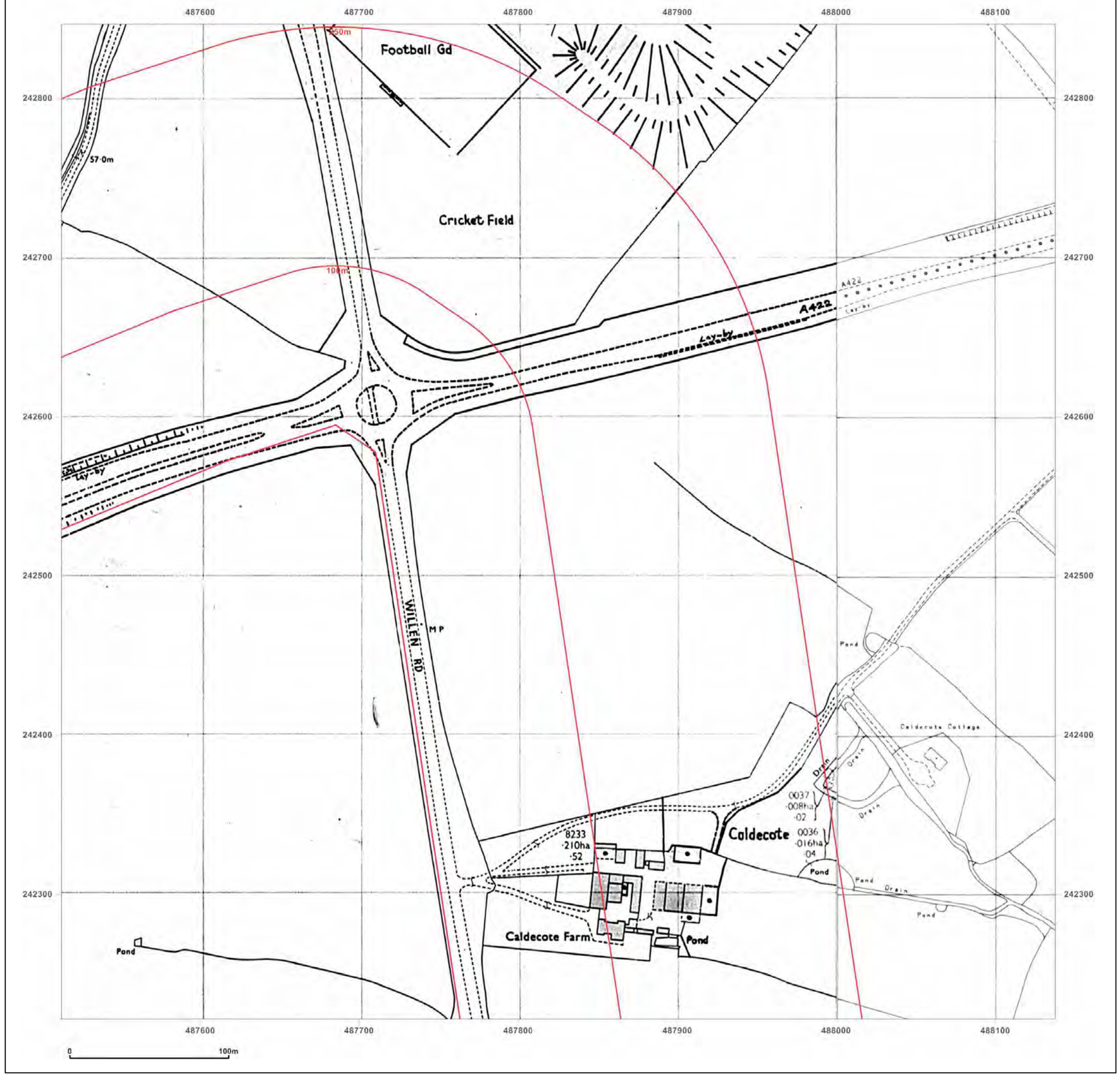

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298_LS_B2
Grid Ref: 487825, 242534

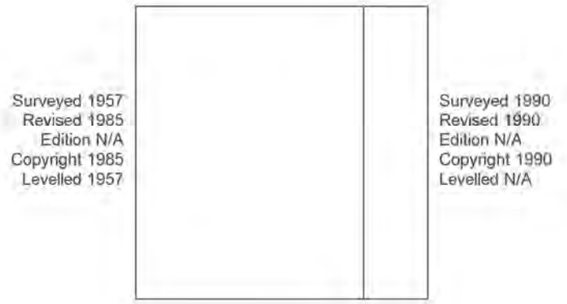
Map Name: National Grid

Map date: **1985-1990**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
S



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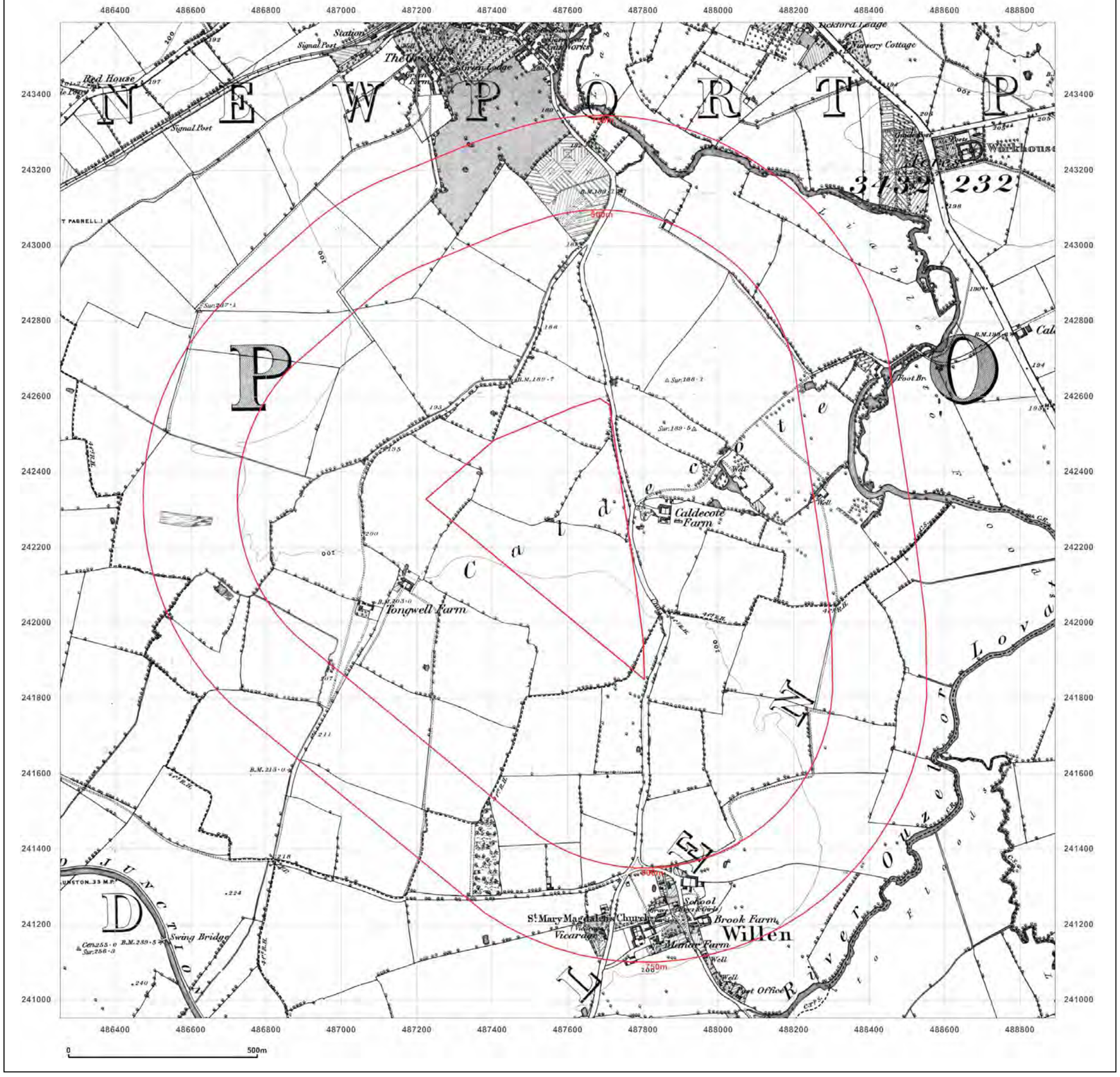

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: County Series

Map date: **1886**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1881
Revised N/A
Edition 1886
Copyright N/A
Levelled N/A

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Production date: 24 August 2015

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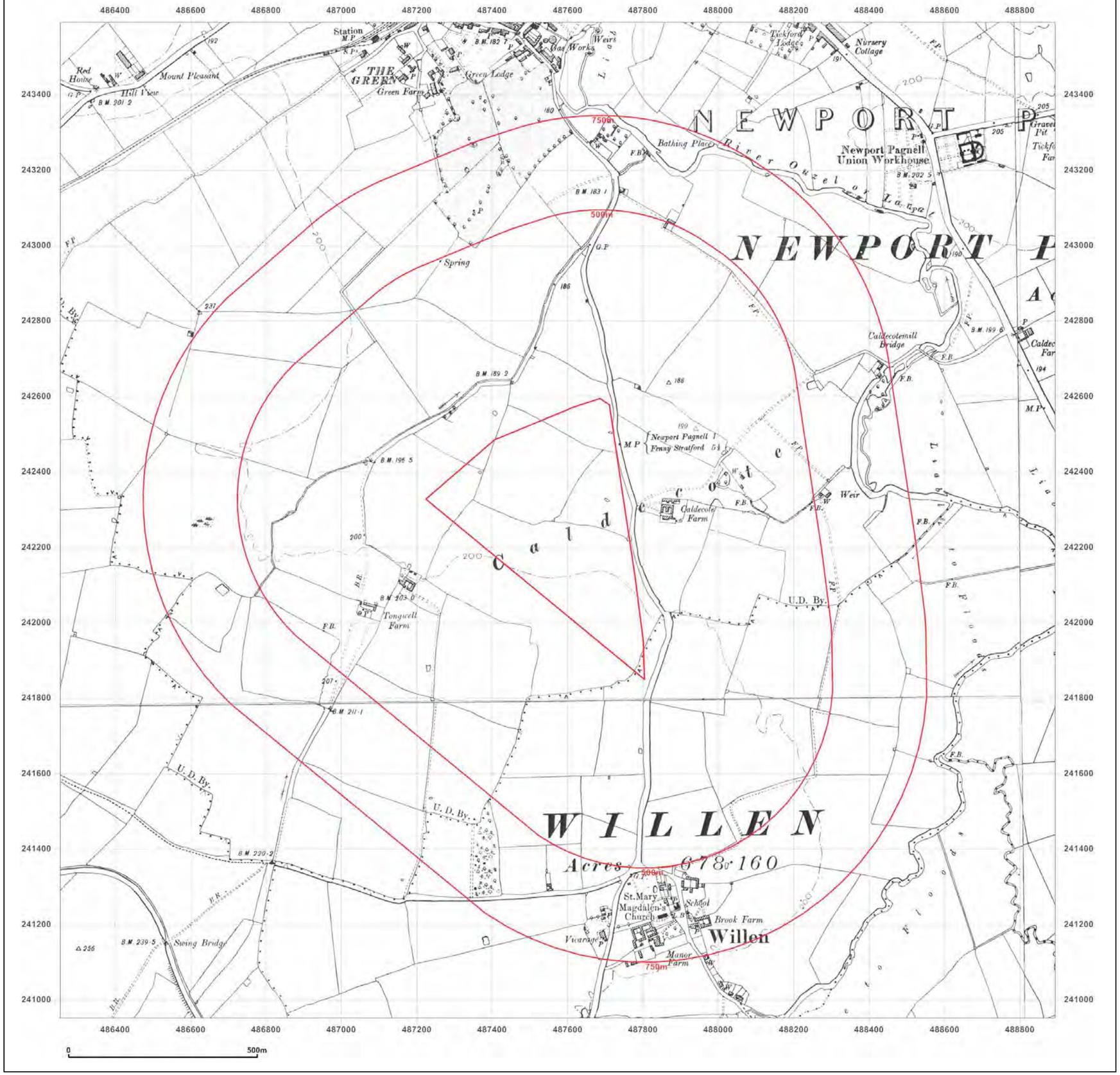

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

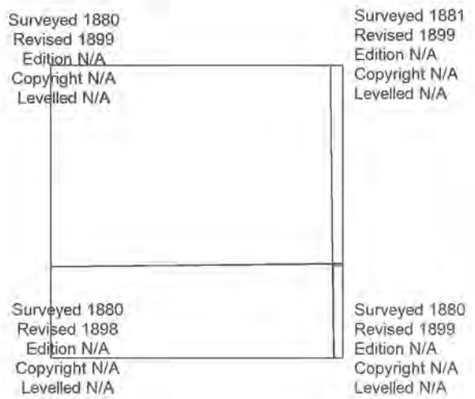
Map Name: County Series

Map date: **1898-1899**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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Production date: 24 August 2015

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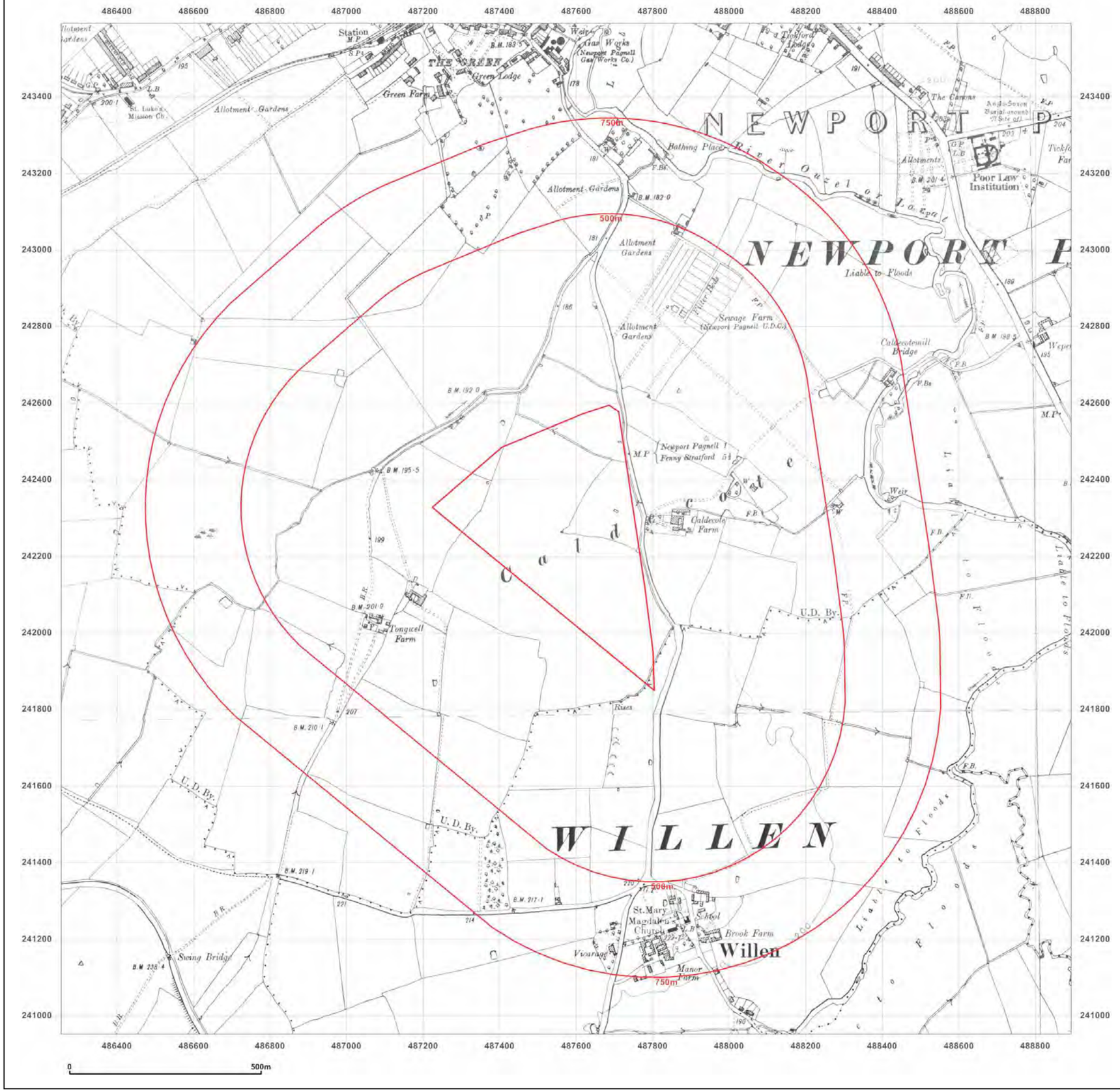

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

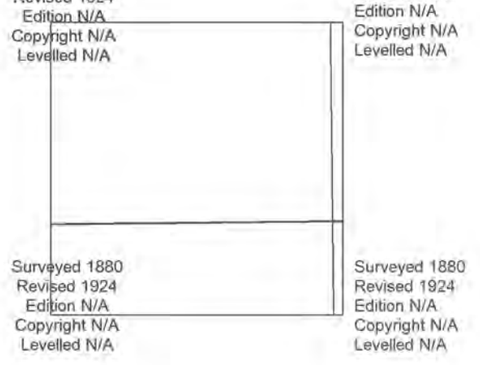
Map Name: County Series

Map date: **1924**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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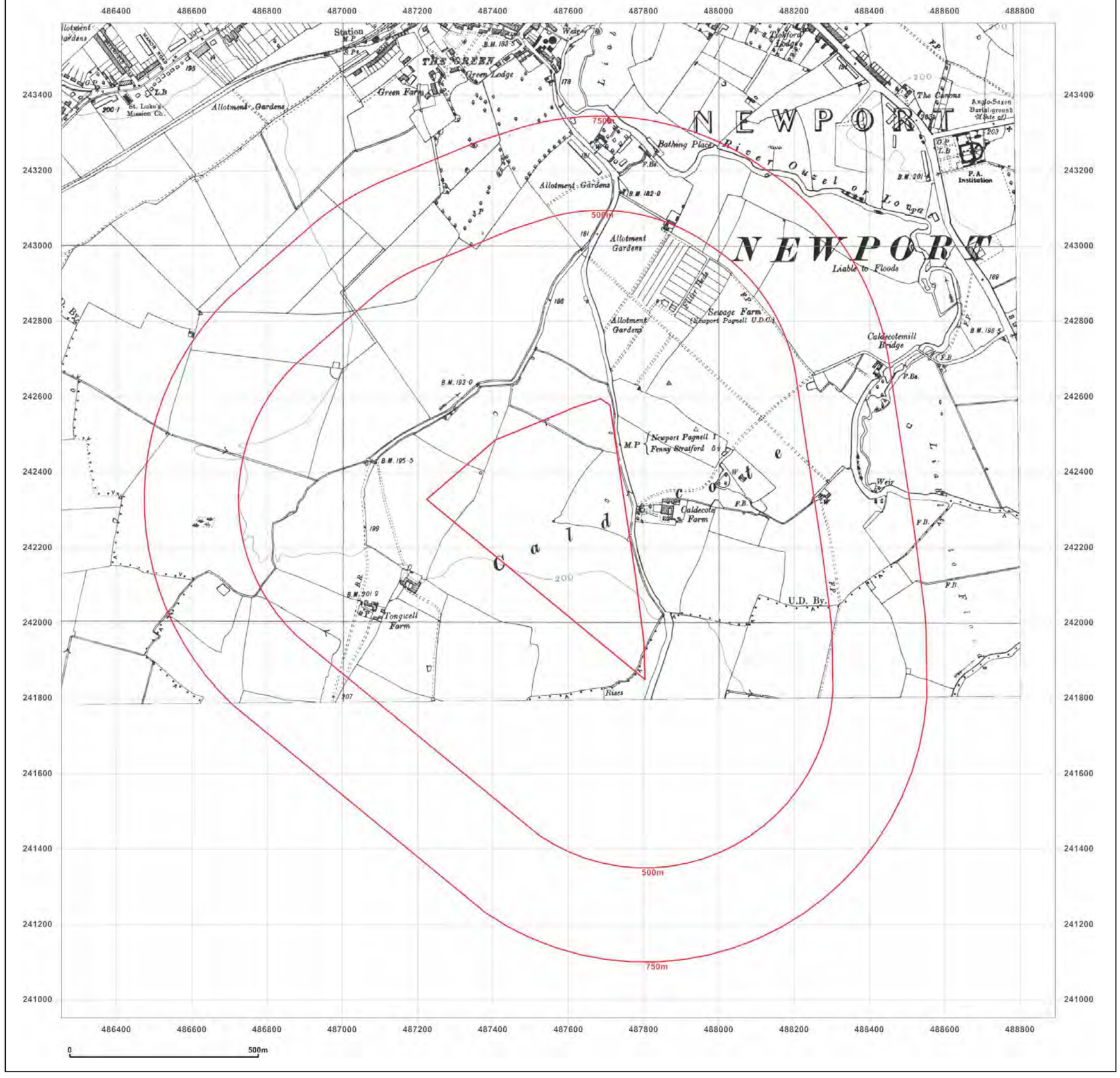

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: County Series

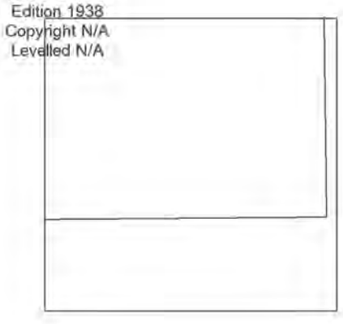
Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1880
Revised 1938
Edition 1938
Copyright N/A
Levelled N/A



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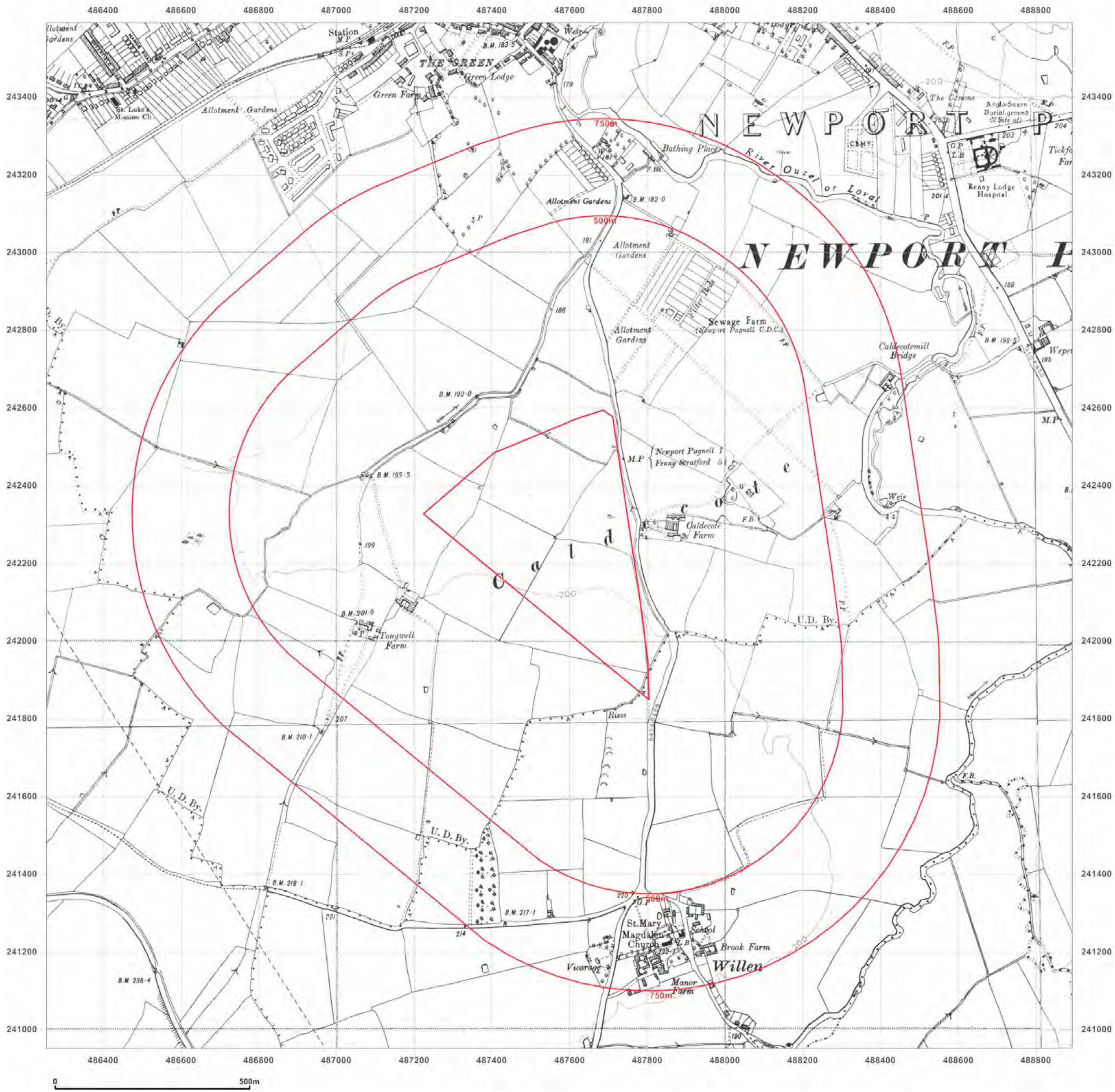

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

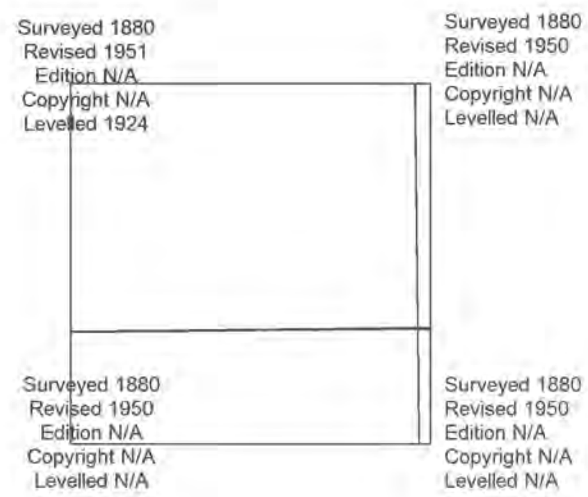
Map Name: County Series

Map date: **1950-1951**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S



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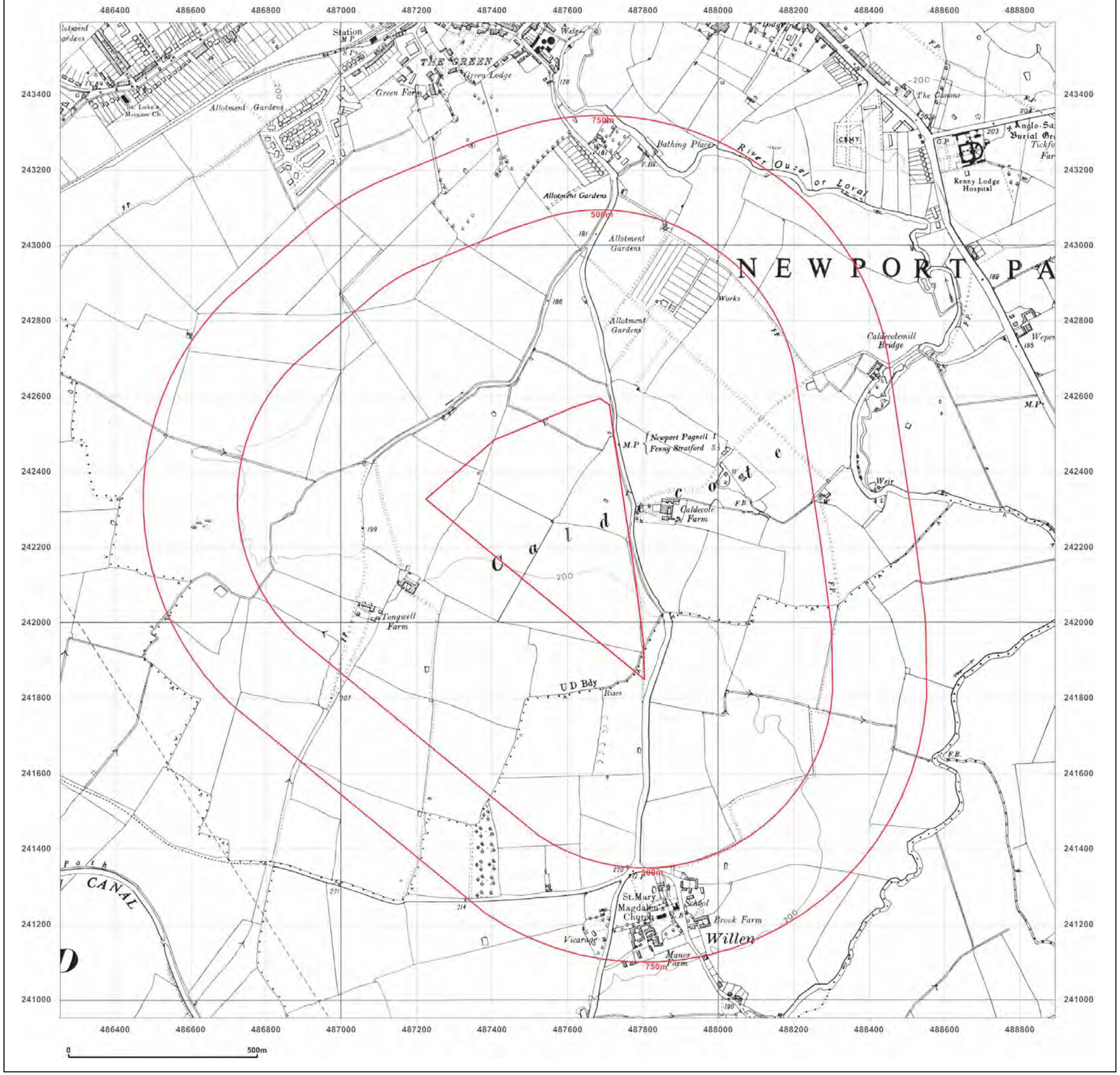

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: Provisional

Map date: **1958**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1957
Edition 1958
Copyright N/A
Levelled N/A

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Production date: 24 August 2015

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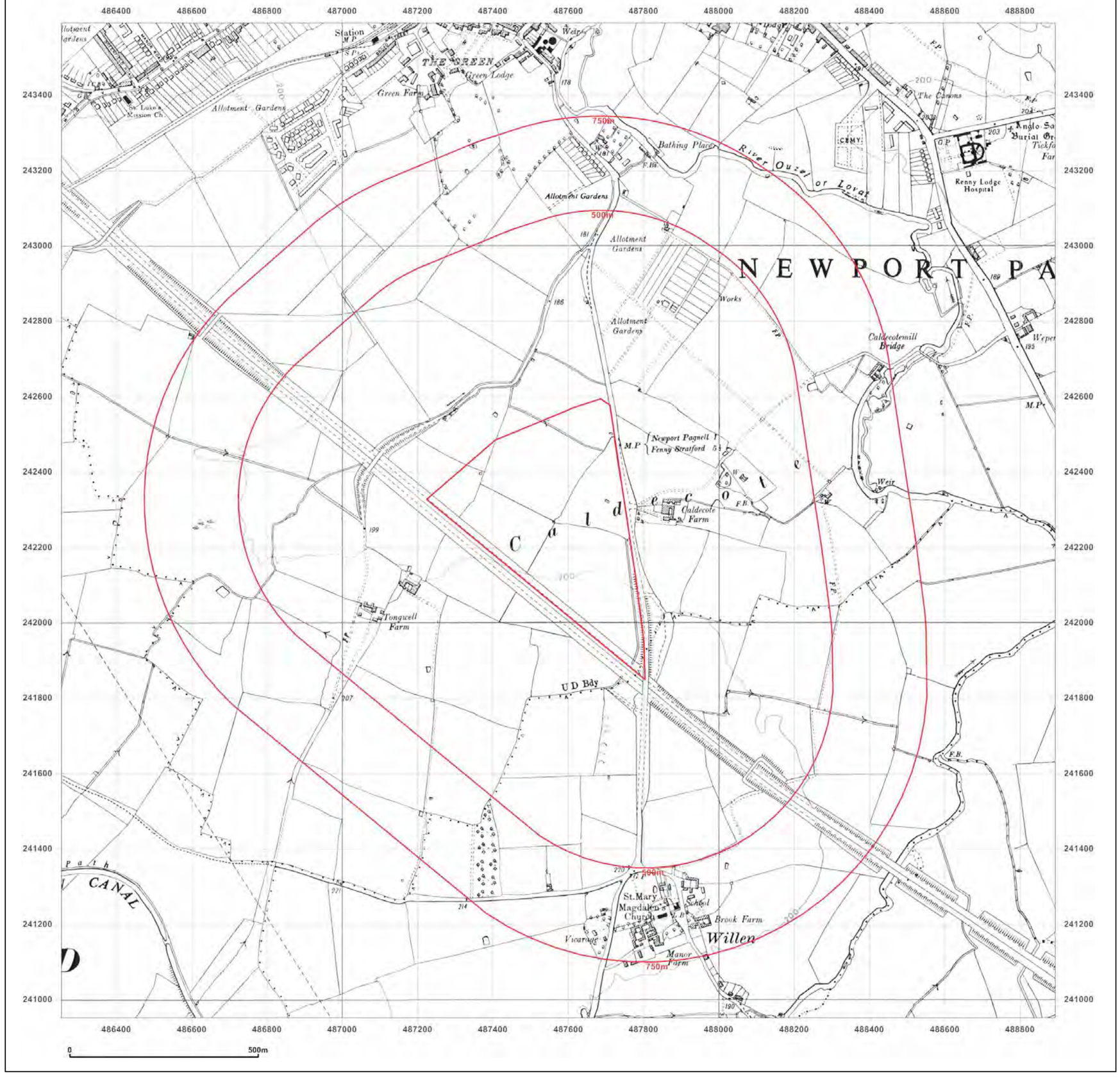

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: Provisional

Map date: **1968**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1968
Edition 1968
Copyright N/A
Levelled N/A

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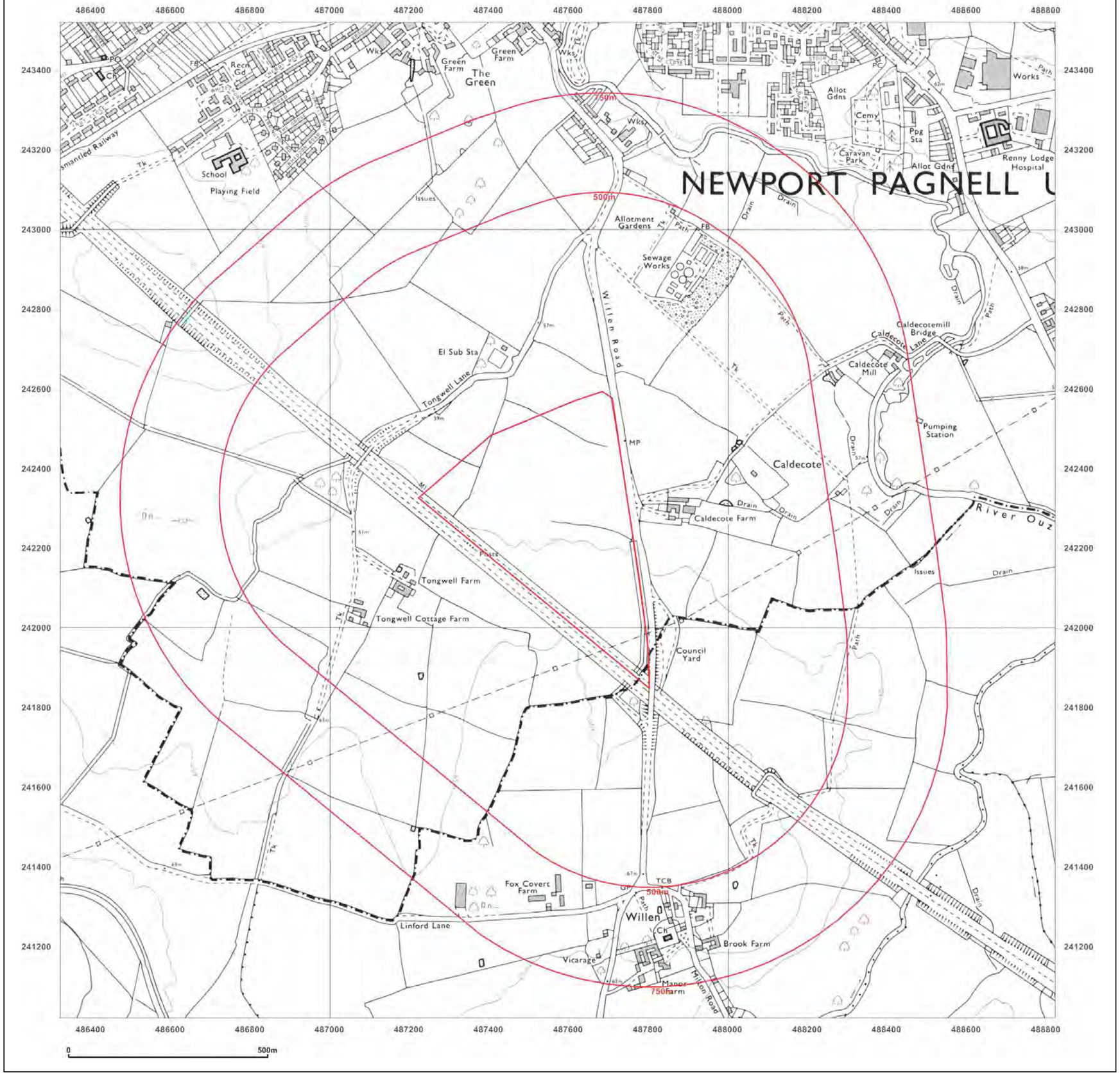

Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: National Grid

Map date: **1971**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1971
Revised 1971
Edition N/A
Copyright N/A
Levelled N/A

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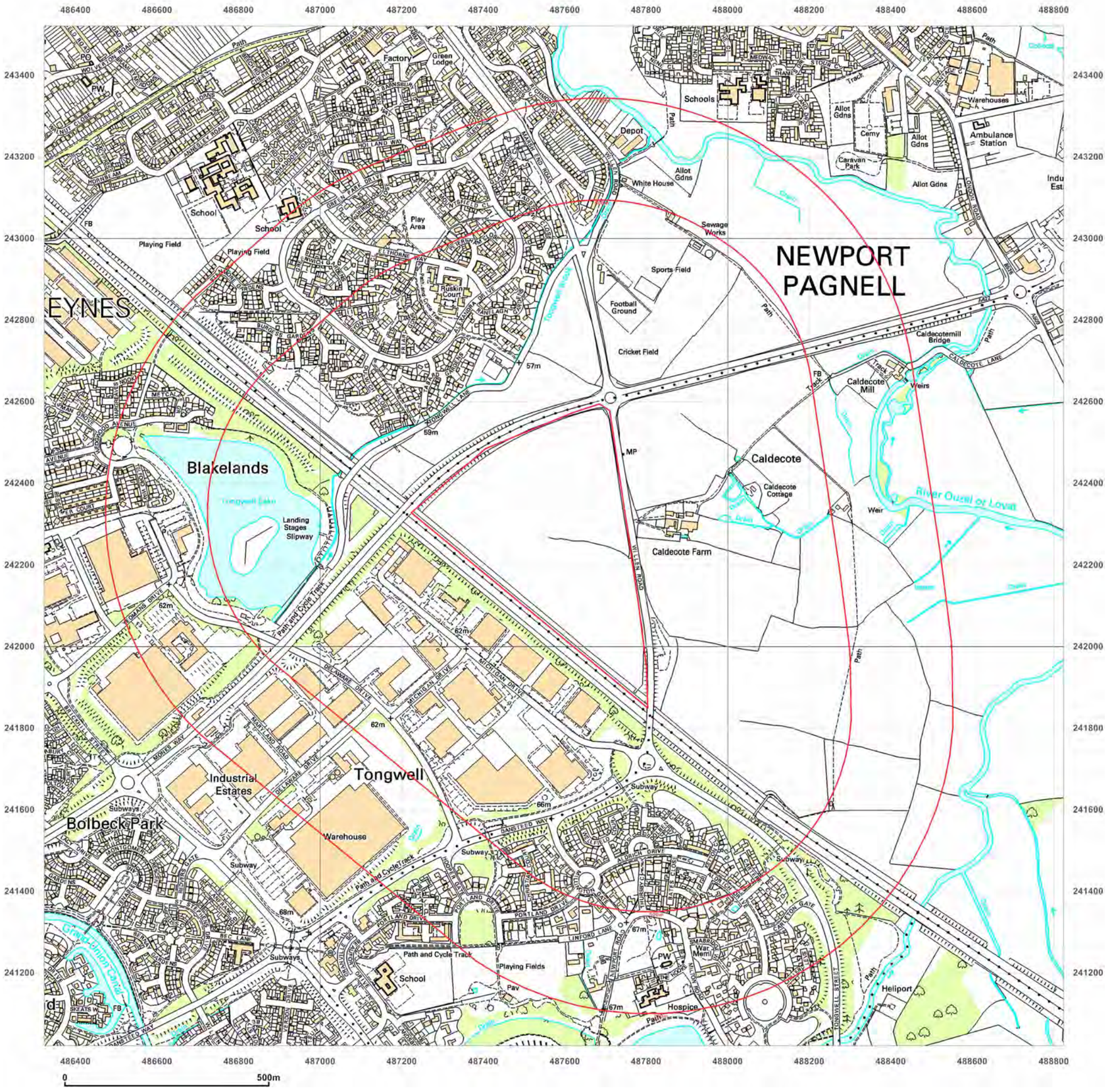

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2002

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Production date: 24 August 2015

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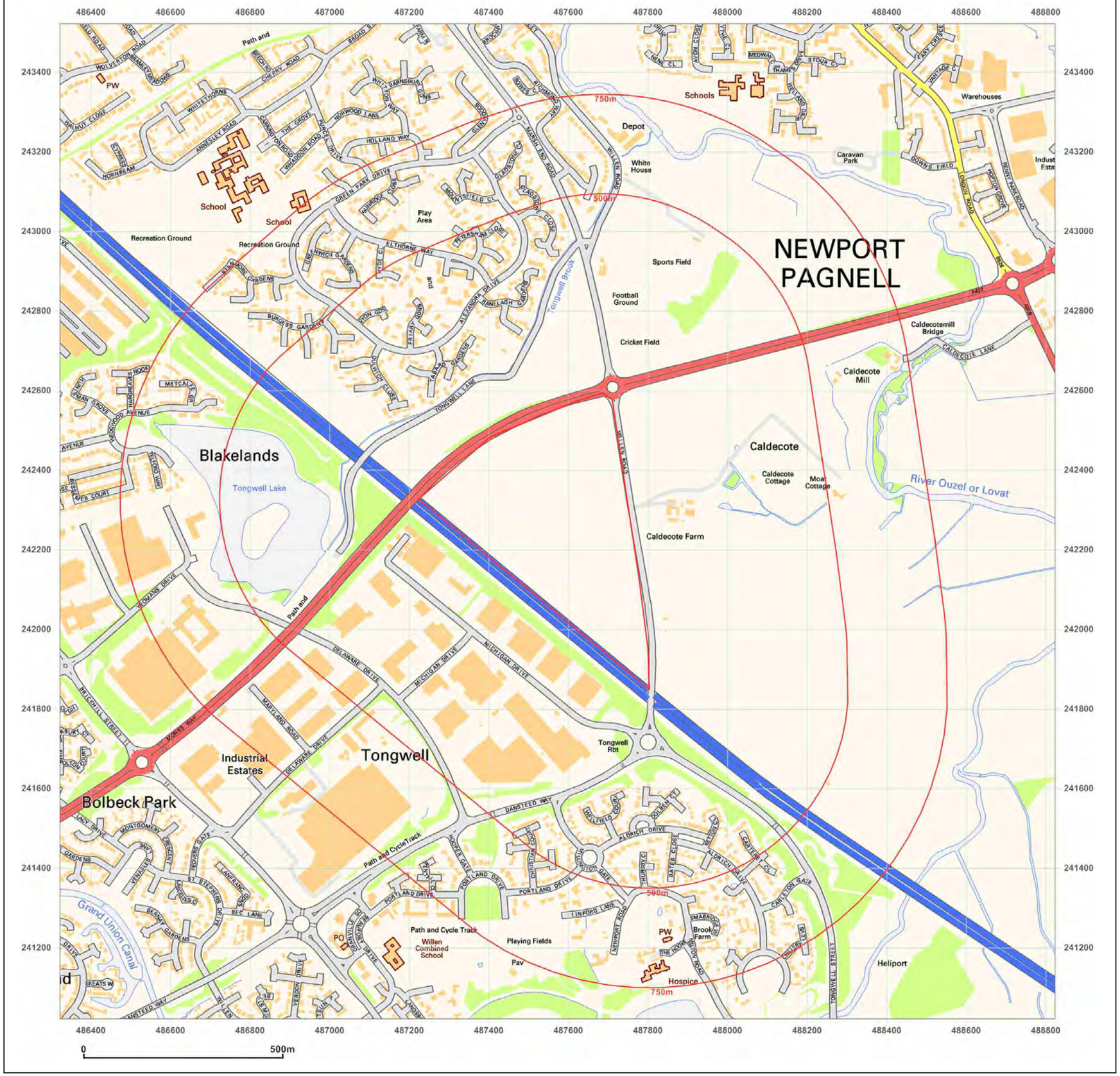

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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Production date: 24 August 2015

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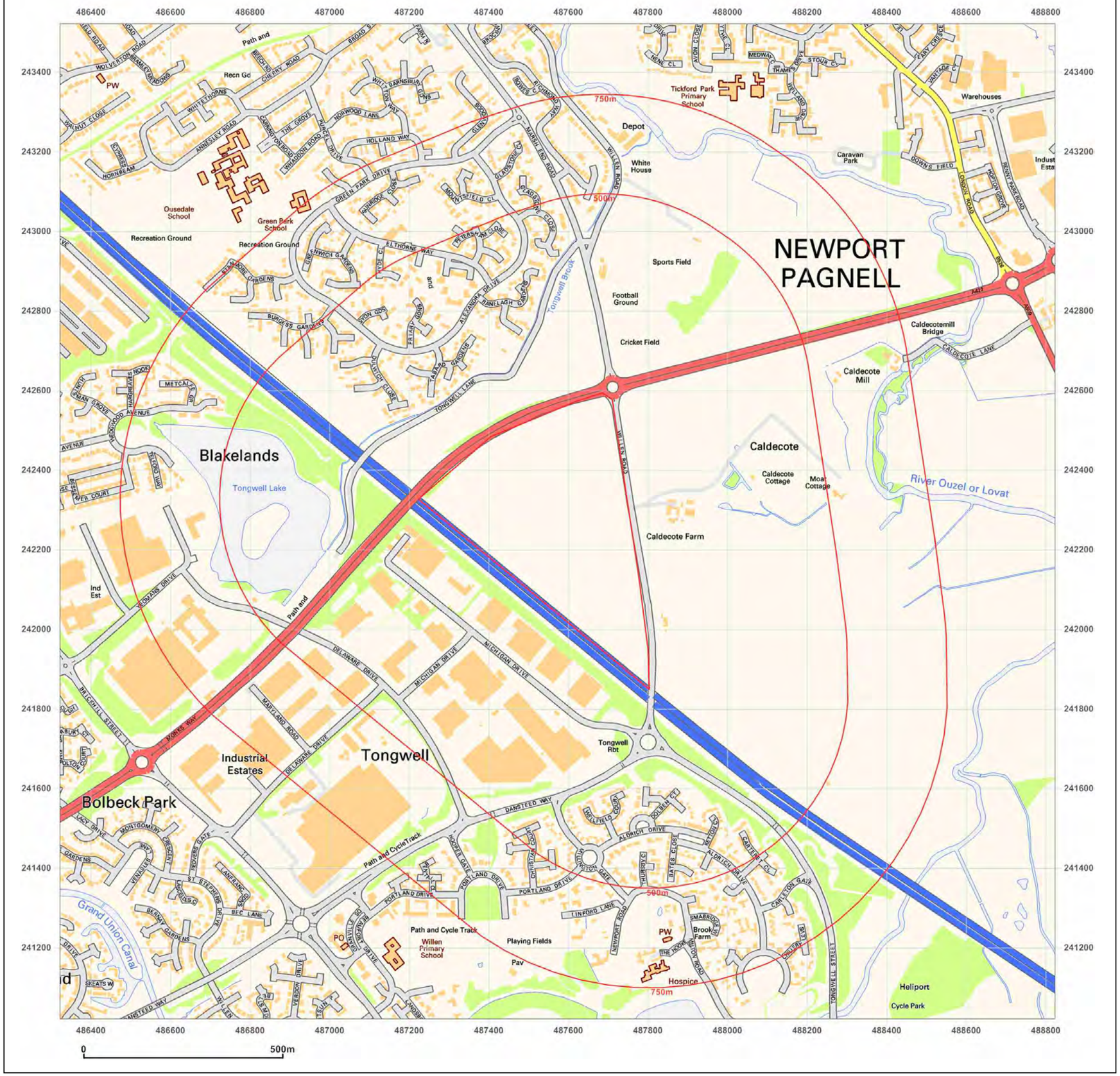

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Site Details:

Client Ref: EMS_321490_433298
Report Ref: EMS-321490_433298
Grid Ref: 487573, 242271

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

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To view map legend click here *Legend*

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Your Reference: EMS_321490_433299

Report Date 24 Aug 2015

Report Delivery Method: Email - pdf

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Yours faithfully,

emapsite customer services team

Enc.
Groundsure Geoinsight

Groundsure Geoinsight

Address:	,
Date:	24 Aug 2015
Reference:	EMS-321490_433299
Client:	EmapSite

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	07-Sep-2012
Grid Reference:	487573,242271
Site Size:	21.32ha

Contents Page

Overview of Findings 5
1 Geology 8
1.1 Artificial Ground Map 8
1 Geology 9
1.1 Artificial Ground 9
1.1.1Artificial/ Made Ground 9
1.1.2 Permeability of Artificial Ground 9
1.2 Superficial Deposits and Landslips Map 10
1.2 Superficial Deposits and Landslips 11
1.2.1 Superficial Deposits/ Drift Geology 11
1.2.2 Permeability of Superficial Ground 11
1.2.3 Landslip 12
1.2.4 Landslip Permeability 12
1.3 Bedrock and Faults Map 13
1.3 Bedrock, Solid Geology & Faults 14
1.3.1 Bedrock/ Solid Geology 14
1.3.2 Permeability of Bedrock Ground 14
1.3.3 Faults 14
1.4 Radon Data 16
1.4.1 Radon Affected Areas 16
1.4.2 Radon Protection 16
2 Ground Workings Map 17
2 Ground Workings 18
2.1 Historical Surface Ground Working Features derived from Historical Mapping 18
2.2 Historical Underground Working Features derived from Historical Mapping 18
2.3 Current Ground Workings 19
3 Mining, Extraction & Natural Cavities Map 20
3 Mining, Extraction & Natural Cavities 21
3.1 Historical Mining 21
3.2 Coal Mining 21
3.3 Johnson Poole and Bloomer 21
3.4 Non-Coal Mining 21
3.5 Non-Coal Mining Cavities 22
3.6 Natural Cavities 22
3.7 Brine Extraction 22
3.8 Gypsum Extraction 22
3.9 Tin Mining 22
3.10 Clay Mining 23
4 Natural Ground Subsidence 24
4.1 Shrink-Swell Clay Map 24
4.2 Landslides Map 25
4.3 Ground Dissolution Soluble Rocks Map 26
4.4 Compressible Deposits Map 27
4.5 Collapsible Deposits Map 28
4.6 Running Sand Map 29
4 Natural Ground Subsidence 30
4.1 Shrink-Swell Clays 30
4.2 Landslides 30
4.3 Ground Dissolution of Soluble Rocks 31

4.4 Compressible Deposits....31
4.5 Collapsible Deposits....32
4.6 Running Sands....32
5 Borehole Records Map....33
5 Borehole Records....34
6 Estimated Background Soil Chemistry....41
7 Railways and Tunnels Map....43
7 Railways and Tunnels....44
7.1 Tunnels....44
7.2 Historical Railway and Tunnel Features....44
7.3 Historical Railways....45
7.4 Active Railways....45
7.5 Railway Projects....45

Overview of Findings

The Groundsure Geoinsight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1:Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	Yes
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	Yes
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	Yes
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
	1.4.2 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

Section 2:Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	0	1	6	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
2.3 Current Ground Workings	1	0	0	0	1

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	0	0	0
3.2 Coal Mining	0	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining	0	0	0	0	0
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Moderate
4.2 Landslides	Very Low
4.3 Ground Dissolution of Soluble Rocks	Low
4.4 Compressible Deposits	Moderate
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	16	11	85

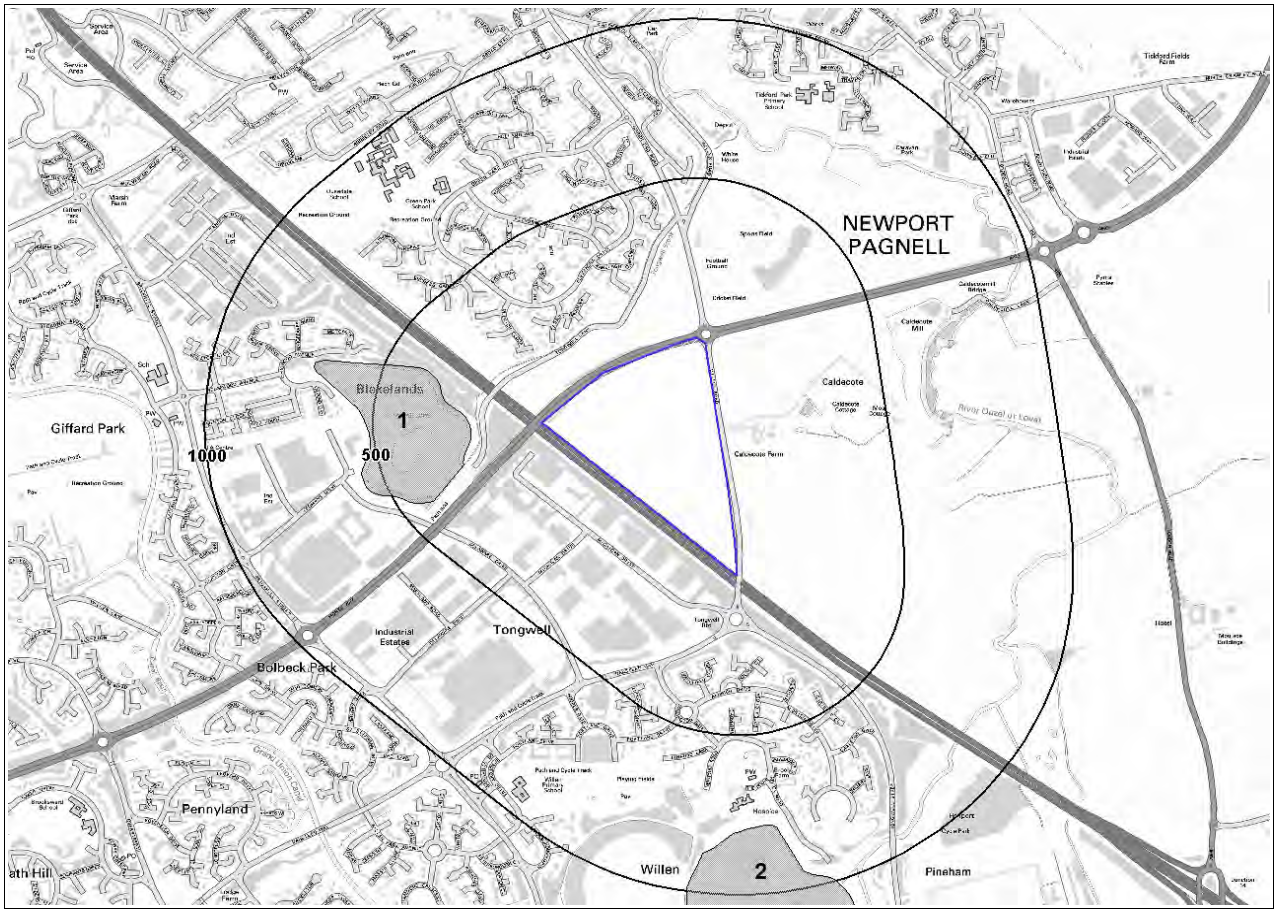
Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	13	5	33

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
7.3 Historical Railways	0	0	0	Not Searched
7.4 Active Railways	0	0	0	Not Searched

Section 7:Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

1 Geology

1.1 Artificial Ground Map



Artificial Ground Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Disturbed Ground (undivided)

Worked Ground (undivided)

Landscaped Ground (undivided)

Infilled Ground

Reclaimed Ground

1 Geology

1.1 Artificial Ground

1.1.1Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:203

Are there any records of Artificial/Made Ground within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	212.0	W	WGR-OPEN	WORKED GROUND (UNDIVIDED)	VOID

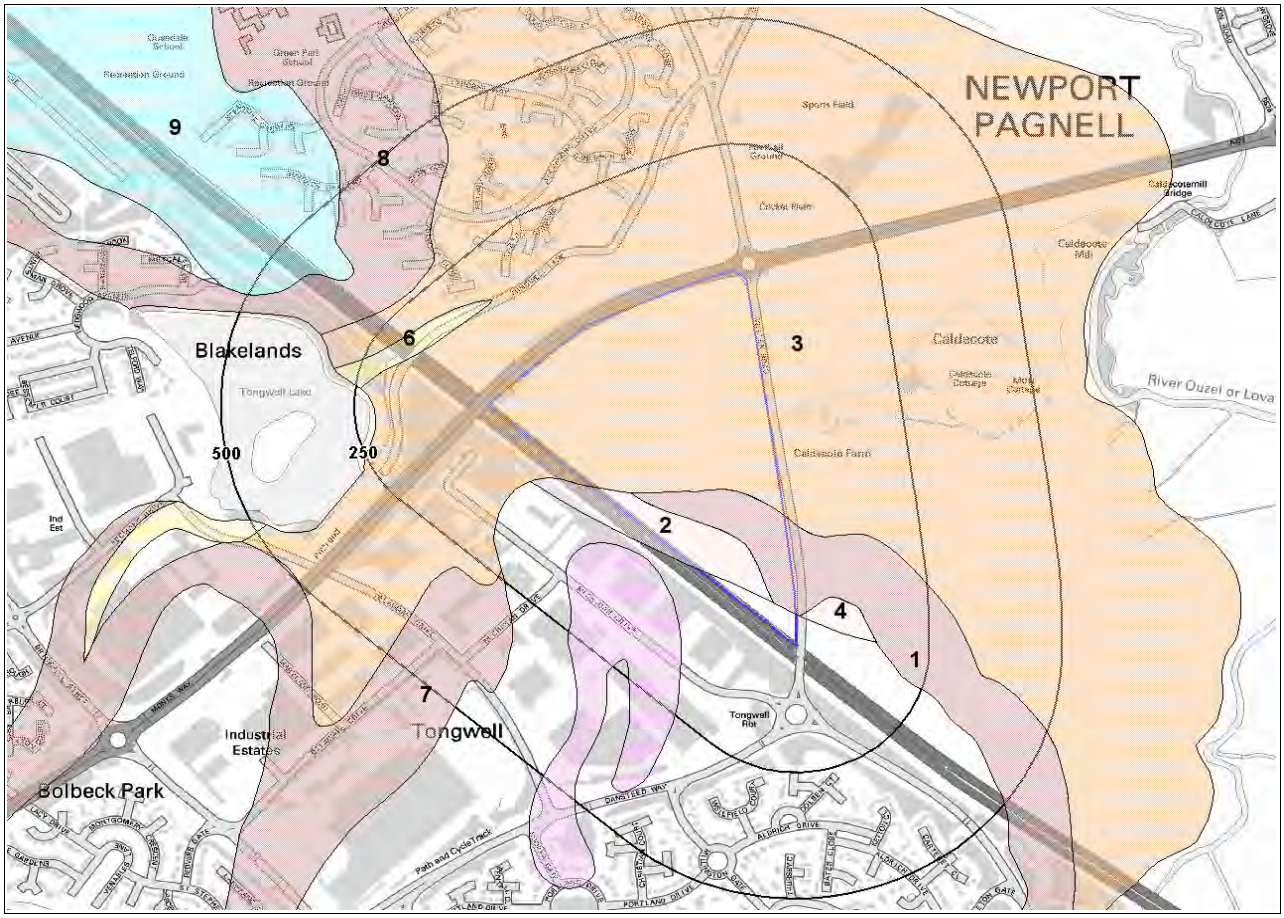
1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map

NW N NE



W E

SW S SE

Superficial Deposits and Landslips Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
2	0.0	On Site	GLLMP	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
3	0.0	On Site	FELM	FELMERSHAM MEMBER	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
4	7.0	E	GLLMP	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
5	45.0	SW	GFDMP	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
6	150.0	NW	ALV	ALLUVIUM	CLAY AND SILT [UNLITHIFIED DEPOSITS CODING SCHEME]
7	237.0	SW	HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
8	264.0	NW	HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
9	362.0	NW	ODT	OADBY MEMBER	DIAMICTON
10	479.0	SW	ALV	ALLUVIUM	CLAY AND SILT [UNLITHIFIED DEPOSITS CODING SCHEME]

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Mixed	High	Very Low

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Low	Very Low
12.0	E	Mixed	Low	Very Low
35.0	SW	Intergranular	Very High	High

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.2.4 Landslip Permeability

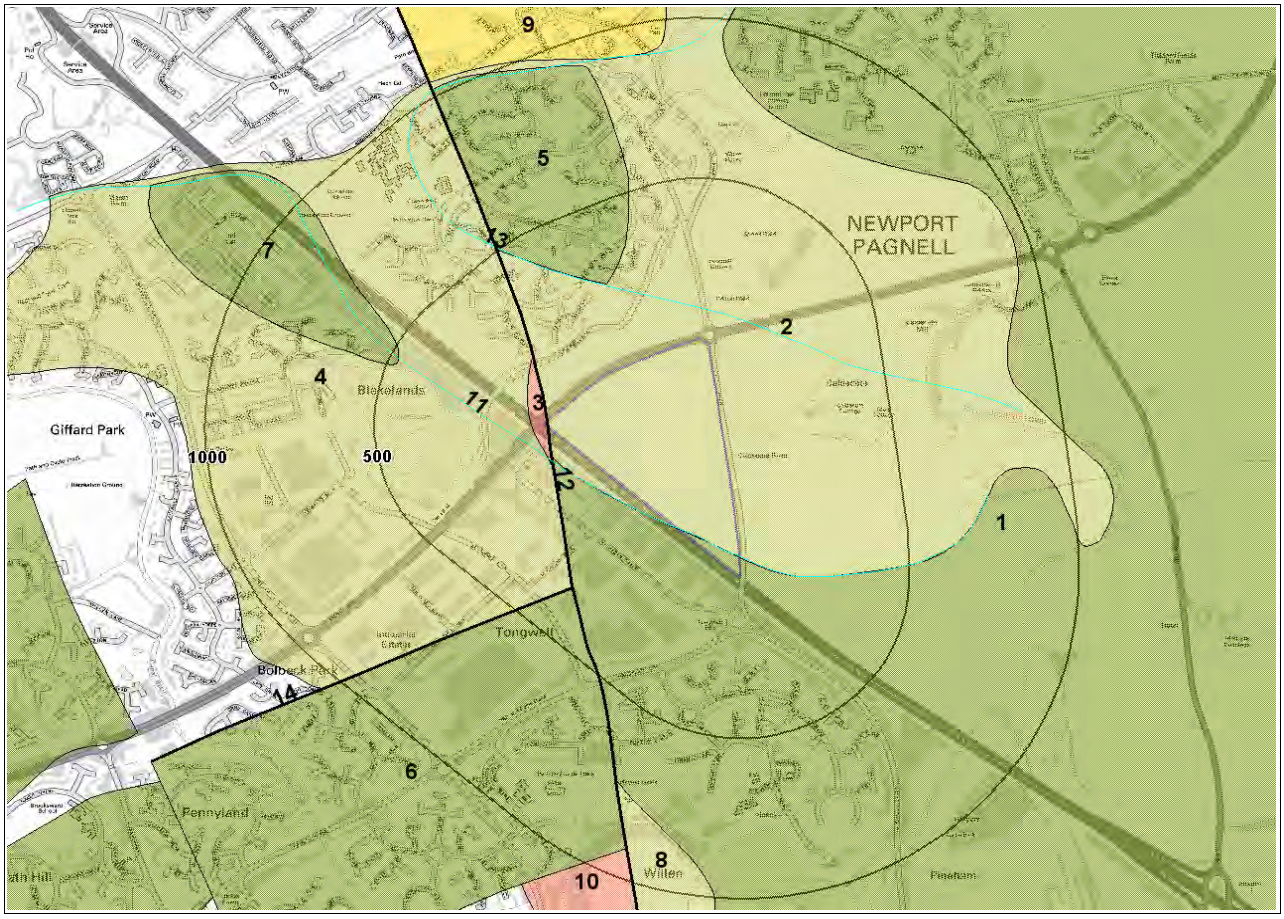
Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

* This includes an automatically generated 50m buffer zone around the site

1.3 Bedrock and Faults Map

NW N NE



W E

SW S SE

Bedrock and Faults Legend

Mapping sourced from Ordnance Survey

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:203

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/ Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	PET-MDST	Peterborough Member - Mudstone	Callovian
2	0.0	On Site	KLB-SDSM	Kellaways Formation - Sandstone, Siltstone And Mudstone	Callovian
3	0.0	On Site	CB-LMST	Cornbrash Formation - Limestone	Callovian / Bathonian
4	34.0	W	KLB-SDSM	Kellaways Formation - Sandstone, Siltstone And Mudstone	Callovian
5	259.0	N	PET-MDST	Peterborough Member - Mudstone	Callovian
6	337.0	SW	PET-MDST	Peterborough Member - Mudstone	Callovian
7	474.0	NW	PET-MDST	Peterborough Member - Mudstone	Callovian

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Very Low
0.0	On Site	Mixed	Moderate	Low

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	Category Description	Feature Description
11	0.0	On Site	LANDFORM	Approximate margin of buried (superficial deposit-filled) channel or valley; beads to outside
12	0.0	On Site	FAULT	Fault, inferred, displacement unknown
13	93.0	N	LANDFORM	Approximate margin of buried (superficial deposit-filled) channel or valley; beads to outside
14	337.0	SW	FAULT	Fault, inferred, displacement unknown

* This includes an automatically generated 50m buffer zone around the site

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.4 Radon Data

1.4.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

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1.4.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary

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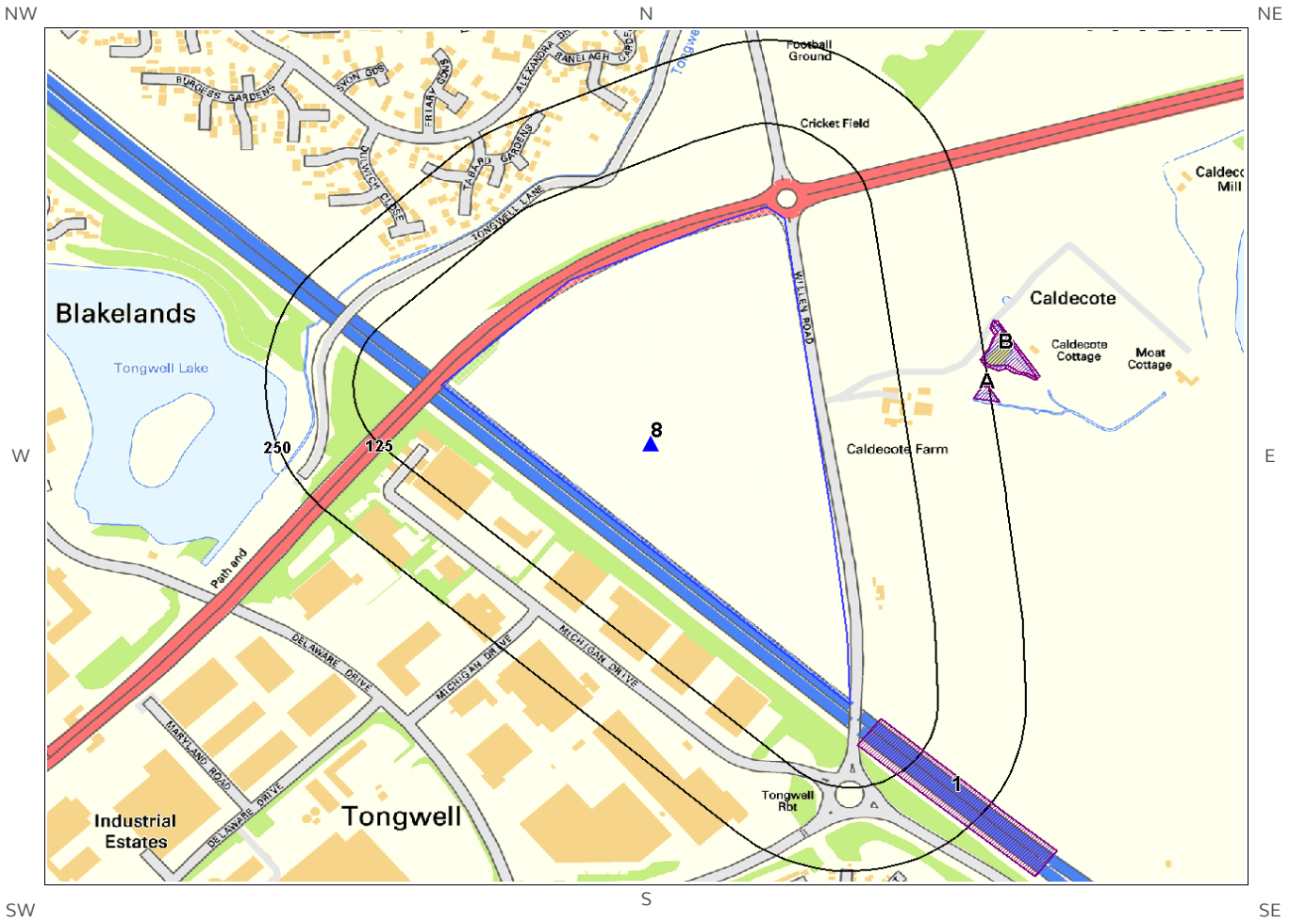
2 Ground Workings Map



Ground Workings Legend

Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

2 Ground Workings

2.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

The following Historical Surface Ground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
1	48.0	SE	487955 241710	Cuttings	1950
2A	226.0	E	487998 242314	Pond	1950
3A	226.0	E	487998 242314	Pond	1971
4B	244.0	E	488029 242380	Pond	1880
5B	244.0	E	488029 242380	Pond	1924
6B	244.0	E	488029 242380	Pond	1899
7B	247.0	E	488032 242381	Pond	1950

2.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

2.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

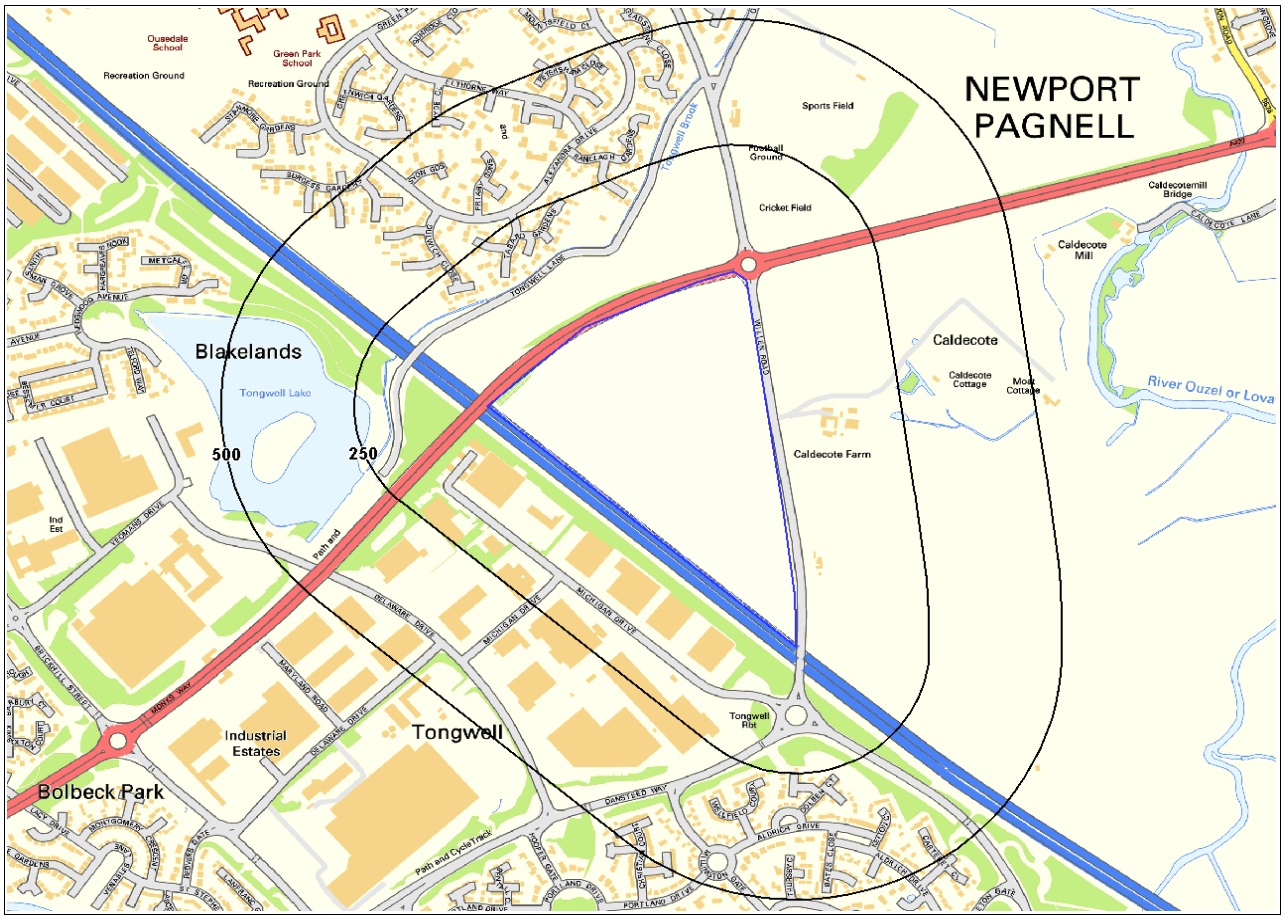
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
8	0.0	On Site	487520 242240	Sand & Gravel	Willen Road Quarry	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Active
Not shown	560.0	N	487597 243148	Sand & Gravel	The Green Gravel Pit	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

3 Mining, Extraction & Natural Cavities Map

NW N NE

W E

SW S SE



Mining, Extraction and Natural Cavities Legend

Mapping sourced from Ordnance Survey

Site Outline

250 / 500 Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

Likely

Unlikely

Highly unlikely

Rare

3 Mining, Extraction & Natural Cavities

3.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

3.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled "Review of mining instability in Great Britain, 1990" PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level.

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.10 Clay Mining

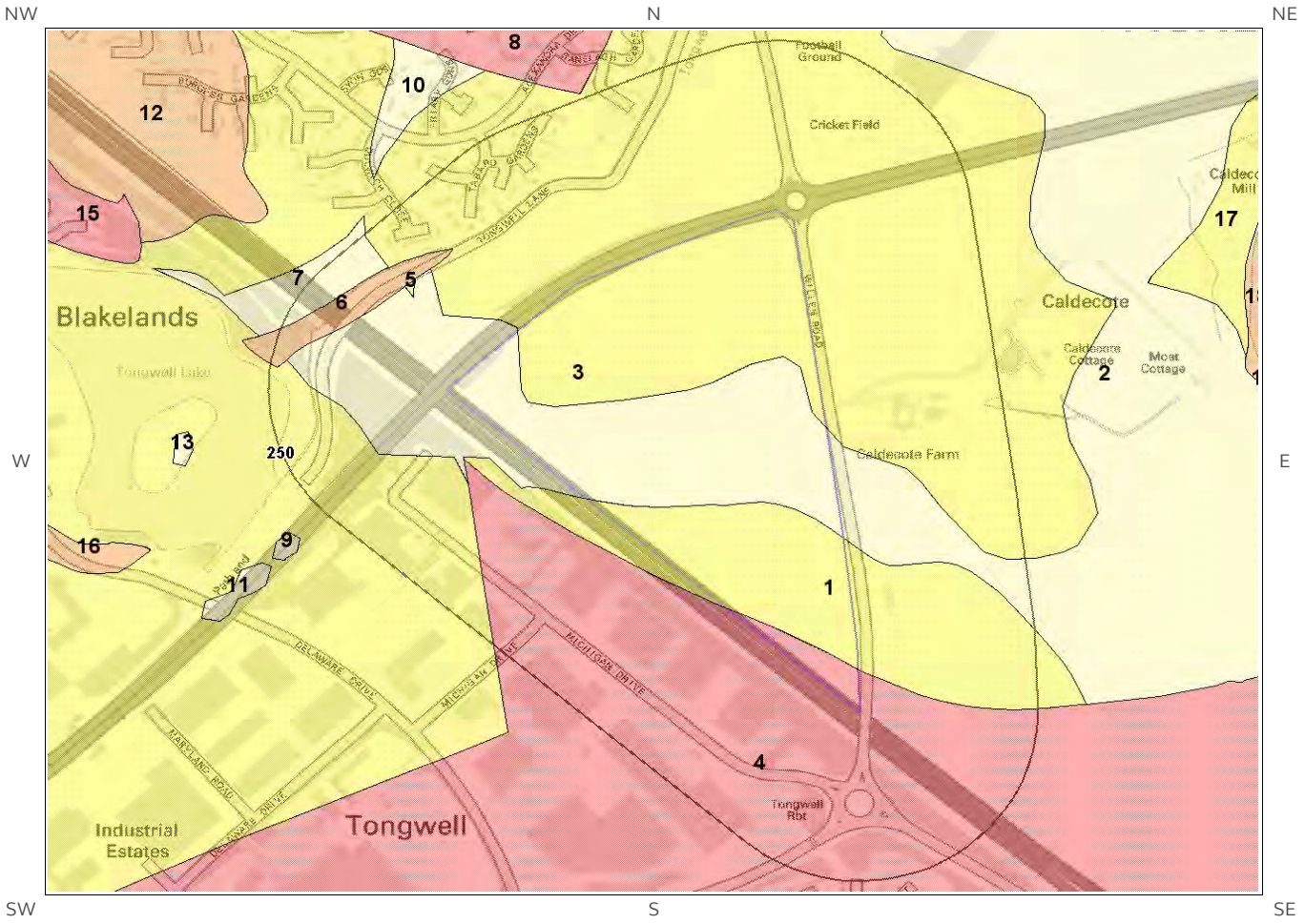
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

4 Natural Ground Subsidence

4.1 Shrink-Swell Clay Map



Shrink Swell Clay Legend

Mapping sourced from Ordnance Survey

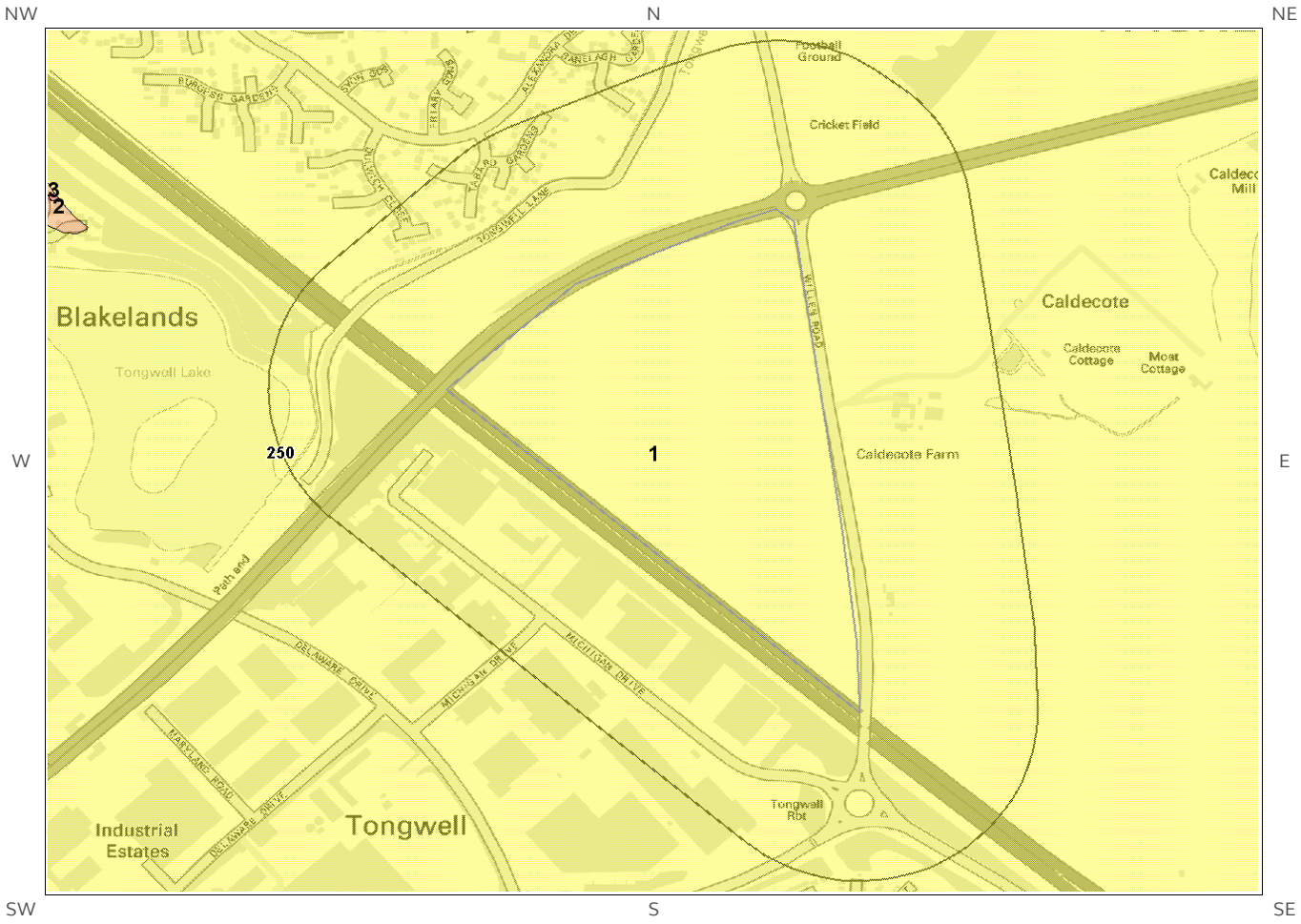
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.2 Landslides Map



Landslides Legend

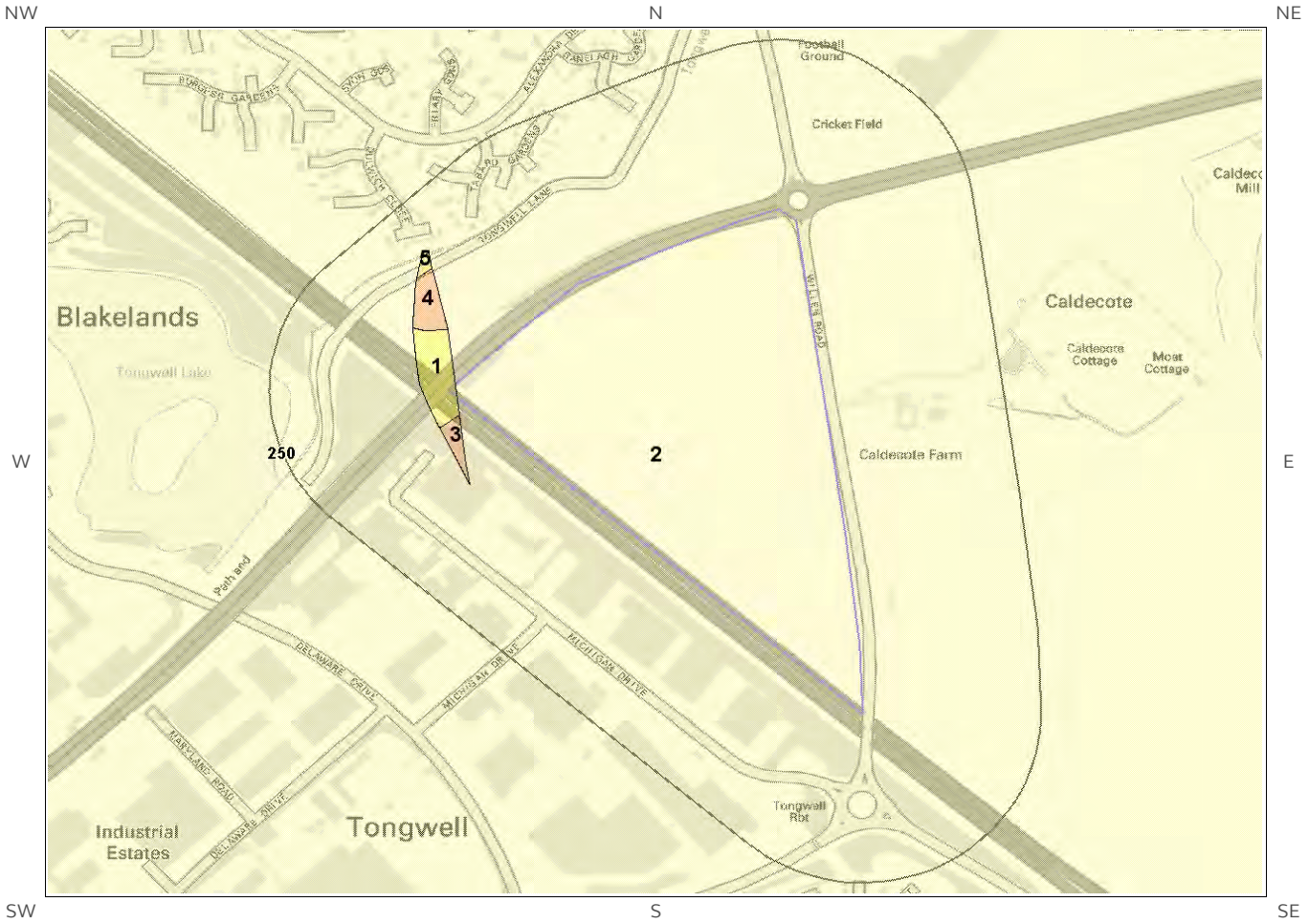
Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low
Low
Moderate
High

4.3 Ground Dissolution Soluble Rocks Map



Ground Dissolution Soluble Rocks Legend

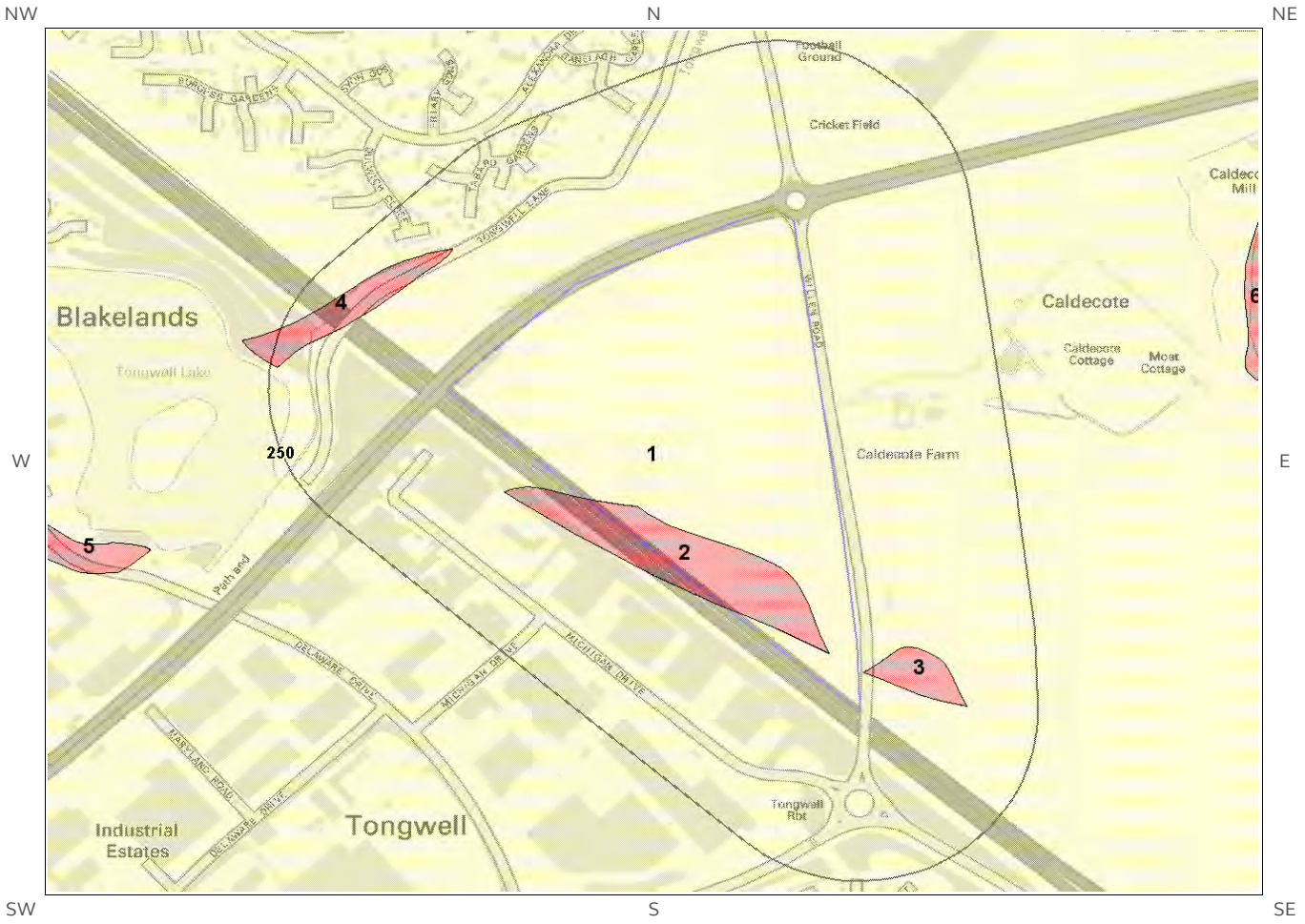
Mapping sourced from Ordnance Survey®

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low
Low
Moderate
High

4.4 Compressible Deposits Map



Compressible Deposits Legend

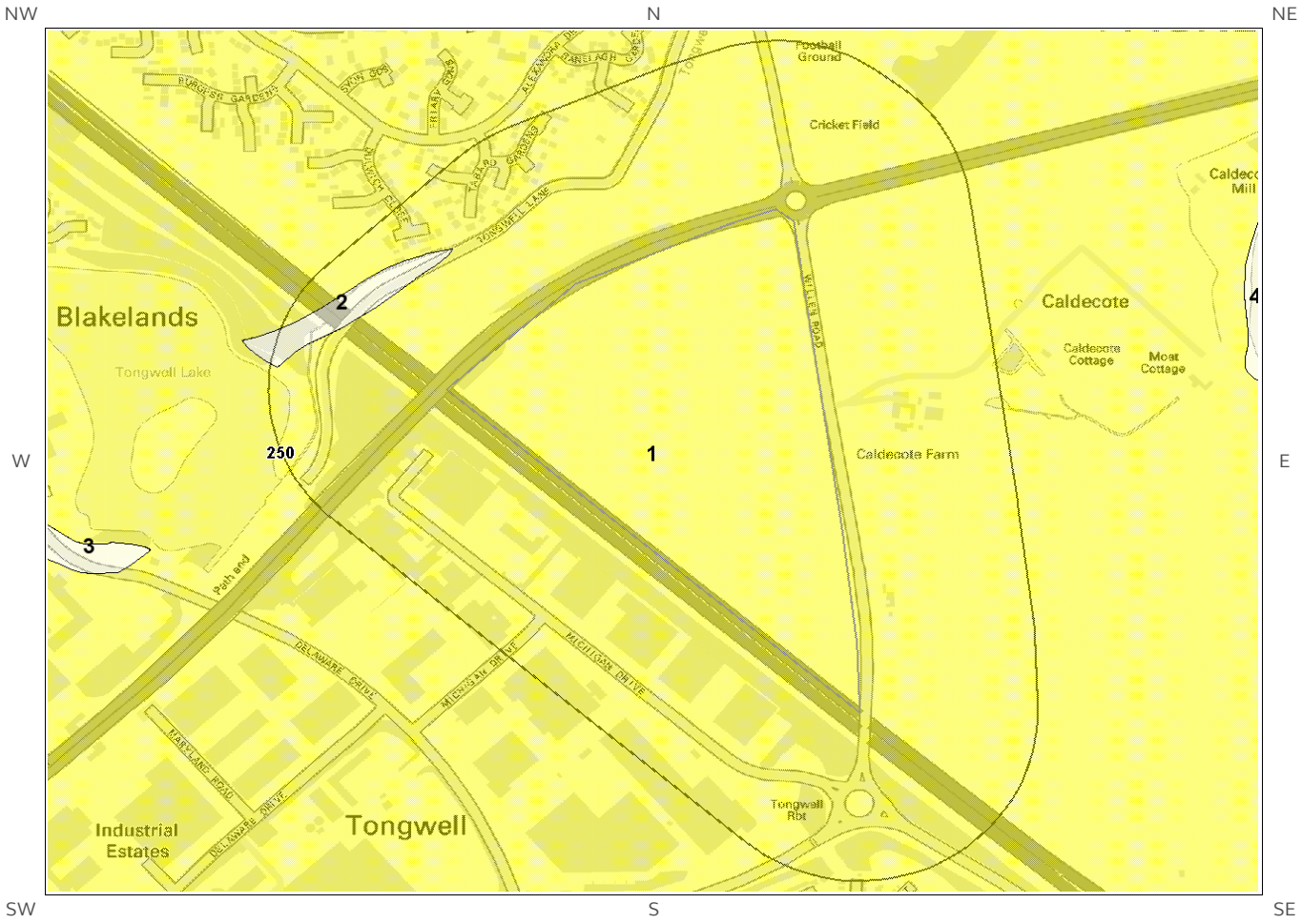
Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low
Low
Moderate
High

4.5 Collapsible Deposits Map



Collapsible Deposits Legend

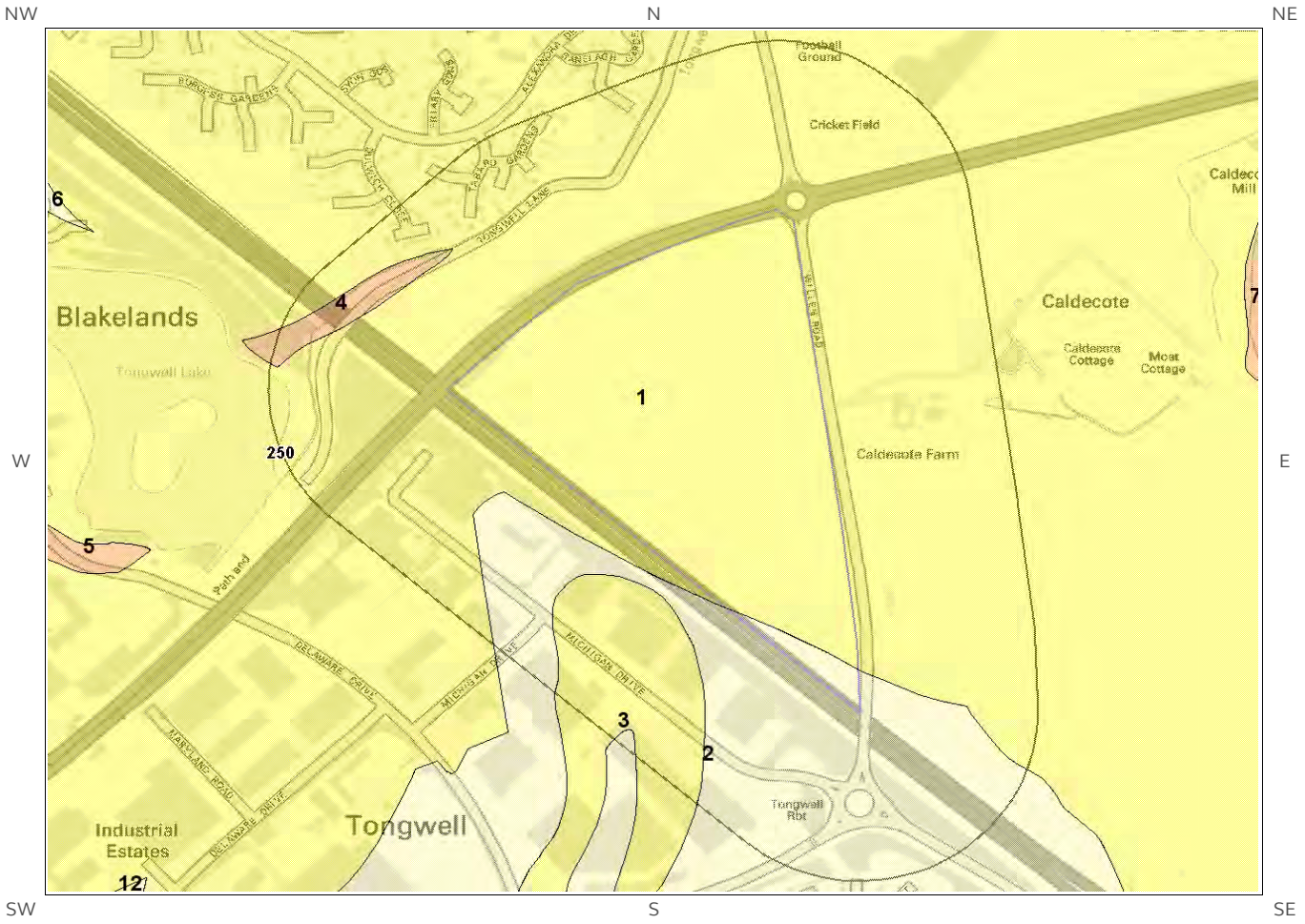
Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low
Low
Moderate
High

4.6 Running Sand Map



Running Sand Legend

Mapping sourced from Ordnance Survey

Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Moderate

4.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
3	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
4	0.0	On Site	Moderate	Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

4.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Significant soluble rocks are present. Problems unlikely except with considerable surface or subsurface water flow. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, or increased construction costs are likely. An increase in financial risk due to potential problems with soluble rocks is unlikely.
2	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
3	18.0	SW	Low	Significant soluble rocks are present. Low possibility of subsidence occurring naturally, but may be possible in adverse conditions such as high surface or subsurface water flow. Consider implications for stability when changes to drainage or new construction are planned. For new build, site investigation should consider potential for dissolution problems on the site and its surroundings. Care should be taken with local drainage into the bedrock. Some possibility groundwater pollution. For existing property, possible increase in insurance risk due to soluble rocks.

4.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.
2	0.0	On Site	Moderate	Significant potential for compressibility problems. Do not drain, load or de-water ground near the property without technical advice. For new build, consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property, possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
3	7.0	E	Moderate	Significant potential for compressibility problems. Do not drain, load or de-water ground near the property without technical advice. For new build, consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property, possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

4.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

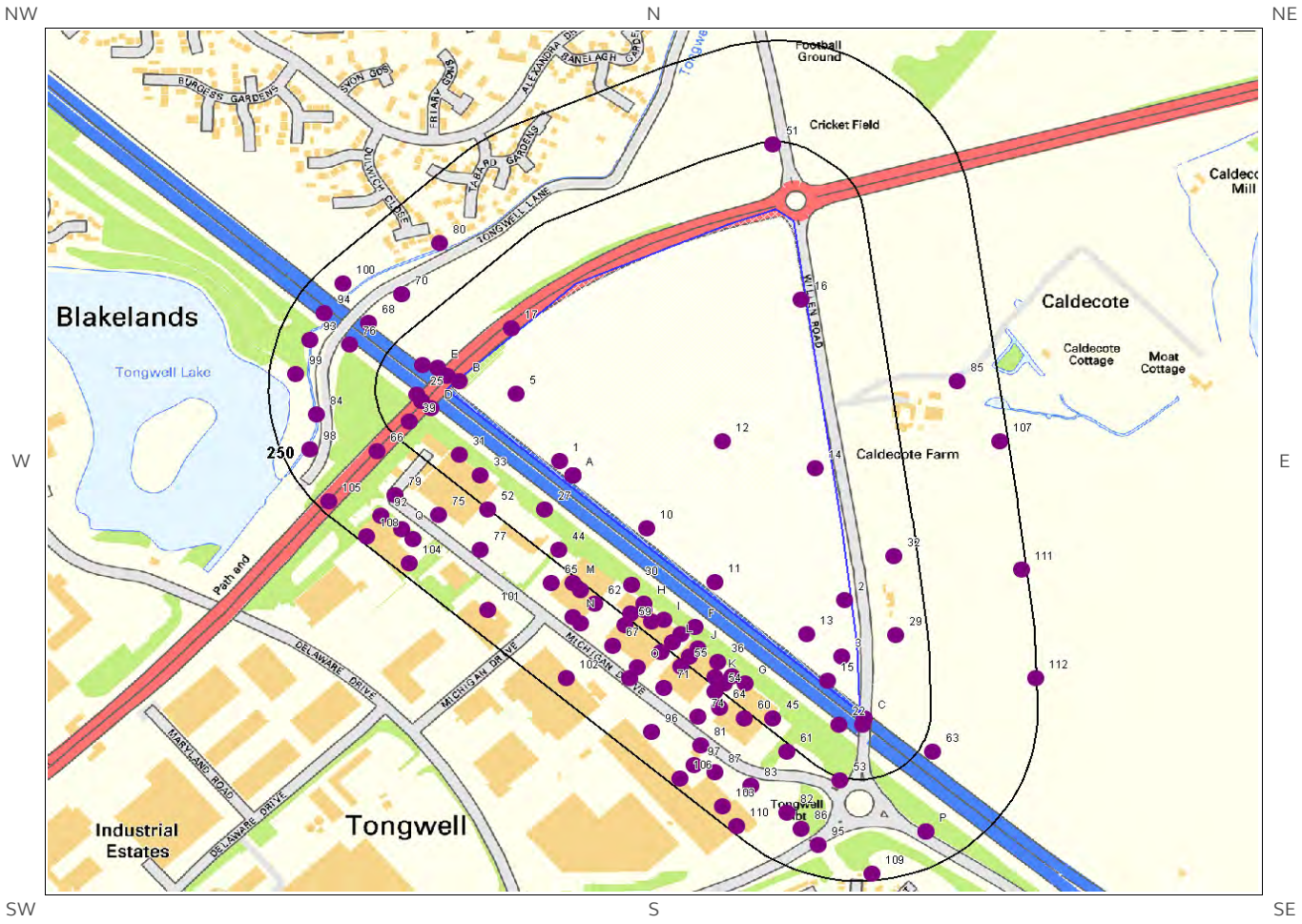
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	45.0	SW	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

5 Borehole Records Map



Borehole Records Legend

Mapping sourced from Ordnance Survey

Site Outline

Borehole Locations

125
250
Search Buffers (m)

5 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 112

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	487382 242221	SP84SE816	2.7	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1424
2	0.0	On Site	487781 242015	SP84SE813	4.5	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1420
3	0.0	On Site	487777 241931	SP84SE760	30.0	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1624
4B	0.0	On Site	487240 242340	SP84SE173	20.0	NEWPORT PAGNELL BY PASS D92
5	0.0	On Site	487320 242321	SP84SE817	2.9	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1425
6A	0.0	On Site	487400 242200	SP84SE730	-1.0	NEWPORT PAGNELL BYPASS TP 2
7A	0.0	On Site	487400 242200	SP84SE729	-1.0	NEWPORT PAGNELL BYPASS TP 1
8A	0.0	On Site	487400 242200	SP84SE727	-1.0	NEWPORT PAGNELL BYPASS D1041
9A	0.0	On Site	487400 242200	SP84SE728	-1.0	NEWPORT PAGNELL BYPASS D1042
10	0.0	On Site	487503 242122	SP84SE815	2.9	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1423
11	0.0	On Site	487599 242042	SP84SE814	3.2	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1422
12	0.0	On Site	487610 242250	SP84SE169	-1.0	CALDECOTE FARM NEWPORT PAGNELL 16
13	0.0	On Site	487728 241964	SP84SE761	10.0	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1625
14	0.0	On Site	487740 242210	SP84SE168	-1.0	CALDECOTE FARM NEWPORT PAGNELL 15
15	0.0	On Site	487758 241896	SP84SE759	35.0	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1623

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
16	0.0	On Site	487720 242460	SP84SE170	-1.0	CALDECOTE FARM NEWPORT PAGNELL 17
17	9.0	NW	487313 242418	SP84SE909	-1.0	MILTON KEYNES ORDER NO G38 13
18C	12.0	SE	487810 241840	SP84SE506	9.2	M1 MOTORWAY 211
19B	15.0	NW	487223 242348	SP84SE479	12.7	MILTON KEYNES DG35 D1041
20C	20.0	S	487807 241830	SP84SE1413	9.2	NGR Z165
21E	33.0	NW	487210 242360	SP84SE172	20.0	NEWPORT PAGNELL BY PASS D91
22	34.0	SW	487773 241831	SP84SE758	34.85	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1622
23D	36.0	SW	487200 242300	SP84SE174	20.3	NEWPORT PAGNELL BY PASS D93
24D	40.0	SW	487187 242310	SP84SE480	8.0	MILTON KEYNES DG35 D1042
25	44.0	W	487180 242320	SP84SE175	20.0	NEWPORT PAGNELL BY PASS D90
26E	49.0	NW	487189 242363	SP84SE762	20.2	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1626
27	50.0	SW	487360 242150	SP84SE2068	3.2	TONGWELL GRID SQUARE TP L350
28F	51.0	SW	487571 241975	SP84SE1795	3.2	TONGWELL GRID SQUARE TP L354
29	54.0	E	487853 241963	SP84SE911	6.1	MK163
30	59.0	SW	487482 242038	SP84SE1793	3.4	TONGWELL GRID SQUARE TP L352
31	65.0	SW	487240 242230	SP84SE2066	3.0	TONGWELL GRID SQUARE TP L348
32	66.0	E	487850 242080	SP84SE155	-1.0	CALDECOTE FARM NEWPORT PAGNELL 2
33	69.0	SW	487270 242200	SP84SE2063	7.0	TONGWELL GRID SQUARE K486
34H	69.0	SW	487500 242010	SP84SE1804	2.0	TONGWELL 3B TP R166
35G	70.0	SW	487642 241892	SP84SE1796	3.0	TONGWELL GRID SQUARE TP L355
36	70.0	SW	487603 241924	SP84SE1811	2.4	TONGWELL 3C TP R173
37I	71.0	SW	487527 241986	SP84SE1803	2.4	TONGWELL 3B TP R165
38F	71.0	SW	487552 241965	SP84SE1802	2.6	TONGWELL 3B TP R164
39	72.0	SW	487170 242280	SP84SE2048	7.2	NEWPORT PAGNELL BY-PASS - M1 OVERBRIDGE K332
40J	72.0	SW	487576 241944	SP84SE1810	2.3	TONGWELL 3C TP R172
41G	74.0	SW	487623 241902	SP84SE1812	2.2	TONGWELL 3C TP R174

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
42H	78.0	SW	487499 242000	SP84SE1791	7.0	TONGWELL GRID SQUARE K497
43I	84.0	SW	487510 241983	SP84SE1794	3.0	TONGWELL GRID SQUARE TP L353
44	84.0	SW	487380 242090	SP84SE1574	7.0	TONGWELL GRID SQUARE K487
45	86.0	SW	487680 241840	SP84SE2070	3.2	TONGWELL GRID SQUARE TP L358
46L	88.0	SW	487540 241953	SP84SE1801	2.3	TONGWELL 3B TP R163
47J	89.0	SW	487564 241931	SP84SE1809	2.2	TONGWELL 3C TP R171
48K	90.0	SW	487600 241901	SP84SE1792	7.0	TONGWELL GRID SQUARE K498
49K	90.0	SW	487612 241891	SP84SE1813	2.4	TONGWELL 3C TP R175
50H	93.0	SW	487481 241995	SP84SE1805	2.4	TONGWELL 3B TP R167
51	96.0	N	487680 242691	SP84SE906	1.67	NEWPORT PAGNELL BYPASS B488 INTERCHANGE TP 1
52	101.0	SW	487280 242150	SP84SE2067	3.4	TONGWELL GRID SQUARE TP L349
53	106.0	S	487775 241748	SP84SE757	35.0	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1621
54	106.0	SW	487600 241880	SP84SE1814	2.4	TONGWELL 3C TP R176
55	109.0	SW	487551 241917	SP84SE1808	2.3	TONGWELL 3C TP R170
56L	110.0	SW	487524 241938	SP84SE1800	2.2	TONGWELL 3B TP R162
57M	110.0	SW	487400 242040	SP84SE1576	3.1	TONGWELL GRID SQUARE TP L351
58M	111.0	SW	487410 242030	SP84SE1580	2.2	TONGWELL 3 TP P342
59	111.0	SW	487473 241978	SP84SE1806	2.5	TONGWELL 3B TP R168
60	111.0	SW	487640 241840	SP84SE2069	3.2	TONGWELL GRID SQUARE TP L357
61	112.0	SW	487700 241790	SP84SE1399	5.0	TONGWELL GRID SQUARE K503
62	114.0	SW	487430 242010	SP84SE1579	2.3	TONGWELL 3 TP P341
63	118.0	SE	487905 241791	SP84SE812	3.5	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1419
64	121.0	SW	487606 241855	SP84SE1797	2.8	TONGWELL GRID SQUARE TP L356
65	129.0	SW	487370 242040	SP84SE1577	1.6	TONGWELL 3 TP P339
66	134.0	SW	487125 242236	SP84SE908	-1.0	MILTON KEYNES ORDER NO G44 D1142
67	145.0	SW	487456 241948	SP84SE1798	2.1	TONGWELL 3B TP R160

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
68	147.0	NW	487113 242426	SP84SE764	25.0	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1628
69O	147.0	SW	487491 241916	SP84SE1799	2.3	TONGWELL 3B TP R161
70	148.0	NW	487159 242468	SP84SE818	2.6	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) TP 1426
71	148.0	SW	487528 241885	SP84SE1807	2.1	TONGWELL 3C TP R169
72N	148.0	SW	487400 241990	SP84SE1575	5.0	TONGWELL GRID SQUARE K488
73N	150.0	SW	487410 241980	SP84SE1578	2.0	TONGWELL 3 TP P340
74	151.0	SW	487576 241842	SP84SE1815	2.3	TONGWELL 3C TP R177
75	152.0	SW	487211 242141	SP84SE900	4.6	MK165
76	152.0	NW	487086 242394	SP84SE763	20.5	M1 WIDENING J10-15 (GROUND INVESTIGATION J14-J15) 1627
77	154.0	SW	487270 242090	SP84SE1778	6.0	TONGWELL GRID SQUARE K485
78O	167.0	SW	487480 241900	SP84SE1780	5.0	TONGWELL GRID SQUARE K496
79	168.0	SW	487150 242170	SP84SE1785	3.3	TONGWELL GRID SQUARE L347
80	170.0	NW	487213 242544	SP84SE901	4.6	MK166
81	180.0	SW	487580 241800	SP84SE1782	5.0	TONGWELL GRID SQUARE K499
82	182.0	SW	487700 241700	SP84SE1398	10.0	TONGWELL GRID SQUARE K502
83	182.0	SW	487650 241740	SP84SE1038	-1.0	L.T.D PROJECT MILTON KEYNES TP 7
84	187.0	W	487040 242290	SP84SE199	11.1	TONGWELL BALANCING LAKE MILTON KEYNES D69
85	193.0	E	487940 242340	SP84SE171	-1.0	CALDECOTE FARM NEWPORT PAGNELL 18
86	193.0	SW	487720 241676	SP84SE1405	12.0	H4 (V9-V11) N600
87	199.0	SW	487600 241760	SP84SE1046	-1.0	L.T.D PROJECT MILTON KEYNES TP 15
88Q	201.0	SW	487160 242120	SP84SE1784	3.2	TONGWELL GRID SQUARE L346
89P	201.0	SE	487896 241672	SP84SE1411	5.0	WILLEN GRID SQUARE S49A
90P	201.0	SE	487896 241672	SP84SE1410	5.6	WILLEN GRID SQUARE S49
91Q	203.0	SW	487175 242105	SP84SE1702	2.7	TONGWELL GRID SQUARE TP Q53
92	204.0	SW	487130 242140	SP84SE1783	3.0	TONGWELL GRID SQUARE L345

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
93	206.0	W	487030 242400	SP84SE198	7.3	TONGWELL BALANCING LAKE MILTON KEYNES D68
94	206.0	NW	487050 242440	SP84SE507	7.7	M1 MOTORWAY 212
95	207.0	S	487744 241652	SP84SE1406	12.0	H4 (V9-V11) N601
96	209.0	SW	487510 241820	SP84SE1036	-1.0	L.T.D PROJECT MILTON KEYNES TP 5
97	210.0	SW	487570 241770	SP84SE1037	-1.0	L.T.D PROJECT MILTON KEYNES TP 6
98	213.0	SW	487030 242239	SP84SE489	3.5	TONGWELL BALANCING LAKE MILTON KEYNES D516
99	214.0	W	487010 242350	SP84SE197	7.0	TONGWELL BALANCING LAKE MILTON KEYNES D67
100	214.0	NW	487077 242485	SP84SE904	3.4	MK174
101	217.0	SW	487280 242000	SP84SE1692	6.7	TONGWELL GRID SQUARE K484
102	224.0	SW	487390 241900	SP84SE1779	7.0	TONGWELL GRID SQUARE K489
103	231.0	SW	487610 241710	SP84SE1039	-1.0	L.T.D PROJECT MILTON KEYNES TP 8
104	233.0	SW	487170 242070	SP84SE1687	4.1	TONGWELL GRID SQUARE K472/K472A
105	235.0	SW	487057 242161	SP84SE907	-1.0	MILTON KEYNES ORDER NO G44 D1141
106	238.0	SW	487550 241750	SP84SE1031	-1.0	L.T.D PROJECT MILTON KEYNES 5
107	238.0	E	488000 242250	SP84SE154	-1.0	CALDECOTE FARM NEWPORT PAGNELL 1
108	240.0	SW	487110 242110	SP84SE2002	2.7	TONGWELL GRID SQUARE TP Q49
109	241.0	S	487820 241610	SP84SE1401	2.7	WILLEN TP L422
110	241.0	SW	487630 241680	SP84SE1040	-1.0	L.T.D PROJECT MILTON KEYNES TP 9
111	242.0	E	488030 242060	SP84SE156	-1.0	CALDECOTE FARM NEWPORT PAGNELL 3
112	248.0	E	488050 241900	SP84SE134	-1.0	MANOR FARM NEWPORT PAGNELL 2

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/353430
#2: scans.bgs.ac.uk/sobi_scans/boreholes/353427
#3: scans.bgs.ac.uk/sobi_scans/boreholes/353374
#4B: scans.bgs.ac.uk/sobi_scans/boreholes/352786
#5: scans.bgs.ac.uk/sobi_scans/boreholes/353431
#10: scans.bgs.ac.uk/sobi_scans/boreholes/353429
#11: scans.bgs.ac.uk/sobi_scans/boreholes/353428
#13: scans.bgs.ac.uk/sobi_scans/boreholes/353375

#15: scans.bgs.ac.uk/sobi_scans/boreholes/353373
#18C: scans.bgs.ac.uk/sobi_scans/boreholes/353119
#19B: scans.bgs.ac.uk/sobi_scans/boreholes/353092
#20C: scans.bgs.ac.uk/sobi_scans/boreholes/17758994
#21E: scans.bgs.ac.uk/sobi_scans/boreholes/352785
#22: scans.bgs.ac.uk/sobi_scans/boreholes/353372
#23D: scans.bgs.ac.uk/sobi_scans/boreholes/352787
#24D: scans.bgs.ac.uk/sobi_scans/boreholes/353093
#25: scans.bgs.ac.uk/sobi_scans/boreholes/352788
#26E: scans.bgs.ac.uk/sobi_scans/boreholes/353376
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#28F: scans.bgs.ac.uk/sobi_scans/boreholes/17897874
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#30: scans.bgs.ac.uk/sobi_scans/boreholes/17897871
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#33: scans.bgs.ac.uk/sobi_scans/boreholes/17937782
#34H: scans.bgs.ac.uk/sobi_scans/boreholes/17897887
#35G: scans.bgs.ac.uk/sobi_scans/boreholes/17897876
#36: scans.bgs.ac.uk/sobi_scans/boreholes/17897918
#37I: scans.bgs.ac.uk/sobi_scans/boreholes/17897885
#38F: scans.bgs.ac.uk/sobi_scans/boreholes/17897884
#39: scans.bgs.ac.uk/sobi_scans/boreholes/17937763
#40J: scans.bgs.ac.uk/sobi_scans/boreholes/17897915
#41G: scans.bgs.ac.uk/sobi_scans/boreholes/17897919
#42H: scans.bgs.ac.uk/sobi_scans/boreholes/17897867
#43I: scans.bgs.ac.uk/sobi_scans/boreholes/17897872
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#46L: scans.bgs.ac.uk/sobi_scans/boreholes/17897882
#47J: scans.bgs.ac.uk/sobi_scans/boreholes/17897912
#48K: scans.bgs.ac.uk/sobi_scans/boreholes/17897869
#49K: scans.bgs.ac.uk/sobi_scans/boreholes/17897920
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#56L: scans.bgs.ac.uk/sobi_scans/boreholes/17897881
#57M: scans.bgs.ac.uk/sobi_scans/boreholes/17870382
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#63: scans.bgs.ac.uk/sobi_scans/boreholes/353426
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#73N: scans.bgs.ac.uk/sobi_scans/boreholes/17870384

#74: scans.bgs.ac.uk/sobi_scans/boreholes/17897922
#75: scans.bgs.ac.uk/sobi_scans/boreholes/353514
#76: scans.bgs.ac.uk/sobi_scans/boreholes/353377
#77: scans.bgs.ac.uk/sobi_scans/boreholes/17896229
#78O: scans.bgs.ac.uk/sobi_scans/boreholes/17896231
#79: scans.bgs.ac.uk/sobi_scans/boreholes/17896508
#80: scans.bgs.ac.uk/sobi_scans/boreholes/353515
#81: scans.bgs.ac.uk/sobi_scans/boreholes/17896235
#82: scans.bgs.ac.uk/sobi_scans/boreholes/17758962
#84: scans.bgs.ac.uk/sobi_scans/boreholes/352812
#86: scans.bgs.ac.uk/sobi_scans/boreholes/17758973
#88Q: scans.bgs.ac.uk/sobi_scans/boreholes/17896506
#89P: scans.bgs.ac.uk/sobi_scans/boreholes/17758992
#90P: scans.bgs.ac.uk/sobi_scans/boreholes/17758990
#91Q: scans.bgs.ac.uk/sobi_scans/boreholes/17879977
#92: scans.bgs.ac.uk/sobi_scans/boreholes/17896442
#93: scans.bgs.ac.uk/sobi_scans/boreholes/352811
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#98: scans.bgs.ac.uk/sobi_scans/boreholes/353102
#99: scans.bgs.ac.uk/sobi_scans/boreholes/352810
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#101: scans.bgs.ac.uk/sobi_scans/boreholes/17879864
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#108: scans.bgs.ac.uk/sobi_scans/boreholes/17925136
#109: scans.bgs.ac.uk/sobi_scans/boreholes/17758967

Groundsure LOCATION INTELLIGENCE

emapsite™

6 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 51

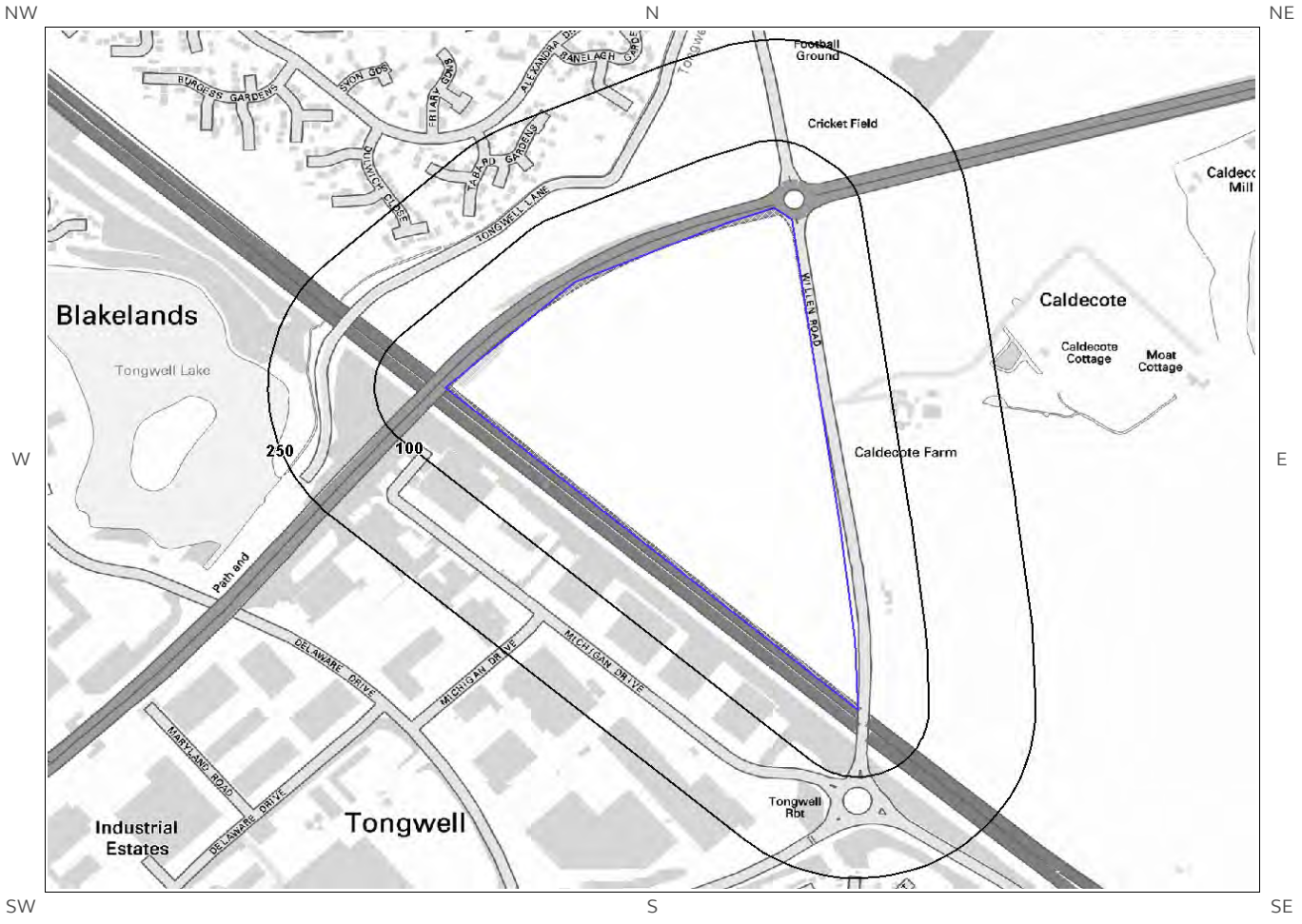
For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geoinsight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
12.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
21.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
35.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
38.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
46.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
51.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
59.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
77.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
95.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
156.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
156.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
158.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
158.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
165.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
177.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
197.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
197.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
197.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
197.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
199.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
201.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
201.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
201.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
205.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
205.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
206.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
209.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
209.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
211.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
215.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
223.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
228.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
228.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
230.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
234.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
237.0	SW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
243.0	E	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
246.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

7 Railways and Tunnels Map



Railways and Tunnels Legend

Mapping sourced from Ordnance Survey

- Site Outline
- 250 / 500 Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

7 Railways and Tunnels

7.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

7.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

7.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels Map.

7.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

7.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

*Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a **Groundsure HS2 and Crossrail 1 Report**.*

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Contact Details

emapsite™

EmapSite

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British Geological Survey Enquiries

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Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

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Ordnance Survey

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SO16 0AS

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Getmapping PLC

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Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

Peter Brett Associates

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Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Contact Details

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**
"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.
"Client" means the party or parties entering into a Contract with Groundsure.
"Commercial" means any building or property which is not Residential.
"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than
(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and
(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).
"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.
"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.
"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.
"Data Reports" means reports comprising factual data with no accompanying interpretation.
"Fees" has the meaning set out in clause 5.1.
"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.
"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.
"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.
"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.
"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.
"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.
"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.
"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.
"Residential" means any building or property used as or intended to be used as a single dwelling.
"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.
"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.
"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.
"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.
"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.
2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.
2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.
2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.
2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.
2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and
(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and
(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.
3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.
3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.
3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.
3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.
3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.
4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;
(i) the Beneficiary,
(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),
(iv) the first purchaser or first tenant of the Site, and
(v) the professional advisers and lenders of the first purchaser or tenant of the Site.
4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.
4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").
5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.
5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to
(i) full payment of all relevant Fees and
(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.
6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure

acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.
6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.
6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.
6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.
7.4 Groundsure shall not be liable for

(i) loss of profits;
(ii) loss of business;
(iii) depletion of goodwill and/or similar losses;
(iv) loss of anticipated savings;
(v) loss of goods;
(vi) loss of contract;
(vii) loss of use;
(viii) loss or corruption of data or information;
(ix) business interruption;
(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;
(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;
(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;
(xiii) loss or damage to a computer, software, modem, telephone or other property; and
(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.
7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.
8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.
9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event
(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.
12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.
12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.
12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.
12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.
12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;
(ii) fire, storm, flood, tempest or epidemic;
(iii) Acts of God or the public enemy;
(iv) riot, civil commotion or war;
(v) strikes, labour disputes or industrial action;
(vi) acts or regulations of any governmental or other agency;
(vii) suspension or delay of services at public registries by Third Party Data Providers;
(viii) changes in law; or
(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent
required by law

EmapSite

Masdar House, ,
Eversley, RG27 0RP

Groundsure Reference:	EMS-321490_433300
Your Reference:	EMS_321490_433300
Report Date	24 Aug 2015
Report Delivery Method:	Email - pdf

Groundsure Enviroinsight

Address: ,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviroinsight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

Yours faithfully,

emapsite customer services team

Enc.
Groundsure Enviroinsight

Groundsure Enviroinsight

Address:	,
Date:	24 Aug 2015
Reference:	EMS-321490_433300
Client:	EmapSite

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	07-Sep-2012
Grid Reference:	487573,242271
Site Size:	21.32ha

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LOCATION INTELLIGENCE

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Contents Page

Contents Page 3
Overview of Findings 6
Using this report 10
1. Historical Land Use 11
1. Historical Industrial Sites 12
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping....12
1.2 Additional Information – Historical Tank Database....12
1.3 Additional Information – Historical Energy Features Database....13
1.4 Additional Information – Historical Petrol and Fuel Site Database....14
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database....14
1.6 Potentially Infilled Land....14
2. Environmental Permits, Incidents and Registers Map 16
2. Environmental Permits, Incidents and Registers 17
2.1 Industrial Sites Holding Licences and/or Authorisations....17
2.1.1 Records of historic IPC Authorisations within 500m of the study site:....17
2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:....17
2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:....17
2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:....17
2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:....18
2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 18
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:....18
2.1.8 Records of Licensed Discharge Consents within 500m of the study site:....18
2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 19
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:....19
2.2 Dangerous or Hazardous Sites....19
2.3 Environment Agency Recorded Pollution Incidents....20
2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:....20
2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:....20
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990....21
3. Landfill and Other Waste Sites Map 22
3. Landfill and Other Waste Sites 23
3.1 Landfill Sites....23
3.1.1 Records from Environment Agency landfill data within 1000m of the study site: 23
3.1.2 Records of Environment Agency historic landfill sites within 1500m of the study site: 23
3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:....24
3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:....24
3.2 Other Waste Sites....24
3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site: 24
3.2.2 Records of Environment Agency licensed waste sites within 1500m of the study site: 25
4. Current Land Use Map 28
4. Current Land Uses 29
4.1 Current Industrial Data....29
4.2 Petrol and Fuel Sites....30
4.3 National Grid High Voltage Underground Electricity Transmission Cables....30
4.4 National Grid High Pressure Gas Transmission Pipelines....30
5. Geology 31

5.1 Artificial Ground and Made Ground....31
5.2 Superficial Ground and Drift Geology....31
5.3 Bedrock and Solid Geology....31
6 Hydrogeology and Hydrology 32
6a. Aquifer Within Superficial Geology 32
6b. Aquifer Within Bedrock Geology and Abstraction Licenses 33
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses 34
6d. Hydrogeology – Source Protection Zones within confined aquifer 35
6e. Hydrology – Detailed River Network and River Quality 36
6.Hydrogeology and Hydrology 37
6.1 Aquifer within Superficial Deposits....37
6.2 Aquifer within Bedrock Deposits....38
6.3 Groundwater Abstraction Licences....38
6.4 Surface Water Abstraction Licences....39
6.5 Potable Water Abstraction Licences....39
6.6 Source Protection Zones....39
6.7 Source Protection Zones within Confined Aquifer....40
6.8 Groundwater Vulnerability and Soil Leaching Potential....40
6.9 River Quality....40
6.9.1 Biological Quality:....41
6.9.2 Chemical Quality:....42
6.10 Detailed River Network....42
6.11 Surface Water Features....43
7a. Environment Agency Flood Map for Planning (from rivers and the sea) 44
7b. Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) Map 45
7 Flooding 46
7.1 River and Coastal Zone 2 Flooding....46
7.2 River and Coastal Zone 3 Flooding....46
7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating....47
7.4 Flood Defences....47
7.5 Areas benefiting from Flood Defences....47
7.6 Areas benefiting from Flood Storage....47
7.7 Groundwater Flooding Susceptibility Areas....47
7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes....47
7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?....48
7.8 Groundwater Flooding Confidence Areas....48
8. Designated Environmentally Sensitive Sites Map 49
8. Designated Environmentally Sensitive Sites 50
8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:....50
8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:....50
8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:....50
8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:....50
8.5 Records of Ramsar sites within 2000m of the study site:....50
8.6 Records of Ancient Woodland within 2000m of the study site: 51
8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:....51
8.8 Records of World Heritage Sites within 2000m of the study site:....51
8.9 Records of Environmentally Sensitive Areas within 2000m of the study site: 51
8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: 51
8.11 Records of National Parks (NP) within 2000m of the study site: 51

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:.....51
8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:.....52
8.14 Records of Green Belt land within 2000m of the study site:.....52
9. Natural Hazards Findings 53
9.1 Detailed BGS GeoSure Data.....53
9.1.1 Shrink Swell.....53
9.1.2 Landslides.....53
9.1.3 Soluble Rocks.....53
9.1.4 Compressible Ground.....54
9.1.5 Collapsible Rocks.....54
9.1.6 Running Sand.....54
9.2 Radon.....54
9.2.1 Radon Affected Areas.....54
9.2.2 Radon Protection.....55
10. Mining 56
10.1 Coal Mining.....56
10.2 Non-Coal Mining.....56
10.3 Brine Affected Areas 56
Contact Details 57
Standard Terms and Conditions 59

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	1	1	2	15
1.2 Additional Information – Historical Tank Database	0	0	3	19
1.3 Additional Information – Historical Energy Features Database	0	0	8	18
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	0
1.6 Potentially Infilled Land	0	1	8	13

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	1
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	1	4	1
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	1	0	3	3
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

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Section 3: Landfill and Other Waste Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-5000
3.1 Landfill Sites						
3.1.1 Environment Agency Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency Historic Landfill Sites	0	0	0	2	1	0
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	1	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	1	1	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	1	0	Not searched	Not searched
3.2.2 Environment Agency Licensed Waste Sites	1	0	1	0	0	9

Section 4: Current Land Use

	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	21	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology

5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology

	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	1	0	1	0	0	1
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	2	1
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	0	0	Not searched	Not searched

	On-site	0-50m	51-250	251-500	501-1000	1000-1500

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Section 6: Hydrogeology and Hydrology

	0-500m					
6.9 Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	No	Yes	Yes
6.10 Detailed River Network entries within 500m of the site	0	0	3	8	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	Yes
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	0
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	0	0	2
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Moderate
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Low
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	No
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

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Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

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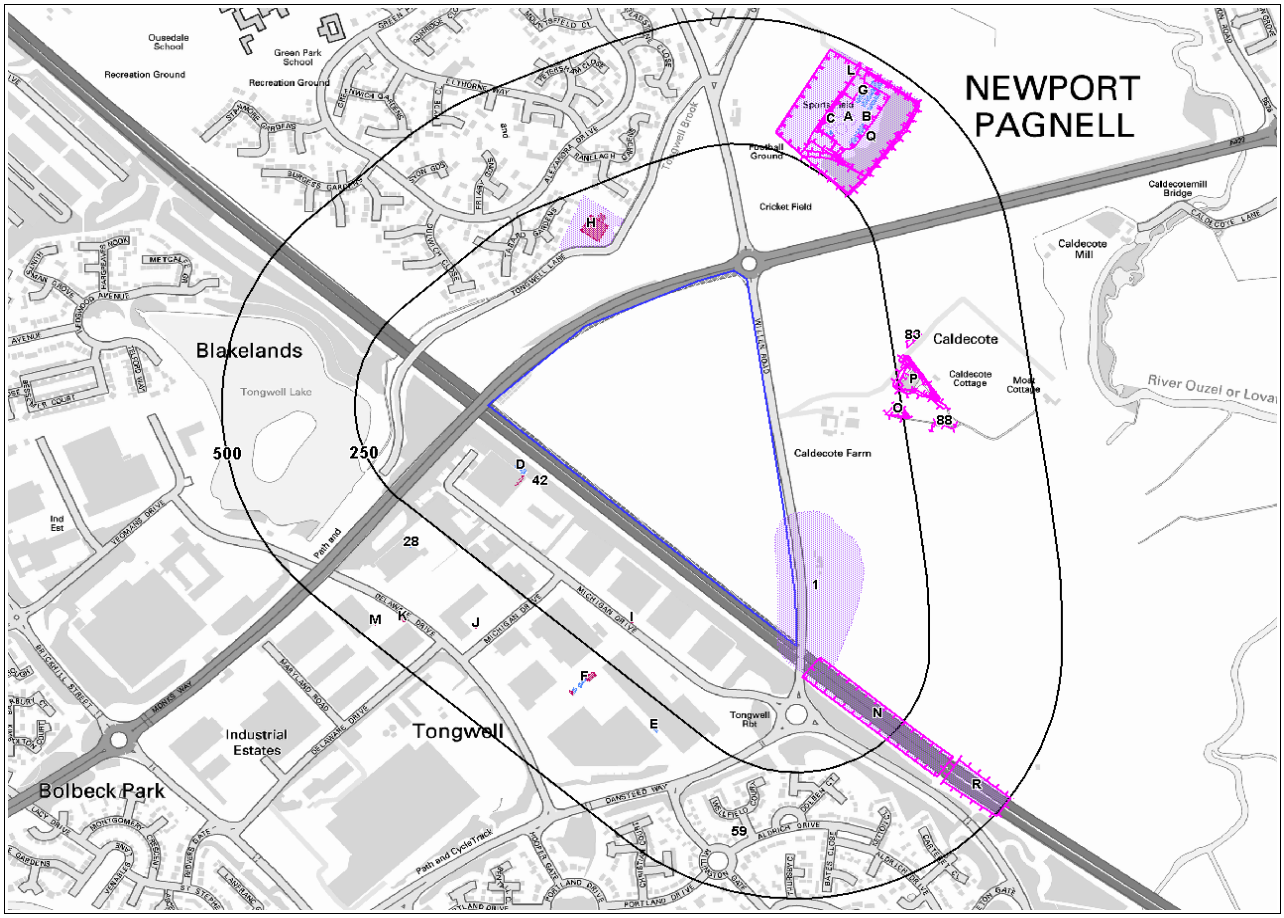
1. Historical Land Use

NW N NE

W E

SW S SE



Mapping sourced from Ordnance Survey®

Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 19

ID	Distance [m]	Direction	Use	Date
1	0	On Site	Council Yard	1971
2N	48	SE	Cuttings	1963
3H	130	N	Electric Substation	1971
4A	250	NE	Unspecified Works	1963
5A	251	NE	Sewage Farm	1938
6A	251	NE	Sewage Farm	1938
7Q	252	NE	Refuse Heap	1971
8A	263	NE	Sewage Farm	1924
9A	263	NE	Sewage Farm	1951
10A	271	NE	Sewage Works	1971
11B	289	NE	Filter Beds	1938
12B	289	NE	Filter Beds	1938
13B	290	NE	Filter Beds	1951
14B	290	NE	Filter Beds	1924
15C	335	NE	Unspecified Tank	1971
16C	335	NE	Unspecified Tank	1971
17A	356	NE	Unspecified Tank	1971
18C	360	NE	Unspecified Tank	1971
19R	379	SE	Cuttings	1963

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 22

ID	Distance (m)	Direction	Use	Date
20D	54	SW	Tanks	1985
21D	56	SW	Tanks	1991
22D	56	SW	Tanks	1991
23E	291	SW	Tanks	1993
24E	291	SW	Tanks	1993
25F	300	SW	Tanks	1994
26F	300	SW	Tanks	1994

27F	302	SW	Tanks	1991
28	304	SW	Unspecified Tank	1925
29F	314	SW	Unspecified Tank	1994
30F	314	SW	Unspecified Tank	1994
31F	315	SW	Unspecified Tank	1991
32C	318	NE	Tanks	1969
33F	328	SW	Unspecified Tank	1994
34F	328	SW	Unspecified Tank	1994
35F	330	SW	Unspecified Tank	1991
36A	331	NE	Tanks	1969
37G	405	NE	Unspecified Tank	1969
38G	405	NE	Unspecified Tank	1969
39G	406	NE	Unspecified Tank	1969
40G	444	NE	Unspecified Tank	1992
41G	445	NE	Unspecified Tank	1985

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 26

ID	Distance (m)	Direction	Use	Date
42	58	SW	Electricity Substation	1985
43D	66	SW	Electricity Substation	1991
44H	144	N	Electricity Substation	1985
45H	146	N	Electricity Substation	1969
46I	158	SW	Electricity Substation	1994
47I	158	SW	Electricity Substation	1994
48I	159	SW	Electricity Substation	1991
49H	178	N	Electricity Substation	1989
50F	281	SW	Electricity Substation	1994
51F	281	SW	Electricity Substation	1994
52F	282	SW	Electricity Substation	1991
53F	336	SW	Electricity Substation	1994
54F	336	SW	Electricity Substation	1994
55F	338	SW	Electricity Substation	1991
56J	350	SW	Electricity Substation	1994
57J	350	SW	Electricity Substation	1994
58J	352	SW	Electricity Substation	1991
59	387	S	Electricity Substation	1991
60K	428	SW	Electricity Substation	1994
61K	428	SW	Electricity Substation	1994
62K	430	SW	Electricity Substation	1991
63L	443	NE	Electricity Substation	1992
64L	445	NE	Electricity Substation	1985

65M	467	SW	Electricity Substation	1994
66M	467	SW	Electricity Substation	1994
67M	468	SW	Electricity Substation	1991

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 0

Database searched and no data found.

1.6 Potentially Infilled Land

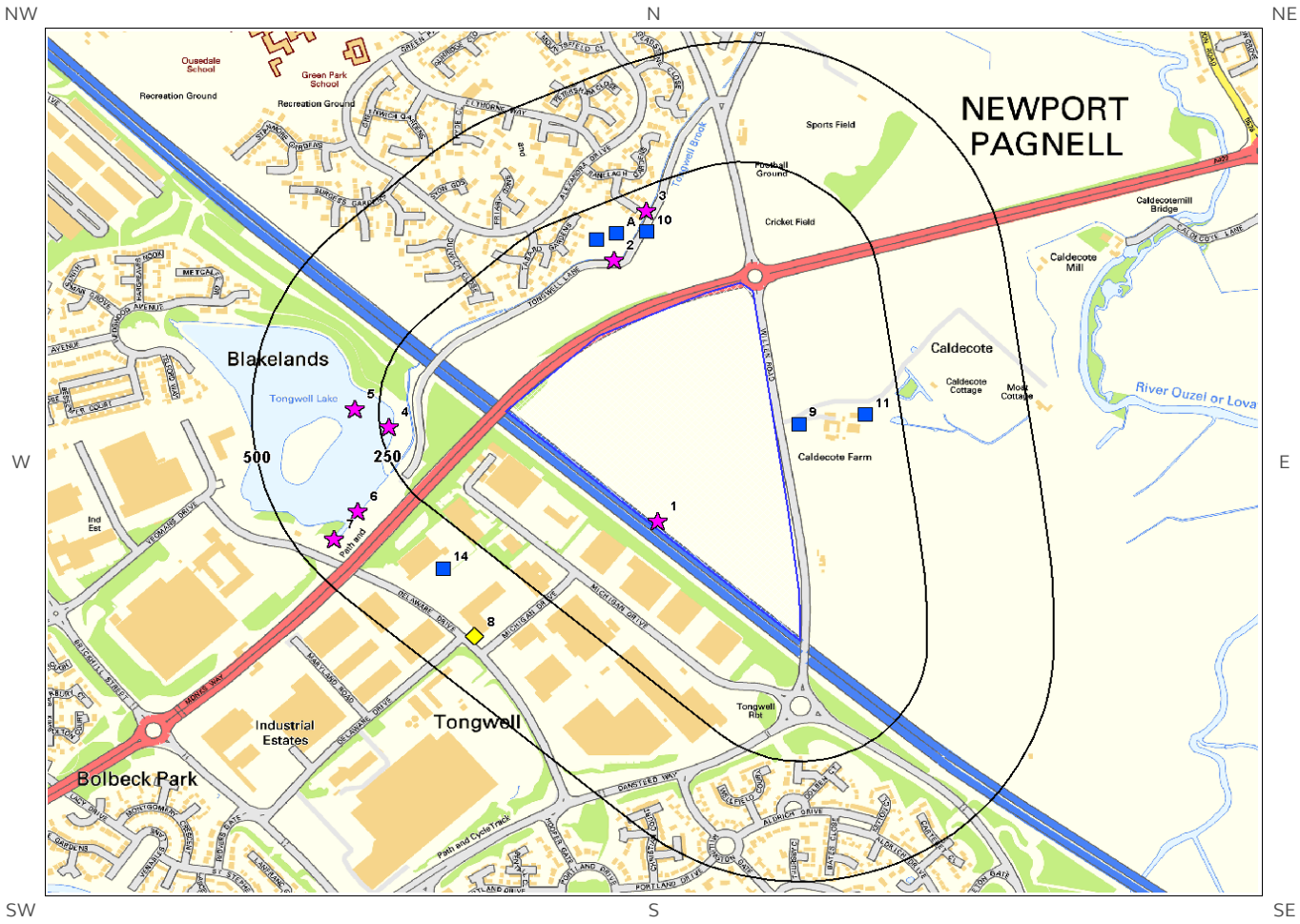
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 22

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
68N	48	SE	Cuttings	1963
69O	219	E	Pond	1882
70O	226	E	Pond	1971
71O	226	E	Pond	1963
72P	241	E	Ponds	1882
73P	244	E	Pond	1899
74P	244	E	Pond	1924
75P	244	E	Pond	1951
76P	247	E	Pond	1963
77A	251	NE	Sewage Farm	1938
78A	251	NE	Sewage Farm	1938
79Q	252	NE	Refuse Heap	1971
80A	263	NE	Sewage Farm	1951
81A	263	NE	Sewage Farm	1924
82A	271	NE	Sewage Works	1971
83	277	E	Ponds	1971
84B	289	NE	Filter Beds	1938
85B	289	NE	Filter Beds	1938

86B	290	NE	Filter Beds	1924
87B	290	NE	Filter Beds	1951
88	302	E	Pond	1882
89R	379	SE	Cuttings	1963

2. Environmental Permits, Incidents and Registers Map



Mapping sourced from Ordnance Survey

- Site Outline
- Search Buffers (m) — 250 / 500
- Recorded Pollution Incident
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

1

The following List 2 Dangerous Substance Inventory Site records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
8	401	SW	487160 241860	Name: Dawson Group Plc Status: Not Active Receiving Water: Na	Authorised Substances: pH

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

6

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
9	48	E	487800 242300	Address: CALDECOTE FARM, NEWPORT PAGNELL, BUCKS., MK16 0JJ Effluent Type: AGRICULTURE - UNSPECIFIED Permit Number: PR1NFG0821 Permit Version: 1	Receiving Water: Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 28/05/1963 Effective Date: 28-May-1963 Revocation Date: 20/02/1991
10	162	N	487500 242700	Address: TONGWELL SUB-STATION, RANELAGH GARDENS, NEWPORT PAGNELL, BUCKS, MK16 0LX Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF1621 Permit Version: 1	Receiving Water: Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 28/01/1985 Effective Date: 28-Jan-1985 Revocation Date: 12/02/1992

ID	Distance (m)	Direction	NGR	Details	
11	181	E	487931 242320	Address: CALDECOTE FARM, WILLEN ROAD, CALDECOTE, MILTON KEYNES, BUCKS, MK16 0JJ Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PRCNF17963 Permit Version: 1	Receiving Water: Status: SURRENDERED UNDER EPR 2010 Issue date: 01/02/2007 Effective Date: 01-Jul-2007 Revocation Date: 06/02/2013
12A	182	N	487440 242696	Address: TONGWELL SUB-STATION, RANELAGH GARDENS, NEWPORT PAGNELL, BUCKS, MK16 0LX Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: PR1NF1621 Permit Version: 2	Receiving Water: Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: 13/02/1992 Effective Date: 13-Feb-1992 Revocation Date: -
13A	185	N	487401 242683	Address: CALDECOTE QUARRY, LAND OFF CALDECOTE FARM, WILLEN ROAD, MILTON KEYNES, BUCKS, MK16 0JJ Effluent Type: TRADE DISCHARGES - MINERAL WORKINGS Permit Number: PRCNF17695 Permit Version: 1	Receiving Water: Status: SURRENDERED UNDER EPR 2010 Issue date: 05/10/2006 Effective Date: 05-Oct-2006 Revocation Date: 07/05/2014
14	331	SW	487100 242000	Address: TONGWELL FARM & COTTAGES, NEWPORT PAGNELL, BUCKS Effluent Type: AGRICULTURE - UNSPECIFIED Permit Number: PR1NFG0034 Permit Version: 1	Receiving Water: Status: PRE NRA LEGISLATION WHERE ISSUE DATE < 01-SEP-89 (HISTORIC ONLY) Issue date: 27/03/1963 Effective Date: 27-Mar-1963 Revocation Date: 20/02/1991

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

7

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	0	On Site	487520 242100	Incident Date: 19-May-2003 Incident Identification: 159459 Pollutant: Oils and Fuel Pollutant Description: Diesel	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
2	133	N	487434 242641	Incident Date: 21-May-2003 Incident Identification: 159729 Pollutant: Oils and Fuel Pollutant Description: Unidentified Oil	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3	205	N	487498 242745	Incident Date: 22-May-2007 Incident Identification: 496575 Pollutant: Inert Materials and Wastes Pollutant Description: Other Inert Material or Waste	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4	234	W	486991 242296	Incident Date: 29-Jul-2014 Incident Identification: 1262426 Pollutant: Other Pollutant Pollutant Description: Microbiological	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
5	298	W	486925 242332	Incident Date: 27-Jul-2003 Incident Identification: 177061 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Algae	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
6	359	SW	486930 242120	Incident Date: 15-Mar-2003 Incident Identification: 143260 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
7	430	SW	486884 242063	Incident Date: 14-May-2002 Incident Identification: 78716 Pollutant: Pollutant Not Identified Pollutant Description: Not Identified	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

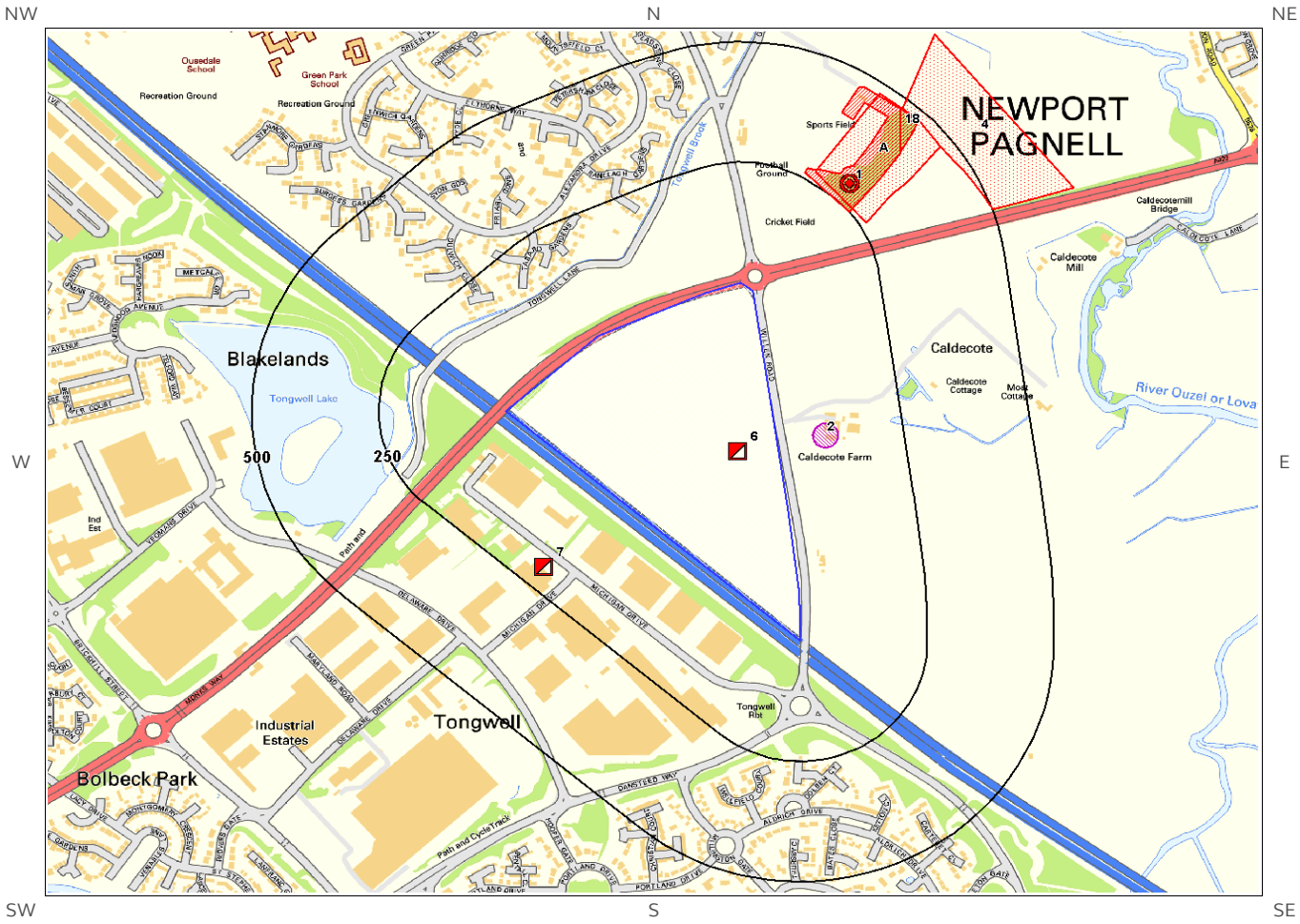
Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site?	0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



Mapping sourced from Ordnance Survey

Site Outline

250 / 500 Search Buffers (m)

E.A. Active Landfill

E.A. Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

E.A. Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency historic landfill sites within 1500m of the study site:

3

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
3A	259	NE	487900 242800	Site Address: Pre-76 Newport Pagnell, Newport Pagnell Waste Licence: - Site Reference: MK4(PRE 1976) Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: Newport Pagnell Urban District Council First Recorded: - Last Recorded: 31-Mar-1972
4	474	NE	488100 242900	Site Address: Borrow Pit, Caldecote Lane, Newport Pagnell Waste Licence: - Site Reference: - Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: Dowsett Eng Construction Limited First Recorded: - Last Recorded: -
Not shown	683	S	487300 240700	Site Address: Willen Tip, Milton Keynes Waste Licence: Yes Site Reference: WDA/116 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 09-Jun-1977 Licence Surrendered: 23-Feb-1993 Licence Hold Address: Wavendon Tower, Milton Keynes Operator: - First Recorded: 01-Jan-1973 Last Recorded: 30-Apr-1980

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

1

The following landfill records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
1	292	NE	487900.0 242800.0	Address: Willen Rd Tip, Newport Pagnell, Bucks BGS Number: 192.0	Risk: No risk to aquifer Waste Type: N/A

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

2

The following landfill records are represented as points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
17A	249	NE	487966 242871	Refuse Tip	1969 mapping	Polygon
18	407	NE	488017 242910	Refuse Tip	1969 mapping	Polygon

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

1

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
2	72	E	487852 242277	Type of Site: Recycling Works Site Address: Caldecote Farm, Willen Road, NEWPORT PAGNELL, Buckinghamshire, MK16 0JJ	Planning Application Reference: 06/01096/MIN Date: -	Further Details: Scheme comprises recycling of aggregates. An application (ref: 06/01096/MIN) for detailed planning permission was granted by Milton Keynes B.C. Planning decision obtained Data Source: Historic Planning Application Data Type: Point

3.2.2 Records of Environment Agency licensed waste sites within 1500m of the study site:

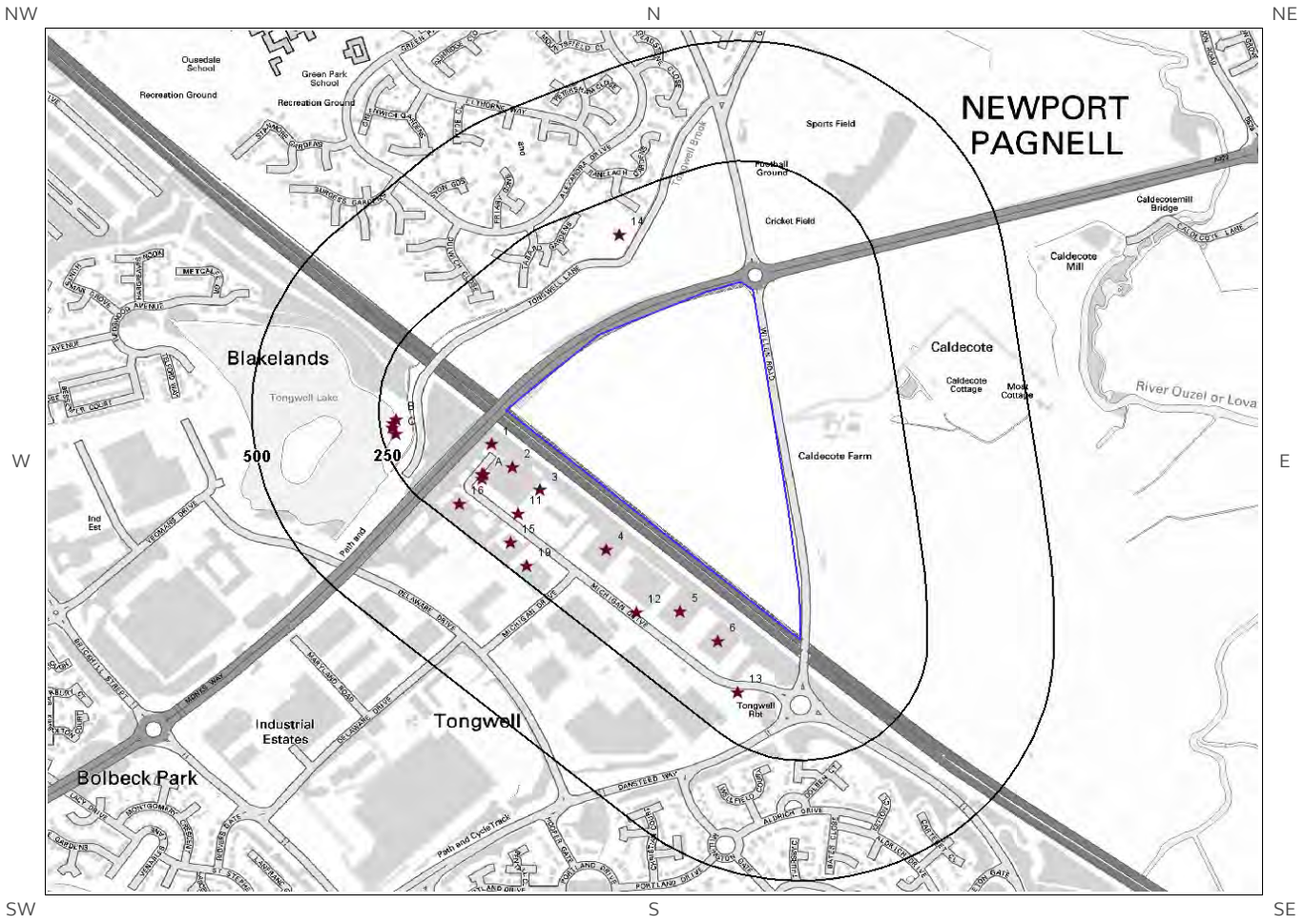
The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
6	0	On Site	487678 242245	Site Address: Willen Road Quarry, Willen Road, Newport Pagnell, Bucks, MK16 0QE Type: Treatment of waste to produce soil <75,000 tpy Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SGS001 EPR reference: EA/EPR/CB3434RE/A001 Operator: Specialist Groundwork Services (Construction) Ltd Waste Management licence No: 103420 Annual Tonnage: 174998.0	Issue Date: 13/01/2012 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Willen Road Quarry Correspondence Address: -, -
7	204	SW	487296 242004	Site Address: Newberry House, Michigan Drive, Tongwell, Milton Keynes, Buckinghamshire, MK15 8HQ Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: MIL017 EPR reference: EA/EPR/FP3896NC/S002 Operator: Milton Keynes Paint & Equipment Ltd Waste Management licence No: 75215 Annual Tonnage: 0.0	Issue Date: 24/04/2007 Effective Date: - Modified: - Surrendered Date: 29/07/2009 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Mk Paints - Tongwell Correspondence Address: -, -
Not shown	1365	NE	488800 243400	Site Address: Civic Amenty Site, North Crawley Rd, Newport Pagnell, Buckinghamshire, MK16 9HG Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WRG002 EPR reference: TP3096NH/V003 Operator: Waste Recycling Group Ltd Waste Management licence No: 75190 Annual Tonnage: 25000.0	Issue Date: 22/06/2006 Effective Date: - Modified: 03/09/2009 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: North Crawley Rd Correspondence Address: -, -
Not shown	1365	NE	488800 243400	Site Address: Civic Amenty Site, North Crawley Rd, Newport Pagnell, Bucks, MK16 9PS Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WRG002 EPR reference: - Operator: Waste Recycling Group Ltd Waste Management licence No: 75190 Annual Tonnage: 25000.0	Issue Date: 22/06/2006 Effective Date: - Modified: 14/09/2006 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: North Crawley Rd Correspondence Address: -, 3, Sidings Court, White Rose Way, Doncaster, South Yorks, DN4 5NU

ID	Distance (m)	Direction	NGR	Details	
Not shown	1365	NE	488800 243400	Site Address: North Crawley Rd, Newport Pagnell, Bucks, MK16 9HG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WRG002 EPR reference: - Operator: Wrg Group Ltd Waste Management licence No: 75190 Annual Tonnage: 0.0	Issue Date: 22/06/2006 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: North Crawley Rd Correspondence Address: -, Mill House, East Haddon, Northampton, Northants, NN6 8DU
Not shown	1394	SE	488590 240700	Site Address: Cottonvalley Wastewater Treatment Works, Pineham, Milton Keynes, Buckinghamshire, MK15 9PA Type: Landfill Gas Engine (<3 mW) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ASL005 EPR reference: EA/EPR/RP3331XK/V002 Operator: Anglian Water Services Ltd Waste Management licence No: 400038 Annual Tonnage: 0.0	Issue Date: 28/03/2013 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Cottonvalley C H P Correspondence Address: -, -
Not shown	1418	SE	488610 240684	Site Address: Pineham, Milton Keynes, Buckinghamshire, MK15 9PA Type: Sewage sludge treatment Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: AWS777 EPR reference: EA/EPR/KP3092EK/A001 Operator: Anglian Water Services Ltd Waste Management licence No: 101791 Annual Tonnage: 249999.0	Issue Date: 09/08/2010 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Cotton Valley Sludge Treatment Centre Correspondence Address: -, -
Not shown	1428	NE	488800 243500	Site Address: Newport Pagnell C A Site, North Crawley Road, Newport Pagnell, Bucks, MK16 9HG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA019 EPR reference: - Operator: Wrg Waste Services Ltd Waste Management licence No: 70100 Annual Tonnage: 5000.0	Issue Date: 12/07/1993 Effective Date: 12/07/2002 Modified: 27/03/1997 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Wrg Waste Services - Newport Pagnell C A Site Correspondence Address: -, Ground Floor West, 900, Pavilion Drive, Northampton Business Park, Northampton, NN4 7RG
Not shown	1428	NE	488800 243500	Site Address: Newport Pagnell C A Site, North Crawley Road, Newport Pagnell, Bucks Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA019 EPR reference: - Operator: Shanks Waste Services Ltd Waste Management licence No: 70100 Annual Tonnage: 0.0	Issue Date: 12/07/1993 Effective Date: 12/07/2002 Modified: 27/03/1997 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Shanks Waste Services - Newport Pagnell C A Site Correspondence Address: -, Dunedin House, Auckland Park, Mount Farm, Milton Keynes, Bucks, MK14 5AX

ID	Distance (m)	Direction	NGR	Details	
Not shown	1428	NE	488800 243500	Site Address: Newport Pagnell C A Site, North Crawley Road, Newport Pagnell, Buckinghamshire, MK16 9HG Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA019 EPR reference: EA/EPR/HP3590ND/T001 Operator: W R G Waste Services Ltd Waste Management licence No: 70100 Annual Tonnage: 5000.0	Issue Date: 12/07/1993 Effective Date: 12/07/2002 Modified: 27/03/1997 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Wrg Waste Services - Newport Pagnell C A Site Correspondence Address: -, -
Not shown	1431	SE	488500 240600	Site Address: Cotton Valley S T W, Pineham, Buckinghamshire, MK15 9PA Type: Physical Treatment Facility Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: ALP002 EPR reference: EA/EPR/TP3590NK/A001 Operator: Alpheus Environmental Ltd Waste Management licence No: 70090 Annual Tonnage: 75000.0	Issue Date: 17/07/1992 Effective Date: - Modified: 02/05/1995 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: To PPC Site Name: Alpheus Environmental - Cotton Valley Sewage Treatment Correspondence Address: -, -

4. Current Land Use Map



Mapping sourced from Ordnance Survey

Site Outline

Search Buffers (m) 250 500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 21

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	72	SW	Opterna Europe Ltd	487195 242258	5, Vermont Place, Tongwell, Milton Keynes, MK15 8JA	Radar and Telecommunications Equipment	Industrial Products
2	83	SW	R B C Logistics	487234 242210	1, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Distribution and Haulage	Transport, Storage and Delivery
3	85	SW	Electricity Sub Station	487289 242163	MK15	Electrical Features	Infrastructure and Facilities
4	98	SW	Control Group	487419 242039	Atlantic House 3a, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Container and Storage	Transport, Storage and Delivery
5	104	SW	Bong UK Ltd	487565 241911	The Envelope Building, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Stationery, Stamps, Tags and Labels	Industrial Products
6	105	SW	Millennium Mats Ltd	487639 241849	3d, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Carpets, Flooring, Rugs and Soft Furnishings	Consumer Products
7A	131	SW	Computer Associated Decisions	487179 242195	12, Vermont Place, Tongwell, Milton Keynes, MK15 8JA	Electrical Equipment Repair and Servicing	Repair and Servicing
8A	132	SW	Rapide Distribution	487176 242195	12, Vermont Place, Tongwell, Milton Keynes, MK15 8JA	Distribution and Haulage	Transport, Storage and Delivery
9A	132	SW	51 Parcel	487176 242195	12a, Vermont Place, Tongwell, Milton Keynes, MK15 8JA	Distribution and Haulage	Transport, Storage and Delivery
10A	140	SW	P C I	487175 242186	14, Vermont Place, Tongwell, Milton Keynes, MK15 8JA	Building and Component Suppliers	Construction Services
11	151	SW	Industrial Estate	487246 242114	MK15	Business Parks and Industrial Estates	Industrial Features
12	161	SW	Electricity Sub Station	487479 241909	MK15	Electrical Features	Infrastructure and Facilities
13	161	SW	Industrial Estate	487679 241743	MK15	Business Parks and Industrial Estates	Industrial Features
14	177	N	Electricity Sub Station	487446 242693	MK16	Electrical Features	Infrastructure and Facilities
15	205	SW	Neo Neon UK Plc	487232 242054	3, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Lampshades and Lighting	Consumer Products

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
16	208	SW	Enveco Ltd	487130 242134	Sunrose Place, Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Stationery, Stamps, Tags and Labels	Industrial Products
17B	217	W	Landing Stage	487007 242310	MK14	Moorings and Unloading Facilities	Water
18C	221	W	Slipway	487007 242279	MK14	Moorings and Unloading Facilities	Water
19	224	SW	L K Q Coatings	487262 242005	Michigan Drive, Tongwell, Milton Keynes, MK15 8HQ	Special Purpose Machinery and Equipment	Industrial Products
20B	225	W	Landing Stage	487000 242302	MK14	Moorings and Unloading Facilities	Water
21C	227	W	Landing Stage	486999 242293	MK14	Moorings and Unloading Facilities	Water

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
HEAD	HEAD	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
GLLMP	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
FELM	FELMERSHAM MEMBER	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
GLLMP	GLACIOLACUSTRINE DEPOSITS, MID PLEISTOCENE	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
GFDMP	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]

5.3 Bedrock and Solid Geology

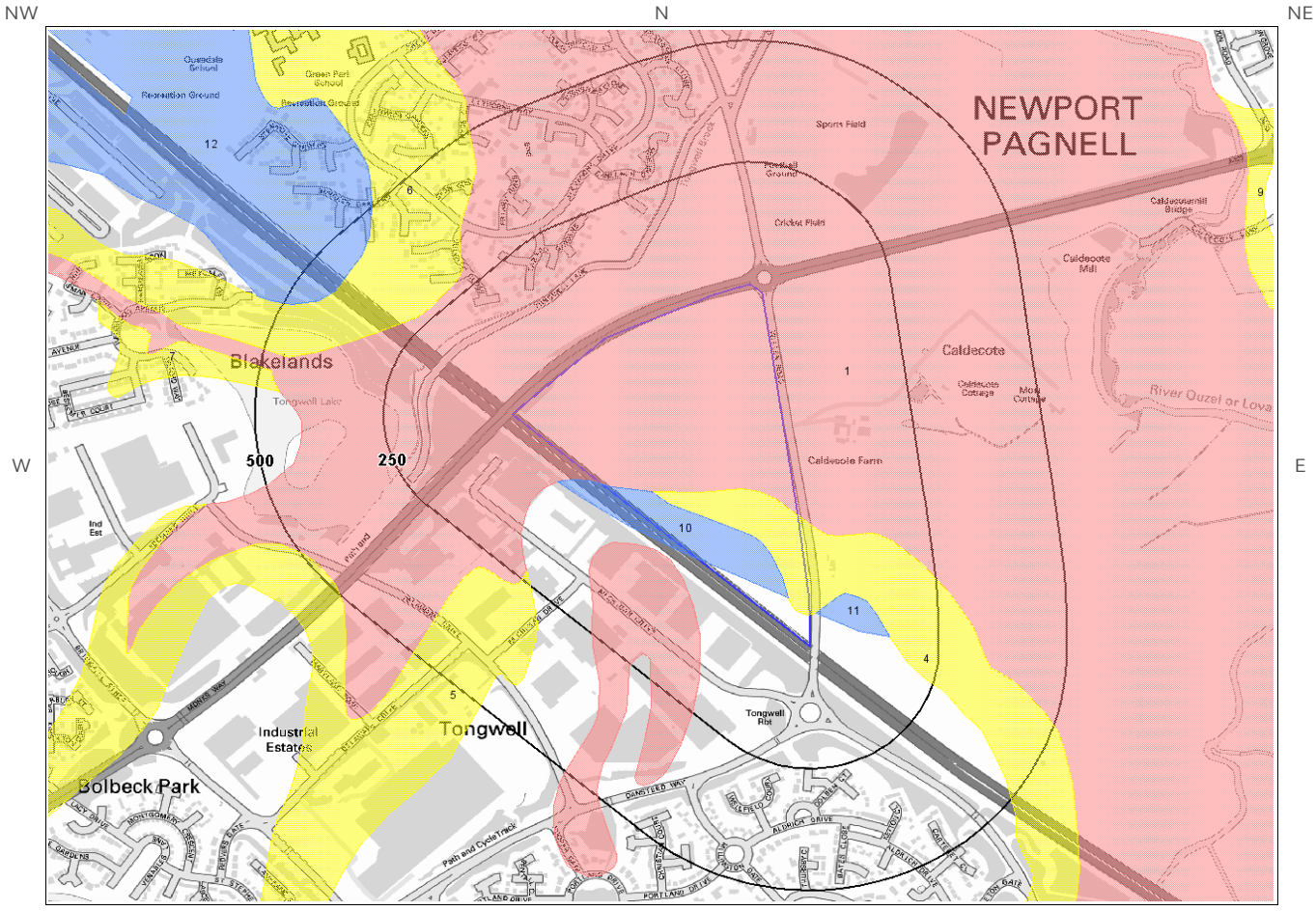
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
PET-MDST	PETERBOROUGH MEMBER	MUDSTONE
KLB-SDSM	KELLAWAYS FORMATION	SANDSTONE, SILTSTONE AND MUDSTONE
CB-LMST	CORNBRASH FORMATION	LIMESTONE
KLB-SDSM	KELLAWAYS FORMATION	SANDSTONE, SILTSTONE AND MUDSTONE

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



Mapping sourced from Ordnance Survey

Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

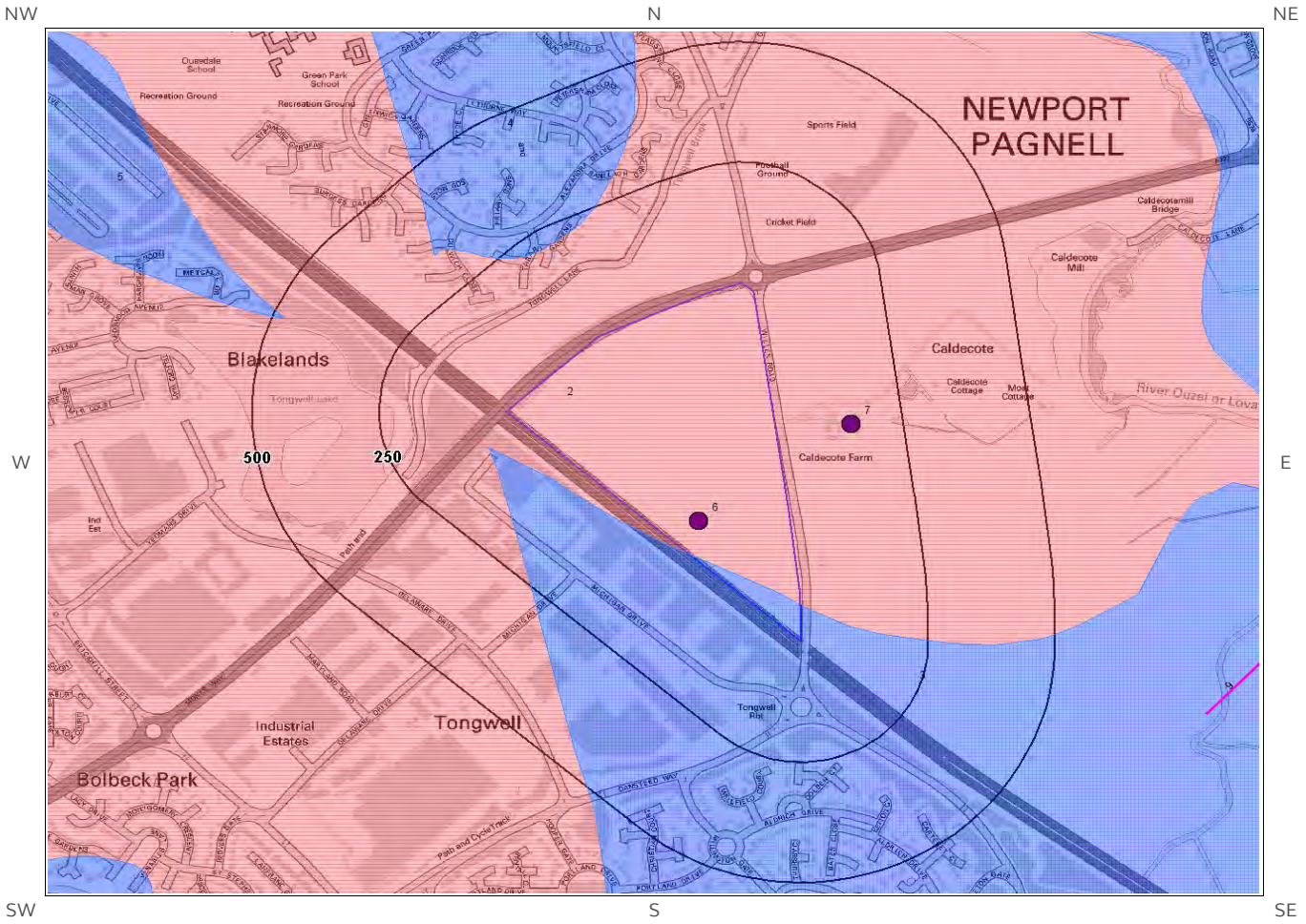
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

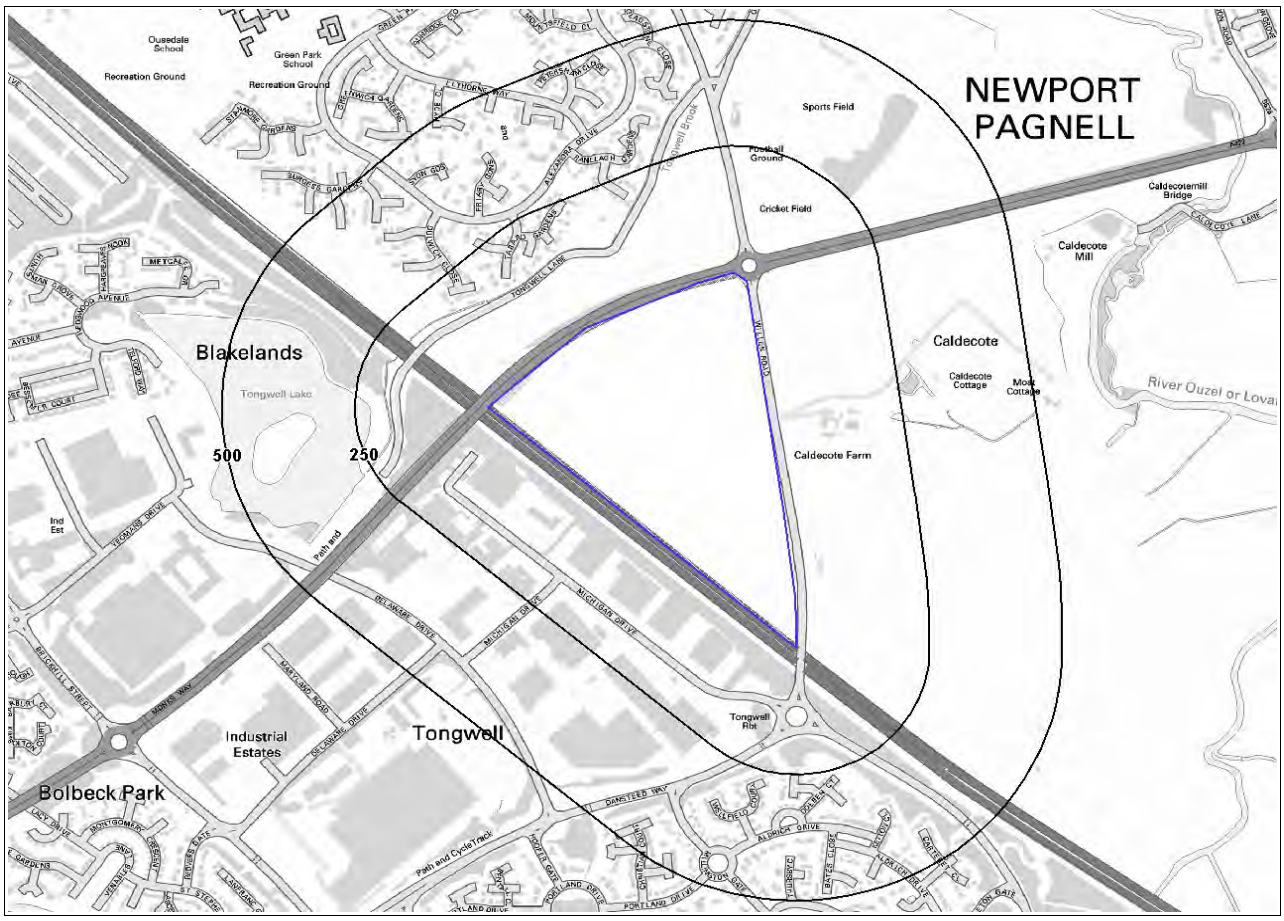
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

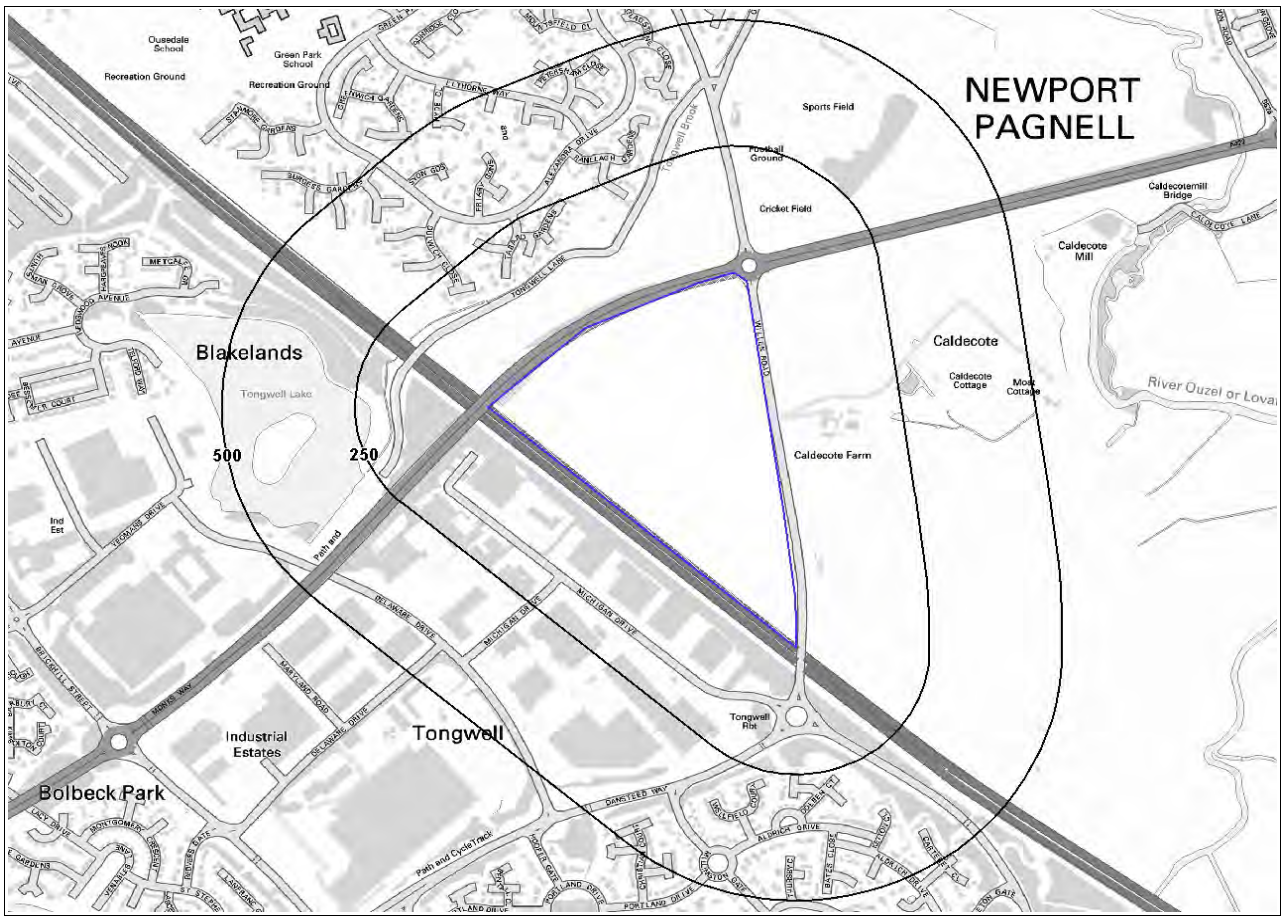
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



Mapping sourced from Ordnance Survey

- Site Outline
- 250 / 500 Search Buffers (m)
- Source Protection Zone 1 - Inner Catchment
- Source Protection Zone 2 - Outer Catchment
- Source Protection Zone 3 - Total Catchment
- Source Protection Zone 4 - Zone of Special Interest
- Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



Mapping sourced from Ordnance Survey

Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

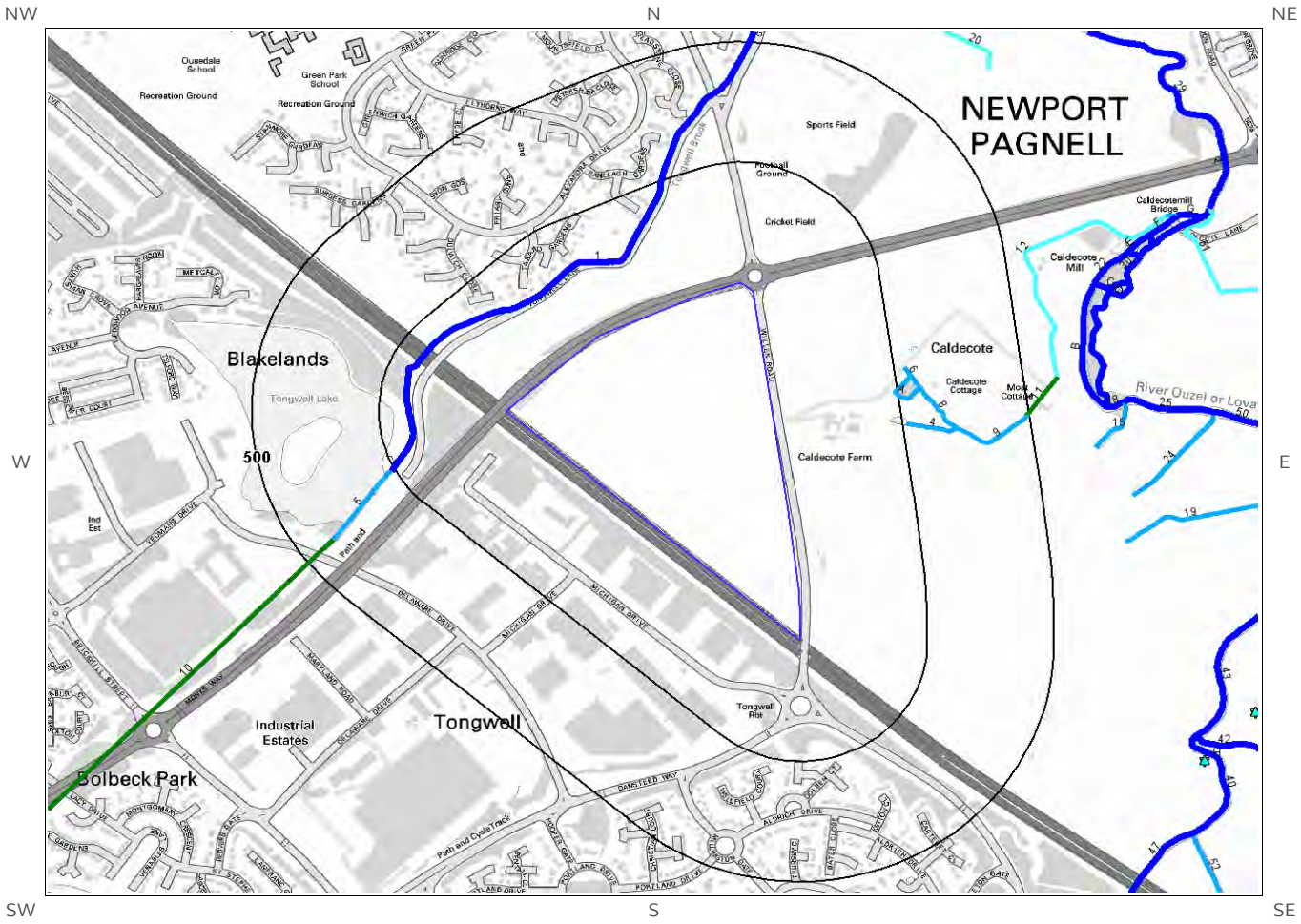
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Site Outline

250
500
Search Buffers (m)

Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



Mapping sourced from Ordnance Survey

- Site Outline
- 250 — Search Buffers (m)
- 500 —
- Primary River
- Secondary River
- Tertiary River
- Lake/Reservoir
- Underground River (inferred)
- General Quality Assessment: Biology
- General Quality Assessment: Chemistry
- Canal
- Canal Tunnel
- Culvert
- Multiple Channel Culvert
- Underground River (Potential Sewer)
- Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property?
Yes

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
4	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
10	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
11	12	E	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	35	SW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
5	230	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
6	270	NW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
12	428	NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
7	455	W	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviroinsight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
2	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
3	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
4	211	NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	476	NW	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
6	0	On Site	487600 242100	Status: Historical Licence No: 6/33/10/*G/0010 Details: Mineral Washing Direct Source: Ground Water Source Of Supply Point: Gravel Pit At Newport Pagnell Data Type: Point Name: SPECIALIST GROUNDWORK SERVICES CONSTRUCTION LTD	Annual Volume (m^3): 291600 Max Daily Volume (m^3): 1944 Original Application No: CV 3606 Original Start Date: 19/5/2006 Expiry Date: 31/3/2016 Issue No: 2 Version Start Date: 27/11/2006 Version End Date:
7	147	E	487900 242300	Status: Historical Licence No: 6/33/10/*G/0007 Details: General Farming & Domestic Direct Source: Ground Water Source Of Supply Point: Well At Caldecote Farm Data Type: Point Name: MORGAN	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/8/1966 Expiry Date: - Issue No: 100 Version Start Date: 1/8/1966 Version End Date:
Not shown	1321	E	489100 241600	Status: Historical Licence No: 6/33/10/*G/0002 Details: General Farming & Domestic Direct Source: Ground Water Source Of Supply Point: Well Moulsoe Buildings Data Type: Point Name: COLLINS	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 1/12/1967 Expiry Date: - Issue No: 100 Version Start Date: 6/12/1967 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
9	811	E	488600 241700	Status: Historical Licence No: 6/33/10/*S/0009 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Ouzel At Moulsoe Data Type: Line Name: CARINGTON	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 1/12/1992 Expiry Date: 30/06/2002 Issue No: 100 Version Start Date: 1/12/1992 Version End Date:
Not shown	909	N	487600 243500	Status: Historical Licence No: 6/33/10/*S/0008 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Surface Water Source Of Supply Point: River Ouzel At Newport Pagnell Data Type: Point Name: COWLEY	Annual Volume (m³): - Max Daily Volume (m³): - Application No: - Original Start Date: 1/6/1973 Expiry Date: - Issue No: 100 Version Start Date: 1/6/1973 Version End Date:
Not shown	1609	N	487400 244700	Status: Active Licence No: 6/33/05/*S/0049 Details: Spray Irrigation - Direct Direct Source: Surface Water Source Of Supply Point: River Ouse-newport Pagnell Data Type: Line Name: J W COOK & SON	Annual Volume (m³): 22700 Max Daily Volume (m³): 1136.5 Application No: - Original Start Date: 1/4/1983 Expiry Date: - Issue No: 100 Version Start Date: 1/4/1992 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.

6.9 River Quality

Is there any Environment Agency information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Biological Quality data describes water quality in terms of 83 groups of macroinvertebrates, some of which are pollution sensitive. The results are graded from A ('Very Good') to F ('Bad').

The following Biological Quality records are shown on the Hydrology Map (6e):

ID	Distance (m)	Direction	NGR	River Quality Grade	Biological Quality Grade				
					2005	2006	2007	2008	2009
62H	835	E	488600 241600	River Name: Ouse Reach: Motel ..... Tickford Abbey End/Start of Stretch: End of Stretch NGR	A	A	A	A	A
63H	835	E	488600 241600	River Name: Ouse Reach: Tickford Abbey...sherrington Bridge End/Start of Stretch: Start of Stretch NGR	A	A	A	A	A
64I	909	E	488700 241700	River Name: Ouzel Reach: A421 Road Bridge ..... Confl. Broughton End/Start of Stretch: End of Stretch NGR	B	B	B	B	B
65I	909	E	488700 241700	River Name: Broughton Brook Reach: M1 ..... Ouzel End/Start of Stretch: End of Stretch NGR	C	B	B	B	B

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
66H	835	E	488600 241600	River Name: Ouse Reach: Motel .. Tickford Abbey End/Start of Stretch: End of Stretch NGR	A	A	A	A	A
67H	835	E	488600 241600	River Name: Ouse Reach: Tickford Abbey Sherrington Bridge End/Start of Stretch: Start of Stretch NGR	A	A	A	A	A
68I	909	E	488700 241700	River Name: Ouzel Reach: Confl. Broughton Brk . Birchmoor Farm End/Start of Stretch: Start of Stretch NGR	A	A	A	A	A
69I	909	E	488700 241700	River Name: Ouzel Reach: A421 Road Bridge .. Confl. Broughton End/Start of Stretch: End of Stretch NGR	C	B	B	B	B
70I	909	E	488700 241700	River Name: Broughton Brook Reach: M1 .. Ouzel End/Start of Stretch: End of Stretch NGR	C	C	B	B	B
Not shown	1030	SE	488200 240900	River Name: Ouzel Reach: A421 Road Bridge .. Confl. Broughton End/Start of Stretch: Sample Point NGR	C	B	B	B	B
Not shown	1310	N	487800 243900	River Name: Ouzel Reach: Confl. Broughton Brk . Birchmoor Farm End/Start of Stretch: Sample Point NGR	A	A	A	A	A
Not shown	1465	N	488100 244000	River Name: Ouzel Reach: Confl. Broughton Brk . Birchmoor Farm End/Start of Stretch: End of Stretch NGR	A	A	A	A	A

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	126	N	River Name: Tongwell Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
2	190	W	River Name: Tongwell Brook Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
3A	246	E	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
4	257	E	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
5	257	SW	River Name: Tongwell Brook Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
6	271	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7A	280	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
8	295	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
9	355	E	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
10	431	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
11	494	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

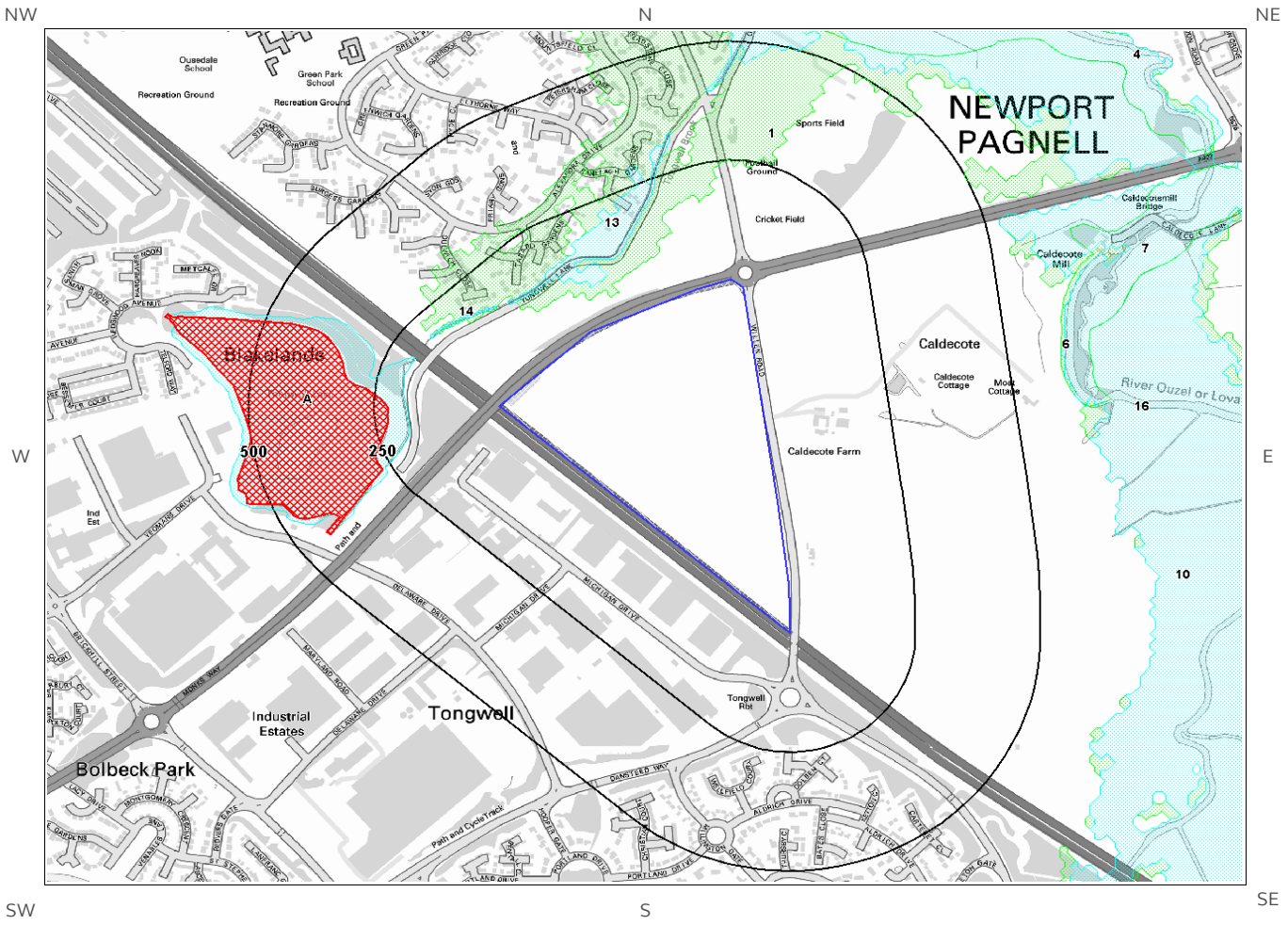
6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
126	N
163	NW
167	N
187	W
221	W
224	E
243	E
249	E

7a. Environment Agency Flood Map for Planning (from rivers and the sea)



Mapping sourced from Ordnance Survey

Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

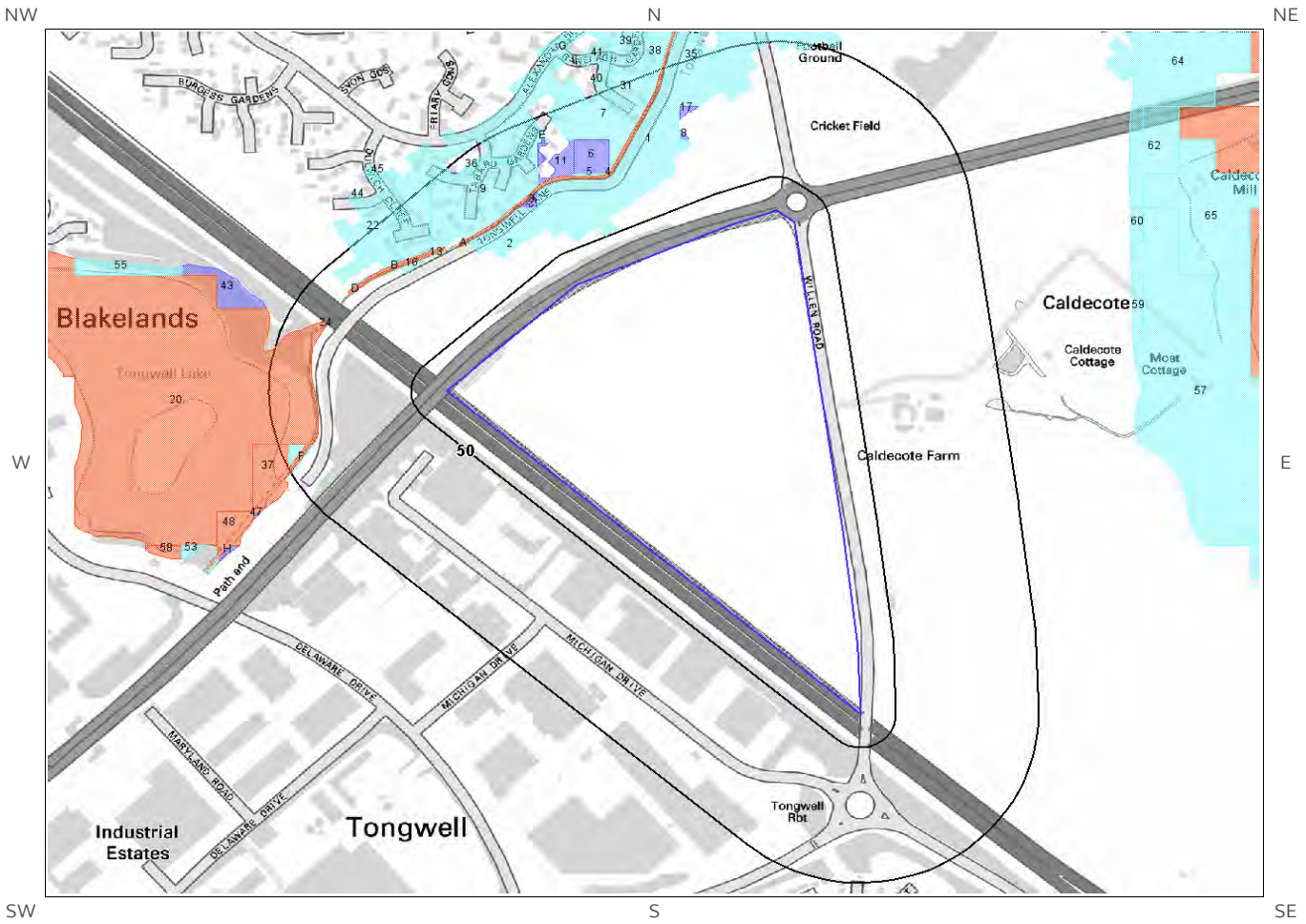
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) Map



Mapping sourced from Ordnance Survey

Site Outline

100 250 Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency Zone 2 floodplain? Yes

Environment Agency Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1	50	N	18-Jun-2015	Zone 2 - (Fluvial / Tidal Models)
2A	184	W	18-Jun-2015	Zone 2 - (Fluvial / Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1	84	N	26-May-2015	Zone 3 - (Fluvial Models)
2A	162	NW	26-May-2015	Zone 3 - (Fluvial Models)
	184	W	26-May-2015	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Very Low

The Environment Agency RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRas flood Risk
1	50.0	N	Low

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? Yes

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

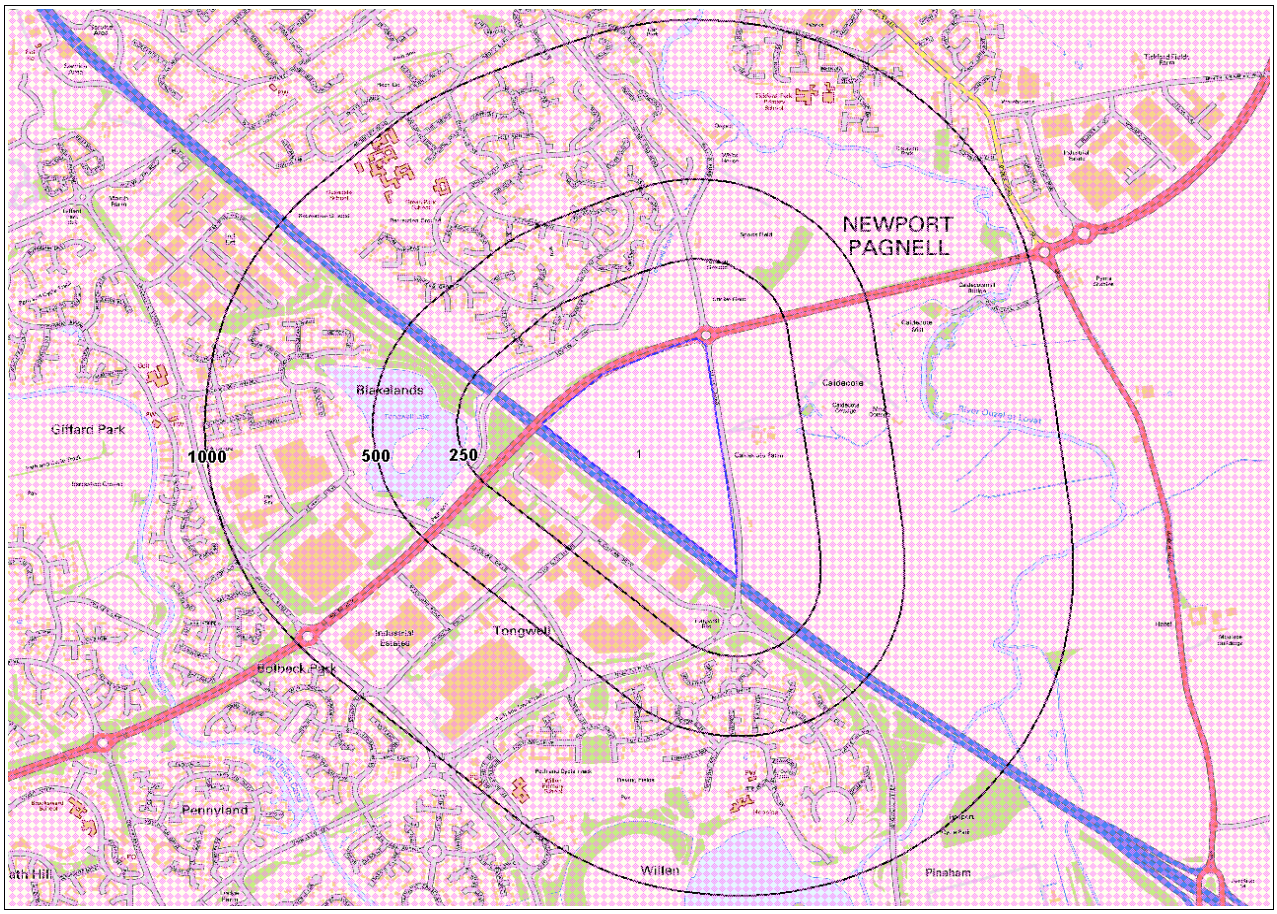
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



Mapping sourced from Ordnance Survey

- Site Outline
- 100 / 250 Search Buffers (m)
- AONB
- National Park
- SSSI
- Special Protection Areas
- Nitrate Vulnerable Zones
- Green Belt
- Environmentally Sensitive Areas
- Special Areas of Conservation
- World Heritage Sites
- Nitrate Sensitive Areas
- Ancient Woodland
- National Nature Reserve
- Local Nature Reserves
- Ramsar Sites

8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site?	Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

0

Database searched and no data found.

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

3

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
1	0	On Site	Existing	DEFRA
Not shown	1219	NE	Existing	DEFRA
Not shown	1850	S	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

0

Database searched and no data found.

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure GeoInsight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly high plasticity. Do not plant or remove trees or shrubs near to buildings without expert advice about their effect and management. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a probable increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a probable increase in insurance risk during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant soluble rocks are present. Low possibility of subsidence occurring naturally, but may be possible in adverse conditions such as high surface or subsurface water flow. Consider implications for stability when changes to drainage or new construction are planned. For new build Ö site investigation should consider potential for dissolution problems on the site and its surroundings. Care should be taken with local drainage into the bedrock. Some possibility groundwater pollution. For existing property Ö possible increase in insurance risk due to soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build Ö consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property ×°ossible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand** hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

* This indicates an automatically generated 50m buffer and site.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? No

Database searched and no data found.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

EmapSite
Telephone: 0118 9736883
sales@emapsite.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 08708 506 506
Web:**www.environment-agency.gov.uk**
Email:**enquiries@environment-agency.gov.uk**

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Milton Keynes
Phone: 01908 691 691
Web: http://www.milton-keynes.gov.uk/
Address: Civic Offices, 1 Saxon Gate East, Milton Keynes, MK9 3HQ

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**

"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.

"Client" means the party or parties entering into a Contract with Groundsure.

"Commercial" means any building or property which is not Residential.

"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.

"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.

"Data Reports" means reports comprising factual data with no accompanying interpretation.

"Fees" has the meaning set out in clause 5.1.

"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.

"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.

"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.

"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.

"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.

"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.

"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.

"Residential" means any building or property used as or intended to be used as a single dwelling.

"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.

"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.

"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.

"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.

"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.

2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.

2.3 Subject to clause 7.3 the Client acknowledges that it has not relied on any statement or representation made by or on behalf of Groundsure which is not set out and expressly agreed in writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.

2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.

2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.

2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.

3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.

3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.

3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.

4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

(i) the Beneficiary,

(ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate),

(iv) the first purchaser or first tenant of the Site, and

(v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and

frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services (together "Fees").

5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.

5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to

(i) full payment of all relevant Fees and

(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.

6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.

6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.

6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, copyright or other proprietary marking belonging to Groundsure or any third party from the Services;

(ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

(iii) not create any product or report which is derived directly or indirectly from the Services (save that those acting in a professional capacity to the Beneficiary may provide advice based upon the Services);

(iv) not combine the Services with or incorporate such Services into any other information data or service;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.

6.6 The Client shall procure that any person to whom the Services are made available shall notify Groundsure of any request or requirement to disclose, publish or disseminate any information contained in the Services in accordance with the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or any associated legislation or regulations in force from time to time.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.

7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.

7.4 Groundsure shall not be liable for

(i) loss of profits;

(ii) loss of business;

(iii) depletion of goodwill and/or similar losses;

(iv) loss of anticipated savings;

(v) loss of goods;

(vi) loss of contract;

(vii) loss of use;

(viii) loss or corruption of data or information;

(ix) business interruption;

(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;

(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;

(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;

(xiii) loss or damage to a computer, software, modem, telephone or other property; and

(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.

7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.

8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 days of the Payment Date; or

(ii) the Client (being an individual) has a bankruptcy order made against him or (being a company) shall enter into liquidation whether compulsory or voluntary or have an administration order made against it or if a receiver shall be appointed over the whole or any part of its property assets or undertaking or if the Client is struck off the Register of Companies or dissolved; or

(iii) the Client being a company is unable to pay its debts within the meaning of Section 123 of the Insolvency Act 1986 or being an individual appears unable to pay his debts within the meaning of Section 268 of the Insolvency Act 1986 or if the Client shall enter into a composition or arrangement with the Client's creditors or shall suffer distress or execution to be levied on his goods; or

(iv) the Client or the Beneficiary breaches any term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.

9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event

(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) Groundsure shall take steps to bring to an end the Services in an orderly manner, vacate any Site with all reasonable speed and shall deliver to the Client and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) the Client shall pay to Groundsure all and any Fees payable in respect of the performance of the Services up to the date of termination or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.

12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.

12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.

12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.

12.5 Save as expressly provided in this Contract, no person other than the persons set out therein shall have any right under the Contract (Rights of Third Parties) Act 1999 to enforce any terms of the Contract.

12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.7 Groundsure shall not be liable to the Client if the provision of the Services is delayed or prevented by one or more of the following circumstances:

(i) the Client or Beneficiary's failure to provide facilities, access or information;

(ii) fire, storm, flood, tempest or epidemic;

(iii) Acts of God or the public enemy;

(iv) riot, civil commotion or war;

(v) strikes, labour disputes or industrial action;

(vi) acts or regulations of any governmental or other agency;

(vii) suspension or delay of services at public registries by Third Party Data Providers;

(viii) changes in law; or

(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 Any notice provided shall be in writing and shall be deemed to be properly given if delivered by hand or sent by first class post, facsimile or by email to the address, facsimile number or email address of the relevant party as may have been notified by each party to the other for such purpose or in the absence of such notification the last known address.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 Each of the provisions of the Contract is severable and distinct from the others and if one or more provisions is or should become invalid, illegal or unenforceable, the validity and enforceability of the remaining provisions shall not in any way be tainted or impaired.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent required by law.

APPENDIX F
EXPLORATORY HOLE RECORDS

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS01**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level:	National Grid Co-ordinate:	Sheet:
313114		**108.56**	**E:487654.5 N:242056.9**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.50	1	ES				Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.40)	
	0.50	2	D					0.40	
	0.90	3	D				Orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (MADE GROUND)		
1.00 - 2.00 (115mm dia) 100% rec	1.00-1.45	1	SPT	N=23	1			(1.40)	
	1.90	4	D					1.80	
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.45	2	SPT	N=2			Very loose orange brown slightly gravelly SAND. Gravel is subangular fine to medium flint. (FELMERSHAM MEMBER)	(1.40)	
								3.20	
3.00 - 4.00 (85mm dia) 100% rec	3.50	5	D				Stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to medium chalk. (GLACIAL DEPOSITS)	(0.80)	
								4.00	
	4.00-4.45	3	SPT	N=59			Window sample hole terminated at 4.00m bgl upon completion.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 1.60m bgl.
4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MHocking**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS02**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**107.87**	**E:487553.7 N:242128.2**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.45) 0.45	
	0.60	1	D				Orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (MADE GROUND)	(0.95) 1.40	
1.00 - 2.00 (115mm dia) 100% rec	1.00-1.38	1	SPT	N=6					
	1.60	2	D				Firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)	(0.60) 2.00	
	1.80	3	ES						
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.45	2	SPT	N=2	▼1		Very soft brown occasional black slightly gravelly silty CLAY. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)	(1.00) 3.00	
	2.80	4	D						
3.00 - 4.00 (85mm dia) 0% rec	3.00-3.45	3	SPT	N=12			Medium dense orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded to rounded fine to medium flint. (FELMERSHAM MEMBER)	(1.25) 4.25	
4.00 - 4.45 (75mm dia) 100% rec	4.00-4.45	4	SPT	N=55					
	4.30	5	D				Stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to medium chalk. (GLACIAL DEPOSITS)	4.45	

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 2.50m bgl.
4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MDixon**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS02**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level:	National Grid Co-ordinate:	Sheet:
313114		**107.87**	**E:487553.7 N:242128.2**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Window sample hole terminated at 4.45m bgl upon completion.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MDixon**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS03**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**---**	**E:487355.0 N:242351.0**	**1** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.50	1	ES				Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.90)	
								0.90	
	1.00-1.45	1	SPT	N=7			Soft to firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)		
1.00 - 2.00 (115mm dia) 100% rec	1.50	2	D						
	2.00-2.45	2	SPT	N=16			. . . becoming soft from 2.20m bgl.	(2.00)	
2.00 - 3.00 (99mm dia) 100% rec	2.50	3	D		▼1			2.90	
	3.00-3.45	3	SPT	N=5			Dark grey slightly gravelly SAND. Gravel is subangular fine chalk. (MADE GROUND)	(1.00)	
3.00 - 4.00 (85mm dia) 0% rec								3.90	
	4.00-4.45	4	SPT	N=10			Orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded fine to medium flint. (FELMERSHAM MEMBER) (PETERBOROUGH MEMBER)	(0.55)	
4.00 - 4.45 (75mm dia) 100% rec	4.40	4	D					4.45	

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 2.90m bgl.
4. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS03**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level:	National Grid Co-ordinate:	Sheet:
313114		**---**	**E:487355.0 N:242351.0**	**2** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Firm dark grey silty CLAY. (PETERBOROUGH MEMBER) Window sample hole terminated at 4.45m bgl upon completion.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS04**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**106.45**	**E:487525.3 N:242338.7**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.40) 0.40	
	0.50	1	ES				Orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (MADE GROUND)	(0.90)	
	0.90	2	D						
	1.00-1.45	1	SPT	N=9				1.30	
1.00 - 2.00 (115mm dia) 100% rec							Soft to firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)		
	1.70	3	D					(1.40)	
	2.00-2.38	2	SPT	N=4					
2.00 - 3.00 (99mm dia) 100% rec	2.50	4	D					2.70	
							Orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded fine to medium flint. (POSSIBLE MADE GROUND)		
	3.00-3.45	3	SPT	N=10				(1.30)	
3.00 - 4.00 (85mm dia) 0% rec								4.00	
	4.00-4.45	4	SPT	N=24			Firm to stiff brown becoming dark grey silty CLAY. (PETERBOROUGH MEMBER)		
4.00 - 4.45 (75mm dia) 100% rec	4.10	5	D					(0.45) 4.45	

Window sample hole terminated at 4.45m bgl upon completion.

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m 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:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS04**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level:	National Grid Co-ordinate:	Sheet:
313114		**106.45**	**E:487525.3 N:242338.7**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS05**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**105.24**	**E:487680.8 N:242544.6**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.30) 0.30	
	0.50	1	ES				Orange brown slightly gravelly SAND. Gravel is subangular fine to medium flint and chalk. (MADE GROUND)	(0.60) 0.90	
1.00 - 2.00 (115mm dia) 100% rec	1.00-1.45	1	SPT	N=9			Firm light brown slightly gravelly CLAY. Gravel is subrounded fine to medium chalk. (MADE GROUND)	1.00	
	1.50	2	D				Soft to firm orange brown mottled grey brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium flint and chalk. (GLACIAL DEPOSITS)	(0.90) 1.90	
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.45	2	SPT	N=13			Firm becoming stiff dark grey brown silty CLAY. (PETERBOROUGH MEMBER)		
	2.10	3	D						
	2.70	4	D						
	3.00-3.45	3	SPT	N=24				(2.40)	
	3.30	5	D						
3.00 - 4.30 (85mm dia) 100% rec	3.40-3.85	4	SPT	N=25					
	3.85-4.30	5	SPT	N=47				4.30	
							Window sample hole terminated at 4.30m bgl upon completion.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m 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:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS06**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**---**	**E:487670.0 N:242306.0**	**1** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.40	1	ES				Firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)	(1.10)	
	0.80	2	D						
	1.00-1.38	1	SPT	N=5				1.10	
1.00 - 2.00 (115mm dia) 100% rec	1.40	3	D				Soft brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium chalk. (MADE GROUND)	(0.60)	
	1.90	4	D					1.70	
	2.00-2.38	2	SPT	N=4			Soft to firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MADE GROUND)	(1.30)	
2.00 - 3.00 (99mm dia) 100% rec	2.80	5	D					3.00	
	3.00-3.45	3	SPT	N=14			Firm dark grey brown silty CLAY with rare subangular fine to medium chalk gravel. (GLACIAL DEPOSITS)	(1.45)	
3.00 - 4.00 (85mm dia) 100% rec	3.70	6	D						
	4.00-4.45	4	SPT	N=23				4.45	
4.00 - 4.45 (75mm dia) 100% rec									

Window sample hole terminated at 4.45m bgl upon completion.

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater not encountered.
4. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**???**	**MLawson**	

WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS06**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**E:487670.0 N:242306.0**	**2** of **2**
	End: **08.09.15**			

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**???**	**MLawson**	

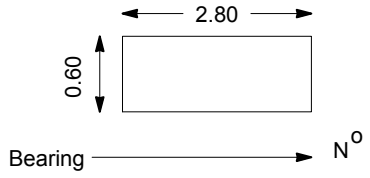
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP01**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487686.0 N:242153.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Soft light brown slightly gravelly sandy CLAY. Gravel is subrounded fine to coarse chalk with rare brick. (MADE GROUND)	(0.90)	
0.50	1	ES		≈			0.90	
1.10	2	D				Soft brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse brick, flint and chalk and occasional rotten wood and metal wire with organic odour. (MADE GROUND)		
2.00	3	B					(3.10)	
3.00	4	D						
							4.00	
						Brown SAND and GRAVEL. Gravel is angular to subangular fine to medium flint. (FELMERSHAM MEMBER)	4.10	
4.20		V	c_u=65			Firm brown silty CLAY. (PETERBOROUGH MEMBER)	(0.30)	
4.30	5	D					4.40	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit on West sidewall slightly unstable with minor collapsing.
3. Groundwater seepage encountered at 0.90m bgl.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

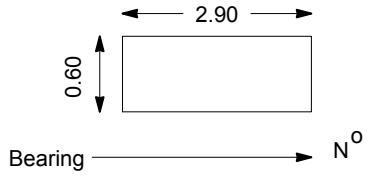
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP02**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	End: **07.09.15**	**---**	**E:487726.0 N:241995.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30)	
0.20	1	ES					0.30	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (MADE GROUND)		
1.00	2	D						
							(3.20)	
2.00	3	D						
3.00	4	B						
							3.50	
						Soft to firm initially brown dark grey CLAY with rare subrounded fine to medium chalk gravel. (GLACIAL DEPOSITS)		
3.60	5	D						
3.70		V	c_u=60				(0.50)	
3.90	6	D						
							4.00	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit became unstable from 1.60m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

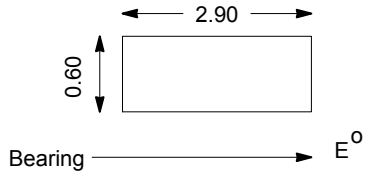
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP03**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487569.0 N:242139.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30)	
0.20	1	ES					0.30	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (MADE GROUND)	(1.30)	
1.30	2	D					1.60	
						Brown clayey SAND and GRAVEL. Gravel is subrounded fine to coarse flint. (MADE GROUND)	(0.60)	
2.10	3	D					2.20	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (FELMERSHAM MEMBER)	(0.60)	
							2.80	
						Firm dark gravelly CLAY. Gravel is subrounded to rounded fine to coarse chalk and flint. (GLACIAL DEPOSITS)	(0.40)	
3.00	4	D						
3.10		V	c_u=80				3.20	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit became unstable from 1.60m bgl and terminated due to collapsing.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

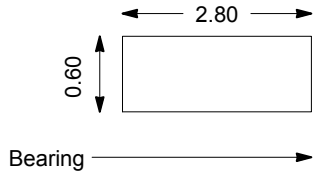
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP04**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487567.0 N:242270.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.60	1	ES				Firm brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MADE GROUND)	(0.60) 0.90	
1.10	2	D				Firm becoming soft grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse brick, flint and chalk. (MADE GROUND)	(1.10) 2.00	
1.50		V	c_u=60					
1.80	3	D		1		Very soft orange brown silty CLAY. (MADE GROUND)	(1.30) 3.30	
3.00	4	D						
3.00		V	c_u=10					
						Orange brown fine to coarse GRAVEL of subrounded to rounded flint. (FELMERSHAM MEMBER)	3.40	
3.50	5	D				Firm dark grey brown mottled brown CLAY. (PETERBOROUGH MEMBER)	3.60	
3.50		V	c_u=80					

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater encountered at 2.10m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

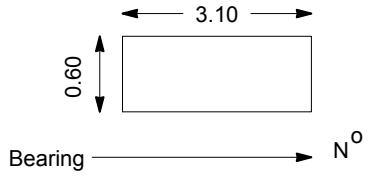
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP05**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487419.0 N:242292.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.50	1	ES				Firm grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MADE GROUND)	(1.40) 1.70	
2.00 2.00	2	D V	c_u=45			Soft to firm organic dark grey slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse chalk and flint. (MADE GROUND)	(0.70) 2.40	
						Firm orange brown slightly gravelly sandy CLAY. Gravel is subrounded to rounded fine to coarse flint. (MADE GROUND)	2.50	
2.70 2.70	3	D V	c_u=0	1		Very soft orange brown silty CLAY. (MADE GROUND)	(0.40) 2.90	
3.00 3.00	4	D V	c_u=75			Firm dark grey gravely CLAY. Gravel is subrounded fine to coarse chalk. (GLACIAL DEPOSITS)	3.10	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater encountered at 2.70m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

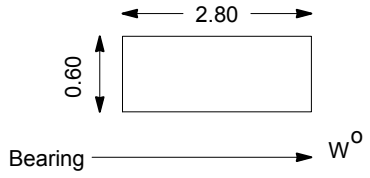
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP06**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487454.0 N:242439.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.50	1	ES				Firm grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MADE GROUND)	(1.20) 1.50	
1.10	2	D						
1.90	3	D				Soft to firm organic dark grey slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse chalk and flint. With occasional brick and concrete. (MADE GROUND)	(1.00) 2.50	
						. . . concrete obstruction at west end of pit at 2.20m abd 2.40m bgl.		
2.40	4	D						
						Orange brown SAND and GRAVEL. Gravel is subrounded fine to coarse flint. (FELMERSHAM MEMBER)	2.70	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

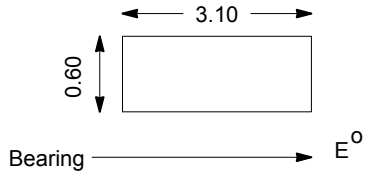
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP07**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487554.0 N:242476.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.50) 0.50	
1.00	2	D				Firm brown becoming dark grey mottled white gravelly CLAY. Gravel is subangular to subrounded fine to coarse brick and chalk. (MADE GROUND)	(1.20) 1.70	
2.20	3	B		1		Brown SAND and GRAVEL. Gravel is subangular to subrounded fine to medium occasionally coarse flint. (FELMERSHAM MEMBER)	(1.10) 2.80	
2.90	4	D				Firm grey brown silty CLAY. (PETERBOROUGH MEMBER)	3.00	
2.90		V	c_u=70					

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit becoming unstable from 1.70m bgl causing major collapses.
3. Groundwater encountered at 2.80m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

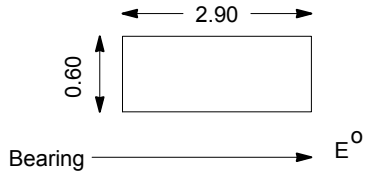
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP08**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487645.0 N:242417.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.60	1	ES				Firm to stiff brown mottled grey brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded flint and occasional chalk and brick. (MADE GROUND)	(1.00) 1.30	
1.50	2	B				Light brown slightly clayey SAND and GRAVEL. Gravel is subangular fine to coarse flint. (FELMERSHAM MEMBER)	(0.60) 1.90	
2.00	3	D				Firm dark grey brown slightly sandy silty CLAY. (PETERBOROUGH MEMBER)	(0.30) 2.20	
2.10		V	c_u=60					
2.50	4	D				Firm dark grey silty CLAY. (PETERBOROUGH MEMBER)	(0.50) 2.70	
2.60		V	c_u=80					

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

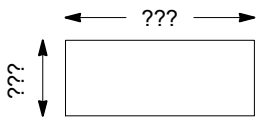
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPA**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	(1.10) 1.40	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

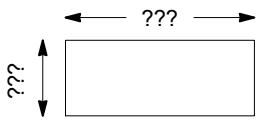
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPB**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	(1.10) 1.40	
						Grey brown clayey SAND and GRAVEL. Gravel is subangular fine to coarse flint.	(0.30) 1.70	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

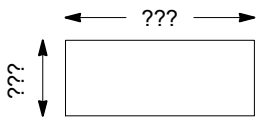
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPC**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.40) 0.40	
						Grey brown clayey SAND and GRAVEL. Gravel is subangular fine to coarse flint.	(1.20) 1.60	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

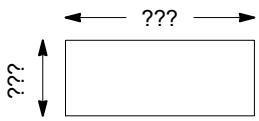
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPD**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	(1.30) 1.60	
						Orange brown SAND and GRAVEL. Gravel is subangular to subrounded fine to medium flint and gravel.	1.80	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

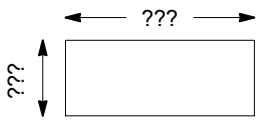
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPE**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.40) 0.40	
						Grey brown clayey SAND and GRAVEL. Gravel is subangular fine to coarse flint.	(1.30) 1.70	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

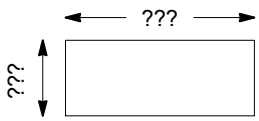
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPF**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	0.50	

Plan (Not to Scale)



General Remarks

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2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

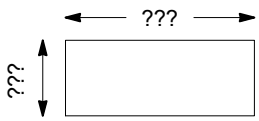
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPG**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	(0.40) 0.70	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

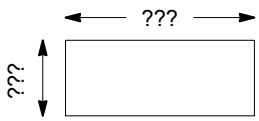
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TPH**

Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**---**	**1** of **1**
	End: **08.09.15**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets.	(0.30) 0.30	
						Light orange brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint and chalk.	(0.40) 0.70	

Plan (Not to Scale)



General Remarks

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2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

APPENDIX G
GROUND GAS AND GROUNDWATER MONITORING DATA

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	Falling	Constant	1005	1005	
Round 2	Constant	Constant	1026	1026	

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)
WS01	1	50	1	3.00	3.07	1.00 to 3.00	23/09/2015	1005	1005	$0.1_{(I)}$	1.43	0.1	0.0	20.8	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	18.7	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	18.4	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
	Remarks: Samples taken.																
WS01	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 11:17:00	1026	1026	$0.2_{(I)}$	1.42	0.1	0.0	20.4	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	2.6	0.0	18.8	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.6	0.0	18.1	0.0	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

[redacted]

Date	Checked By	Date
23/10/15		

Contract Ref: **313114**

Willen Road, Newport Pagnell

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)
WS01	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS02	1	50	1	3.00	3.16	1.00 to 3.00	23/09/2015 14:06:00	1005	1005	$0.1_{(I)}$	1.62	0.1	0.0	20.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	18.4	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	16.9	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	2	3.00	3.15	1.00 to 3.00	01/10/2015 11:03:00	1026	1026	$0.2_{(I)}$	1.65	0.1	0.0	20.3	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	3.5	0.0	17.4	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS04	1	50	1	3.00	3.10	1.00 to 3.00	23/09/2015 13:40:00	1005	1005	$0.1_{(I)}$	0.78	0.1	0.0	20.8	0.0	0.0	0.0
WS04	1	50	1		---	1.00 to 3.00	15 secs	-	-	$-0.1_{(SS)}$	-	0.5	0.0	20.5	0.0	4.0	0.0
WS04	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.5	0.0	20.5	0.0	3.0	0.0
WS04	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.5	0.0	20.1	0.0	2.0	0.0

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

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)
WS04	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.1	0.0	19.6	0.0	1.0	0.0
WS04	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	16.2	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	360 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	420 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
	Remarks: Borehole ran dry after 6L purged.																
WS04	1	50	2	3.00	3.10	1.00 to 3.00	01/10/2015 10:42:00	1026	1026	$1.9_{(I)}$	0.90	0.3	0.0	20.4	0.0	0.0	0.0
WS04	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	1.3	0.0	19.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	1.4	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	18.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	17.3	0.0	1.0	0.0
WS05	1	50	1	3.00	3.08	1.00 to 3.00	23/09/2015	1005	1005	$0.0_{(I)}$	2.24	0.1	0.0	20.9	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.2	0.0	20.8	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0

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

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)
WS05	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
	Remarks: Borehole ran dry after 2L purged.																
WS05	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 10:01:00	1026	1026	$10.3_{(I)}$	2.29	0.1	0.0	20.8	0.0	0.0	0.0
WS05	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	3.2	0.0	17.0	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.2	0.0	15.3	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WSA	#REF!	#REF!	1	NDA	1.88	No Installation	23/09/2015	1005	1005	$0.0_{(I)}$	1.61	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	19.3	0.0	1.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1	NDA	9.53	No Installation	23/09/2015 15:03:00	1005	1005	$0.0_{(I)}$	2.13	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0

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

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)
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.2	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	1.89	No Installation	01/10/2015 10:16:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	1.5	0.0	20.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	1.7	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	1.8	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	1.9	0.0	19.5	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	2.3	0.0	19.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	2.9	0.0	18.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	3.1	0.0	18.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	9.02	No Installation	01/10/2015 10:22:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	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

[redacted]	Date	Checked By	Date	Contract Ref:
	23/10/15			313114

Contract: **Willen Road, Newport Pagnell**

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)
WSB	#REF!	#REF!	1	NDA	1.66	No Installation	23/09/2015	1005	1005	$0.1_{(I)}$	0.89	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.6	0.0	20.4	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1	NDA	3.29	No Installation	23/09/2015 00:06:00	1005	1005	$0.2_{(I)}$	2.19	0.1	0.0	20.9	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	375 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	390 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	420 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	450 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	480 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	540 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	600 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	660 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	1.66	No Installation	01/10/2015 11:27:00	1026	1026	$0.2_{(I)}$	1.14	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0

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

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)
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.5	0.0	20.3	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	3.30	No Installation	01/10/2015 11:35:00	1026	1026	$0.2_{(I)}$	2.23	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	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

[redacted]	Date	Checked By	Date	Contract Ref:
	23/10/15			313114

Contract: **Willen Road, Newport Pagnell**

Page: **7** of **7**

APPENDIX H
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 15/05909
Issue Number: 1 **Date:** 23 September, 2015

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Michael Lawson
Project Name: Willen Road, Newport Pagnell
Project Ref: 313114
Order No: N/A
Date Samples Received: 10/09/15
Date Instructions Received: 10/09/15
Date Analysis Completed: 22/09/15

Prepared by:

[redacted]

Danielle Brierley
Administrative Assistant

Approved by:

[redacted]

Liz Oliver
Sales Executive

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/2	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/9	15/05909/10	15/05909/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04		
Depth to Top	3.50	1.80	0.50	0.40	0.50	4.30	0.20	0.60		
Depth To Bottom										
Date Sampled	08-Sep-15	08-Sep-15	08-Sep-15	08-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15		
Sample Type	Soil - D	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - D	Soil - ES	Soil - ES		
Sample Matrix Code	5A	6A	5A	5A	6A	5	6AE	5A		
% Stones >10mm$_A^{\#}$	9.2	4.9	31.0	10.0	<0.1	<0.1	9.8	4.8	% w/w	A-T-044
pH$_D^{M\#}$	-	8.40	7.89	9.36	8.28	-	7.48	7.93	pH	A-T-031s
pH BRE$_D^{M\#}$	8.23	8.40	-	9.36	8.28	8.55	-	-	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	94	63	-	327	73	33	-	-	mg/l	A-T-026s
Phenols - Total by HPLC$_A$	-	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	mg/kg	A-T-050s
Total Organic Carbon$_D^{M\#}$	-	0.77	0.23	1.02	1.41	-	1.55	0.28	% w/w	A-T-032s
Arsenic$_D^{M\#}$	-	10	12	12	11	-	12	14	mg/kg	A-T-024s
Cadmium$_D^{M\#}$	-	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	mg/kg	A-T-024s
Copper$_D^{M\#}$	-	16	8	14	22	-	12	10	mg/kg	A-T-024s
Chromium$_D^{M\#}$	-	29	21	19	27	-	21	30	mg/kg	A-T-024s
Chromium (hexavalent)$_D$	-	<1	<1	<1	<1	-	<1	<1	mg/kg	A-T-040s
Iron$_D$	-	32800	30800	22100	25500	-	23800	31600	mg/kg	A-T-024s
Lead$_D^{M\#}$	-	20	10	15	67	-	38	13	mg/kg	A-T-024s
Mercury$_D$	-	0.20	<0.17	0.21	0.18	-	<0.17	<0.17	mg/kg	A-T-024s
Nickel$_D^{M\#}$	-	27	23	20	26	-	17	30	mg/kg	A-T-024s
Selenium$_D^{M\#}$	-	<1	<1	<1	1	-	<1	<1	mg/kg	A-T-024s
Zinc$_D^{M\#}$	-	58	37	55	62	-	48	44	mg/kg	A-T-024s

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/2	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/9	15/05909/10	15/05909/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04		
Depth to Top	3.50	1.80	0.50	0.40	0.50	4.30	0.20	0.60		
Depth To Bottom										
Date Sampled	08-Sep-15	08-Sep-15	08-Sep-15	08-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15		
Sample Type	Soil - D	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - D	Soil - ES	Soil - ES		
Sample Matrix Code	5A	6A	5A	5A	6A	5	6AE	5A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	-	NAD	NAD	NAD	NAD	-	NAD	NAD		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	-	N/A	N/A	N/A	N/A	-	N/A	N/A		Gravimetry

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/2	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/9	15/05909/10	15/05909/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04		
Depth to Top	3.50	1.80	0.50	0.40	0.50	4.30	0.20	0.60		
Depth To Bottom										
Date Sampled	08-Sep-15	08-Sep-15	08-Sep-15	08-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15		
Sample Type	Soil - D	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - D	Soil - ES	Soil - ES		
Sample Matrix Code	5A	6A	5A	5A	6A	5	6AE	5A		
PAH 16										
Acenaphthene$_A^{M\#}$	-	<0.01	<0.01	0.02	<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	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	-	<0.02	<0.02	0.05	<0.02	-	<0.02	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	-	0.06	<0.04	0.15	<0.04	-	<0.04	<0.04	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	-	0.05	<0.04	0.12	<0.04	-	0.10	<0.04	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	-	<0.05	<0.05	0.22	<0.05	-	0.12	<0.05	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	-	<0.05	<0.05	0.10	<0.05	-	<0.05	<0.05	mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	-	<0.07	<0.07	0.12	<0.07	-	0.07	<0.07	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	-	0.10	<0.06	0.22	<0.06	-	0.10	0.06	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	-	<0.04	<0.04	<0.04	<0.04	-	<0.04	<0.04	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	-	0.19	<0.08	0.50	<0.08	-	0.10	0.08	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	-	*<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	0.09	<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	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	-	0.06	<0.03	0.20	<0.03	-	<0.03	<0.03	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	-	0.15	<0.07	0.33	<0.07	-	0.09	0.08	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	-	0.60	<0.08	2.10	<0.08	-	0.60	0.24	mg/kg	A-T-019s

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/2	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/9	15/05909/10	15/05909/12	Units	Method ref
Client Sample No										
Client Sample ID	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04		
Depth to Top	3.50	1.80	0.50	0.40	0.50	4.30	0.20	0.60		
Depth To Bottom										
Date Sampled	08-Sep-15	08-Sep-15	08-Sep-15	08-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15	07-Sep-15		
Sample Type	Soil - D	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - D	Soil - ES	Soil - ES		
Sample Matrix Code	5A	6A	5A	5A	6A	5	6AE	5A		
TPH CWG										
Ali >C5-C6$_A^\#$	-	<0.03	<0.03	<0.03	<0.03	-	<0.03	<0.03	mg/kg	A-T-022s
Ali >C6-C8$_A^\#$	-	<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	mg/kg	A-T-022s
Ali >C10-C12$_A^\#$	-	<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	mg/kg	A-T-023s
Ali >C16-C21$_A^\#$	-	<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	mg/kg	A-T-023s
Total Aliphatics$_A$	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	mg/kg	A-T-022+23s
Aro >C5-C7$_A^\#$	-	<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	mg/kg	A-T-022s
Aro >C8-C9$_A^\#$	-	<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	mg/kg	A-T-022s
Aro >C10-C12$_A^\#$	-	<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	mg/kg	A-T-023s
Aro >C16-C21$_A^\#$	-	<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	mg/kg	A-T-023s
Total Aromatics$_A$	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	mg/kg	A-T-022+23s
TPH (Ali & Aro)$_A$	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	mg/kg	A-T-022+23s
BTEX - Benzene$_A^\#$	-	<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	mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A^\#$	-	<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	mg/kg	A-T-022s
BTEX - o Xylene$_A^\#$	-	<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	mg/kg	A-T-022s

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/13	15/05909/14	15/05909/15						Units	Method ref
Client Sample No										
Client Sample ID	TP05	TP06	TP07							
Depth to Top	0.50	0.50	0.20							
Depth To Bottom										
Date Sampled	07-Sep-15	07-Sep-15	07-Sep-15							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	5A	6A	6AE							
% Stones >10mm$_A^{\#}$	12.0	2.4	7.1						% w/w	A-T-044
pH$_D^{M\#}$	8.33	-	7.88						pH	A-T-031s
pH BRE$_D^{M\#}$	-	8.74	-						pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	-	145	-						mg/l	A-T-026s
Phenols - Total by HPLC$_A$	<0.2	-	<0.2						mg/kg	A-T-050s
Total Organic Carbon$_D^{M\#}$	0.98	-	1.77						% w/w	A-T-032s
Arsenic$_D^{M\#}$	25	-	11						mg/kg	A-T-024s
Cadmium$_D^{M\#}$	<0.5	-	<0.5						mg/kg	A-T-024s
Copper$_D^{M\#}$	16	-	15						mg/kg	A-T-024s
Chromium$_D^{M\#}$	21	-	26						mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	-	<1						mg/kg	A-T-040s
Iron$_D$	30400	-	29800						mg/kg	A-T-024s
Lead$_D^{M\#}$	20	-	35						mg/kg	A-T-024s
Mercury$_D$	0.20	-	<0.17						mg/kg	A-T-024s
Nickel$_D^{M\#}$	23	-	20						mg/kg	A-T-024s
Selenium$_D^{M\#}$	<1	-	<1						mg/kg	A-T-024s
Zinc$_D^{M\#}$	65	-	57						mg/kg	A-T-024s

Lab Sample ID	15/05909/13	15/05909/14	15/05909/15						Units	Method ref
Client Sample No										
Client Sample ID	TP05	TP06	TP07							
Depth to Top	0.50	0.50	0.20							
Depth To Bottom										
Date Sampled	07-Sep-15	07-Sep-15	07-Sep-15							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	5A	6A	6AE							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	NAD	-	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	-	N/A							Gravimetry

Lab Sample ID	15/05909/13	15/05909/14	15/05909/15						Units	Method ref
Client Sample No										
Client Sample ID	TP05	TP06	TP07							
Depth to Top	0.50	0.50	0.20							
Depth To Bottom										
Date Sampled	07-Sep-15	07-Sep-15	07-Sep-15							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	5A	6A	6AE							
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$_A^{M\#}$	0.03	-	<0.02						mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.13	-	0.11						mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.13	-	0.14						mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.22	-	0.15						mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.08	-	0.08						mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.13	-	0.10						mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.22	-	0.18						mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	-	<0.04						mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	0.42	-	0.32						mg/kg	A-T-019s
Fluorene$_A^{M\#}$	*<0.01*	-	*<0.01*						mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.08	-	0.05						mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03	-	<0.03						mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	0.12	-	0.05						mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.32	-	0.26						mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	1.86	-	1.44						mg/kg	A-T-019s

Envirolab Job Number: 15/05909

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/05909/13	15/05909/14	15/05909/15						Units	Method ref
Client Sample No										
Client Sample ID	TP05	TP06	TP07							
Depth to Top	0.50	0.50	0.20							
Depth To Bottom										
Date Sampled	07-Sep-15	07-Sep-15	07-Sep-15							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	5A	6A	6AE							
TPH CWG										
Ali >C5-C6$_A^\#$	<0.03	-	<0.03						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-022+23s
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-022+23s
TPH (Ali & Aro)$_A$	<0.1	-	<0.1						mg/kg	A-T-022+23s
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

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. 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.

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.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. 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 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient 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.
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.

Please contact us if you need any further information.

APPENDIX I
LABORATORY CERTIFICATES FOR GROUNDWATER ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT
SUPPLEMENT TO TEST REPORT 15/06279/1

Envirolab Job Number: 15/06279
Issue Number: 2 **Date:** 19 October, 2015

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Michael Lawson
Project Name: Willen Road, Newport Pagnell
Project Ref: 313114
Order No: N/A
Date Samples Received: 25/09/15
Date Instructions Received: 28/09/15
Date Analysis Completed: 19/10/15

Prepared by: **Approved by:**

[redacted]

Danielle Brierley
Administrative Assistant

Lianne Bromiley
Senior Client Manager

UKAS TESTING
1247

Envirolab Job Number: 15/06279

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/06279/1	15/06279/2							Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2								
Depth to Top	1.43	1.62								
Depth To Bottom										
Date Sampled	23-Sep-15	23-Sep-15								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
pH (w)$_A^\#$	7.24	7.30							pH	A-T-031w
Electrical conductivity @ 20degC (w)$_A^\#$	732	1565							µs/cm	A-T-037w
Hardness Total$_A^\#$	320	816							mg/l Ca CO3	A-T-049w
Arsenic (dissolved)$_A^\#$	<1	2							µg/l	A-T-025w
Cadmium (dissolved)$_A^\#$	<0.2	<0.2							µg/l	A-T-025w
Calcium (dissolved)$_A^\#$	117	271							mg/l	A-T-049w
Copper (dissolved)$_A^\#$	<1	<1							µg/l	A-T-025w
Chromium (dissolved)$_A^\#$	<1	<1							µg/l	A-T-025w
Chromium (hexavalent) (w)$_A^\#$	<0.05	<0.05							mg/l	A-T-040w
Lead (dissolved)$_A^\#$	<1	<1							µg/l	A-T-025w
Mercury (dissolved)$_A^\#$	<0.1	<0.1							µg/l	A-T-025w
Nickel (dissolved)$_A^\#$	<1	10							µg/l	A-T-025w
Selenium (dissolved)$_A^\#$	<1	<1							µg/l	A-T-025w
Zinc (dissolved)$_A^\#$	1	1							µg/l	A-T-025w

Envirolab Job Number: 15/06279

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/06279/1	15/06279/2							Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2								
Depth to Top	1.43	1.62								
Depth To Bottom										
Date Sampled	23-Sep-15	23-Sep-15								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
PAH 16MS (w)										
Acenaphthene $(w)_A^{\#}$	<0.01	0.03							µg/l	A-T-019w
Acenaphthylene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Anthracene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Benzo(a)anthracene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Benzo(a)pyrene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Benzo(b)fluoranthene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Benzo(ghi)perylene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Benzo(k)fluoranthene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Chrysene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Dibenzo(ah)anthracene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Fluoranthene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Fluorene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Indeno(123-cd)pyrene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Naphthalene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Phenanthrene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
Pyrene $(w)_A^{\#}$	<0.01	<0.01							µg/l	A-T-019w
PAH (total 16) $(w)_A^{\#}$	<0.01	0.03							µg/l	A-T-019w

Envirolab Job Number: 15/06279

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	15/06279/1	15/06279/2							Units	Method ref
Client Sample No										
Client Sample ID	WS1	WS2								
Depth to Top	1.43	1.62								
Depth To Bottom										
Date Sampled	23-Sep-15	23-Sep-15								
Sample Type	Water - EW	Water - EW								
Sample Matrix Code	N/A	N/A								
TPH CWG										
Ali >C5-C6 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Ali >C6-C8 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Ali >C8-C10 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Ali >C10-C12 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Ali >C12-C16 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Ali >C16-C21 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Ali >C21-C35 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Total Aliphatics $(w)_A$	<10	<5							µg/l	A-T-022+23w
Aro >C5-C7 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Aro >C7-C8 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Aro >C8-C9 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Aro >C9-C10 $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
Aro >C10-C12 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Aro >C12-C16 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Aro >C16-C21 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Aro >C21-C35 $(w)_A^{\#}$	<10	<5							µg/l	A-T-023w
Total Aromatics $(w)_A$	<10	<5							µg/l	A-T-022+23w
TPH (Ali & Aro) $(w)_A$	<10	<5							µg/l	A-T-022+23w
BTEX - Benzene $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
BTEX - Toluene $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
BTEX - Ethyl Benzene $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
BTEX - m & p Xylene $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
BTEX - o Xylene $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w
MTBE $(w)_A^{\#}$	<1	<1							µg/l	A-T-022w

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. 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.

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.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. 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 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient 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.
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.

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 C_8–C_9 (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 C_5–C_8 were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C_8–C_9 hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C_8–C_9 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 14.8m^3 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

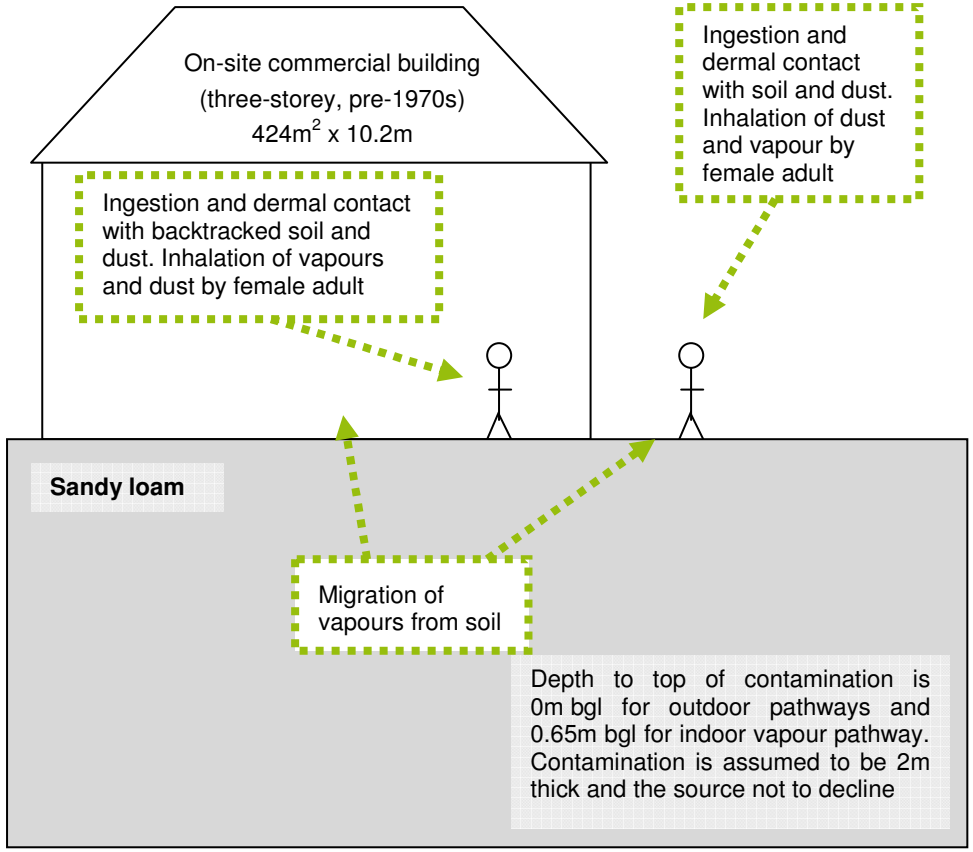

Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

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

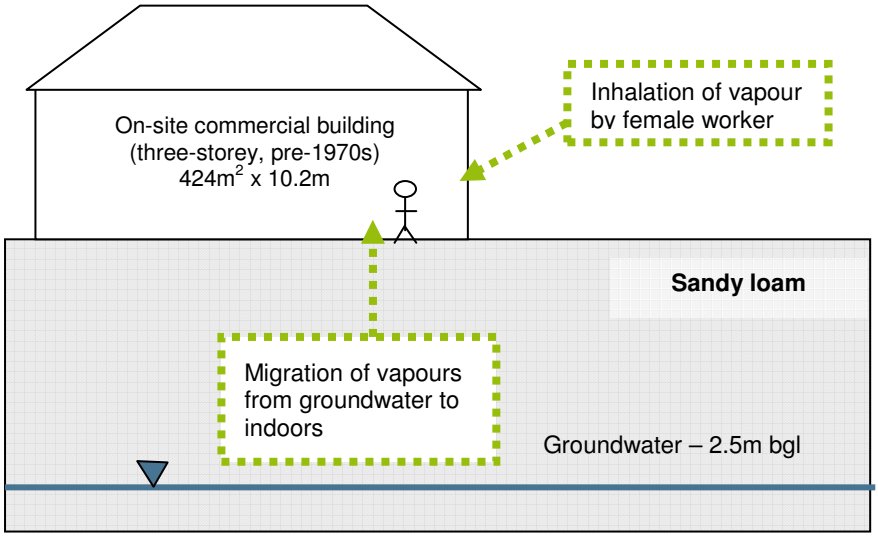

Table 3: Commercial – RBCA inputs

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

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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).

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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 >EC_9-EC_{10}		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 cellls 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.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

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_6	36	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-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 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 though 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]	-	-
Zinc	-	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	-			
Benzo(g,h,i)perylene	-		0.000002[15g]	0.000002[5g]
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]
Bentazone	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
Aluminium	-	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 (NH_4^+ and NH_3) 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 $CaCO_3$, 40–<50mg/l $CaCO_3$, 50–<100mg/l $CaCO_3$, 100–<200mg/l $CaCO_3$ and >/=200mg/l $CaCO_3$. 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 $CaCO_3$, 50–100mg/l $CaCO_3$, 100–250mg/l $CaCO_3$ and >250mg/l $CaCO_3$. The target concentrations included in Table 1 are listed in order of increasing calcium carbonate concentrations; applies to annual mean concentration (mg/l) of $CaCO_3$. Applies to annual mean concentration of metal (mg/l) for 'Good' standard.

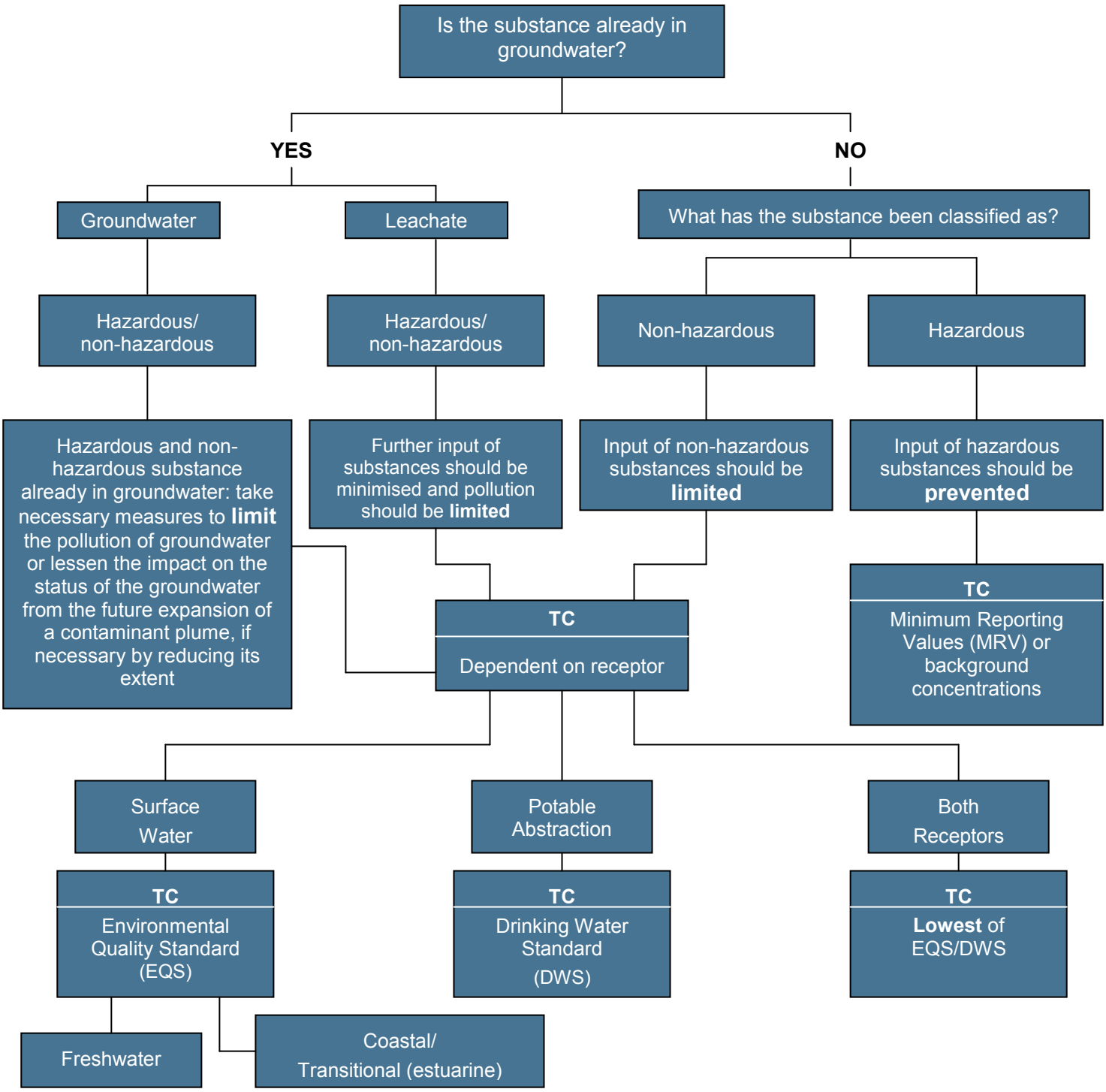
5f. Sum of benzo(b)fluoranthene and benzo(k)fluoranthene

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 L
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	• 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	• Phenols	2	0.4
2f	• 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 M
COMPARISON OF LABORATORY DATA TO GAC

312954 - Harwell Innovation Centre - Human Health Risk Assessment Soil Results Summary Table and Direct Comparison

Sample Identity		Industrial/Commercial Screening Value (1% SOM)	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07
Depth		**GACs**	**3.50**	**1.80**	**0.50**	**0.40**	**0.50**	**4.30**	**0.20**	**0.60**	**0.50**	**0.50**	**0.20**
Strata													
Determinants	**Units**												
Visual Fibre Screen				NAD	NAD	NAD	NAD		NAD	NAD	NAD		NAD
pH	pH		8.23	8.4	7.89	9.36	8.28	8.55	7.48	7.93	8.33	8.74	7.88
Sulphate BRE (water sol 2:1)	mg/l		94	63		327	73	33				145	
Phenols - Total by HPLC	mg/kg	440		<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2		<0.2
Total Organic Carbon	% w/w			1.32	0.4	1.75	2.43		2.67	0.48	1.69		3.04
Metals													
Arsenic	mg/kg	640		10	12	12	11		12	14	25		11
Cadmium	mg/kg	410		<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<0.5
Copper	mg/kg	68000		16	8	14	22		12	10	16		15
Chromium	mg/kg	8600		29	21	19	27		21	30	21		26
Chromium (hexavalent)	mg/kg	49		<1	<1	<1	<1		<1	<1	<1		<1
Lead	mg/kg	2300		20	10	15	67		38	13	20		35
Mercury	mg/kg	1120		0.2	<0.17	0.21	0.18		<0.17	<0.17	0.2		<0.17
Nickel	mg/kg	1000		27	23	20	26		17	30	23		20
Selenium	mg/kg	12000		<1	<1	<1	1		<1	<1	<1		<1
Zinc	mg/kg	740000		58	37	55	62		48	44	65		57
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)													
Ali >C5-C6	mg/kg	3200		<0.03	<0.03	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03
Ali >C6-C8	mg/kg	7800		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Ali >C8-C10	mg/kg	2000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Ali >C10-C12	mg/kg	22900		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C12-C16	mg/kg	82000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C16-C21	mg/kg	Assess as sum below		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C21-C35	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C16-C35	mg/kg	1000000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Total Aliphatics	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C5-C7	mg/kg			<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C7-C8	mg/kg			<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C8-C9	mg/kg	18000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C9-C10	mg/kg	8100		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C10-C12	mg/kg	28000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C12-C16	mg/kg	37000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C16-C21	mg/kg	28000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C21-C35	mg/kg	28000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Total Aromatics	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
TPH (Ali & Aro)	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
BTEX - Benzene	mg/kg	27		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - Toluene	mg/kg	56000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - Ethyl Benzene	mg/kg	6000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - m & p Xylene	mg/kg	5900		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - o Xylene	mg/kg	6600		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
MTBE	mg/kg	67000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
PAHs (Polycyclic Aromatic Hydrocarbons)													
Acenapthene	mg/kg	110000		<0.01	<0.01	0.02	<0.01		<0.01	<0.01	<0.01		<0.01
Acenapthylene	mg/kg	110000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Anthracene	mg/kg	520000		<0.02	<0.02	0.05	<0.02		<0.02	<0.02	0.03		<0.02
Benzo(a)anthracene	mg/kg	170		0.06	<0.04	0.15	<0.04		<0.04	<0.04	0.13		0.11
Benzo(a)pyrene	mg/kg	77		0.05	<0.04	0.12	<0.04		0.1	<0.04	0.13		0.14
Benzo(b)fluoranthene	mg/kg	44		<0.05	<0.05	0.22	<0.05		0.12	<0.05	0.22		0.15
Benzo(ghi)perylene	mg/kg	3900		<0.05	<0.05	0.1	<0.05		<0.05	<0.05	0.08		0.08
Benzo(k)fluoranthene	mg/kg	1200		<0.07	<0.07	0.12	<0.07		0.07	<0.07	0.13		0.1
Chrysene	mg/kg	350		0.1	<0.06	0.22	<0.06		0.1	0.06	0.22		0.18
Dibenzo(ah)anthracene	mg/kg	3.5		<0.04	<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04
Fluoranthene	mg/kg	23000		0.19	<0.08	0.5	<0.08		0.1	0.08	0.42		0.32
Fluorene	mg/kg	63000		<0.01	<0.01	0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Indeno(123-cd)pyrene	mg/kg	500		<0.03	<0.03	0.09	<0.03		<0.03	<0.03	0.08		0.05
Napthalene	mg/kg	1800		<0.03	<0.03	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03
Phenanthrene	mg/kg	22000		0.06	<0.03	0.2	<0.03		<0.03	<0.03	0.12		0.05
Pyrene	mg/kg	54000		0.15	<0.07	0.33	<0.07		0.09	0.08	0.32		0.26

= Exceedence of GAC for an industrial/commercial end-use

All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and LQM/CIEH Generic Assessment Criteria

Sample Identity		Tier 2 Target Concentration (LTC2)					WS1	WS2
Depth								
		Environmental Quality Standard or Best Equivalent						
Strata		Freshwater EQS	UK/EC DWS	WHO DWS	Dutch Intervention Value	US Regional Screening Levels (RSLs) - Tapwater		
Determinants	**Units**							
pH	pH		6.5-9.5				7.24	7.3
Hardness	mg/l Ca CO3						320	816
Metals								
Arsenic (dissolved)	µg/l		10				<1	2
Cadmium (dissolved)	µg/l		5				<0.2	<0.2
Calcium	mg/l						117	271
Copper (dissolved)	µg/l		2000				<1	<1
Chromium (dissolved) (III + VI)	µg/l		50				<1	<1
Chromium (dissolved) (VI)	mg/l		0.05				<0.05	<0.05
Lead (dissolved)	µg/l		25				<1	<1
Mercury (dissolved)	µg/l		1				<0.1	<0.1
Nickel (dissolved)	µg/l		20				<1	10
Selenium (dissolved)	µg/l		10				<1	<1
Zinc (dissolved)	µg/l		3000				1	1
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)								
BTEX - Benzene	µg/l		1				<1	<1
BTEX - Ethyl Benzene	µg/l			300			<1	<1
BTEX - Toluene	µg/l			700			<1	<1
BTEX - m & p Xylene	µg/l						<1	<1
BTEX - o Xylene	µg/l						<1	<1
Sum of xylenes	µg/l			500			<1	<1
MTBE	µg/l				9200		<1	<1
Ali >C5-C6	µg/l		10				<1	<1
Ali >C6-C8	µg/l		10				<1	<1
Ali >C8-C10	µg/l		10				<1	<1
Ali >C10-C12	µg/l		10				<10	<5
Ali >C12-C16	µg/l		10				<10	<5
Ali >C16-C21	µg/l		10				<10	<5
Ali >C21-C35	µg/l		10				<10	<5
Total Aliphatics	µg/l						<10	<5
Aro >C5-C7	µg/l		10				<1	<1
Aro >C7-C8	µg/l		10				<1	<1
Aro >C8-C9	µg/l		10				<1	<1
Aro >C9-C10	µg/l		10				<1	<1
Aro >C10-C12	µg/l		10				<10	<5
Aro >C12-C16	µg/l		10				<10	<5
Aro >C16-C21	µg/l		10				<10	<5
Aro >C21-C35	µg/l		10				<10	<5
Total Aromatics	µg/l						<10	<5
TPH (Ali & Aro)	µg/l						<10	<5
PAHs (Polycyclic Aromatic Hydrocarbons)								
Acenapthene	µg/l					2200	<0.01	0.03
Acenapthylene	µg/l	5.8					<0.01	<0.01
Anthracene	µg/l	0.1					<0.01	<0.01
Benzo(a)anthracene	µg/l				0.5		<0.01	<0.01
Benzo(a)pyrene	µg/l		0.01				<0.01	<0.01
Benzo(b)fluoranthene	µg/l		Sum				<0.01	<0.01
Benzo(ghi)perylene	µg/l		Sum				<0.01	<0.01
Benzo(k)fluoranthene	µg/l		Sum				<0.01	<0.01
Chrysene	µg/l				0.2		<0.01	<0.01
Dibenzo(ah)anthracene	µg/l	0.01					<0.01	<0.01
Fluoranthene	µg/l					1500	<0.01	<0.01
Fluorene	µg/l					240	<0.01	<0.01
Indeno(123-cd)pyrene	µg/l		Sum				<0.01	<0.01
Naphthalene	µg/l	2.4					<0.01	<0.01
Phenanthrene	µg/l				5		<0.01	<0.01
Pyrene	µg/l					1100	<0.01	<0.01
Sum of Benzo(b) and Benzo(k)fluroanthene	µg/l	0.03					<0.01	<0.01
Sum of benzo(ghi)perylene and indeno(1,2,3-cd)pyrene and Benzo(k)fluroanthene	µg/l	0.002					<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

= exceedance of Tier 2 target concentrations

* = Total PAH EQS (0.1) assessed via comparsion 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 N
CERTIFICATES OF GEOTECHNICAL ANALYSIS

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 745985R.01(00) 1774

Date 23-October-2015 Contract Wilien Road, Newport Pagnell

Client RSK Environment Limited
Address Abbey Park
Humber Road
Coventry
CV3 4AQ

For the Attention of Michael Lawson

Samples submitted by client	06-October-2015	Client Reference	313114
Testing Started	06-October-2015	Client Order No.	None
Testing Completed	13-October-2015	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests

1.01	Moisture Content (oven drying method) BS1377:Part 2:1990:clause 3.2 (superseded)*
1.03	Liquid Limit (one point method) & Plastic Limit BS1377:Part 2:1990,clause 4.4/5.3
1.10	Particle Size Distribution wet sieve method BS1377:Part 2:1990,clause 9.2
3.04	Dry density/moisture content relationship 4.5kg rammer method BS1377:Part 4:1990 clause 3.6

NON UKAS Accredited Tests

1.13	Particle Size Distribution sedimentation hydrometer method BS1377:Part 2: 1990,clause 9.5

* 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 1a Princess Street Bedminster Bristol BS3 4AG Tel.0117 9471000 Fax.0117 9471004 e-mail justin.barrett@soils.co.uk

TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with Structural Soils Ltd Laboratory Quality Assurance Manual, Issue 6, January 2010 all results sheets and summaries of results issued by the laboratory are checked by an approved signatory. This check will also involve checking of at least 10% of calculations for each test type to ensure that data has been correctly entered into the computer and calculated. 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 Assurance Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **20/10/2015 10:00:57**.

Testing reported after this date is not covered by this Verification Certificate.

[redacted]

Approved Signatory
Justin Barrett (Laboratory Manager)

STRUCTURAL SOILS 1a Princess Street Bedminster Bristol BS3 4AG	Contract: **Willen Road, Newport Pagnell**	Job No: **745985**	AGS

SUMMARY OF MOISTURE CONTENT TESTS

In accordance with clause 3.2 of BS1377:Part 2

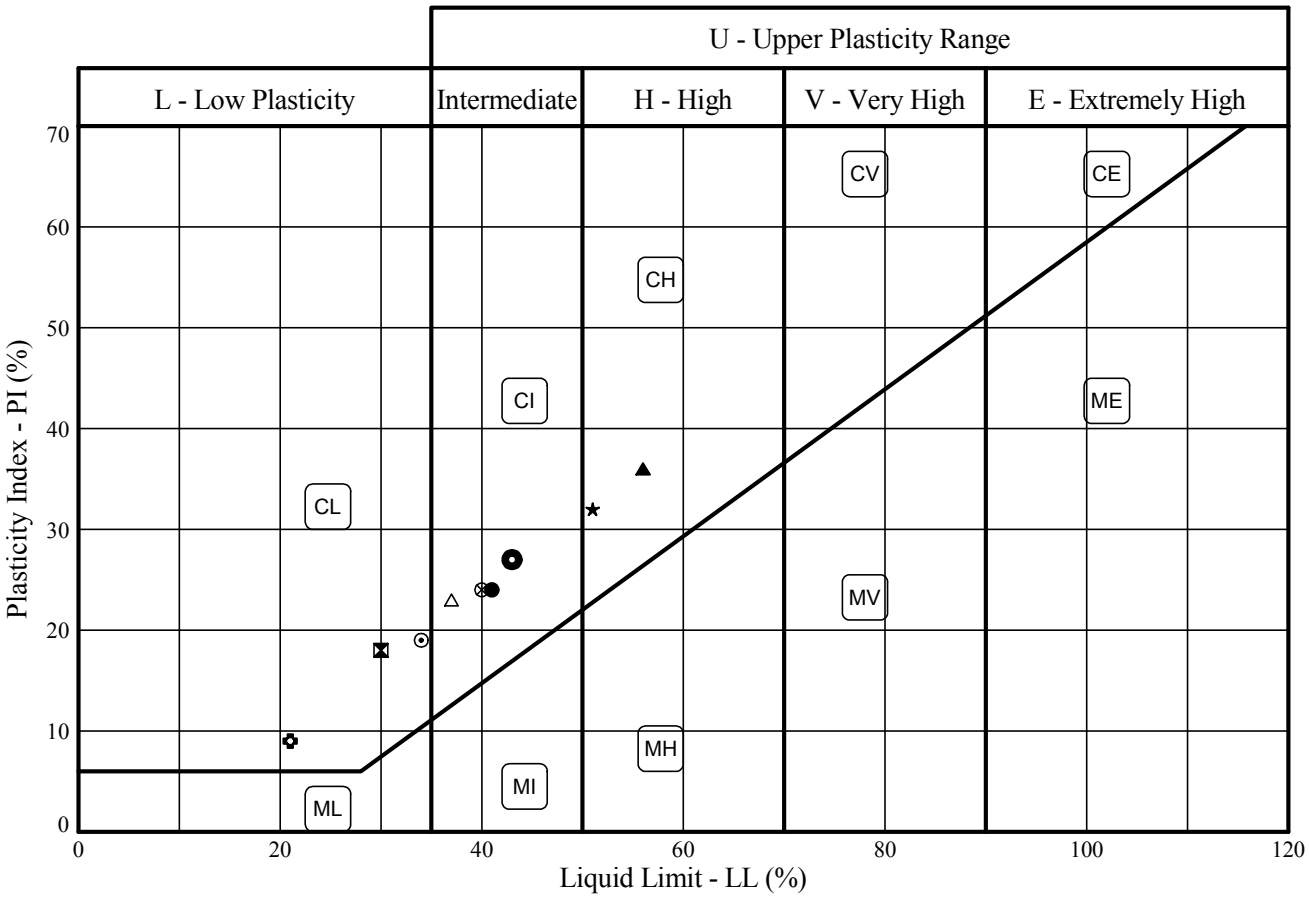
Exploratory Position ID	Sample Ref	Depth (m)	Sample Type	Moisture Content (%)
WS05		**2.10**	**D**	**29**

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

STRUCTURAL SOIL 1a Princess Street Bedminster Bristol BS3 4AG	[redacted] ompiled By	**ALAN FROST**	Date **13/10/15**
	Contract: **Willen Road, Newport Pagnell**		Contract Ref: **745985**

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC %	LL %	PL %	PI %	<425um %	
	Exploratory Position ID	Sample	Depth (m)								
●	TP01	LB	2.00	3.2/4.4/5.3/5.4	4.2.4	18	41	17	24	67	
⊠	TP02	B	3.00	3.2/4.4/5.3/5.4	4.2.4	11	30	12	18	27	
▲	TP04	D	3.00	3.2/4.4/5.3/5.4	4.2.3	46	56	20	36	89	
★	TP06	LB	1.90	3.2/4.4/5.3/5.4	4.2.4	23	51	19	32	54	
⊙	TP08	B	1.50	3.2/4.4/5.3/5.4	4.2.4	12	34	15	19	40	
✿	WS02	D	4.30	3.2/4.4/5.3/5.4	4.2.4	12	21	12	9	79	*
●	WS04	D	4.10	3.2/4.4/5.3/5.4	4.2.3	20	43	16	27	74	
△	WS05	D	1.50	3.2/4.4/5.3/5.4	4.2.4	17	37	14	23	51	
⊗	WS05	D	3.30	3.2/4.4/5.3/5.4	4.2.3	18	40	16	24	100	

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.

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

STRUCTURAL SOILS
1a Princess Street
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Bristol
BS3 4AG

Compiled By		Date
[redacted]	ALAN FROST	13/10/15

Con

Willen Road, Newport Pagnell

Contract Ref:

745985

AGS

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
TP01		LB	2.00	18	41	17	24	67	Brown mottled grey clayey very gravelly SAND
TP02		B	3.00	11	30	12	18	27	Orangish brown clayey SAND and GRAVEL
TP04		D	3.00	46	56	20	36	89	Orangish brown slightly sandy slightly gravelly CLAY
TP06		LB	1.90	23	51	19	32	54	Brown slightly gravelly slightly sandy CLAY
TP08		B	1.50	12	34	15	19	40	Dark brown clayey very sandy GRAVEL
WS02		D	4.30	12	21	12	9	79	Brown mottled grey slightly gravelly sandy CLAY
WS04		D	4.10	20	43	16	27	74	Dark greyish brown slightly sandy slightly gravelly CLAY
WS05		D	1.50	17	37	14	23	51	Grey slightly sandy slightly gravelly CLAY

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
WS05		D	2.10	29					Dark grey slightly sandy slightly gravelly CLAY
WS05		D	3.30	18	40	16	24	100	Dark greyish brown slightly sandy CLAY

STRUCTURAL SOILS LTD

Contract:

Willen Road, Newport Pagnell

Contract Ref:

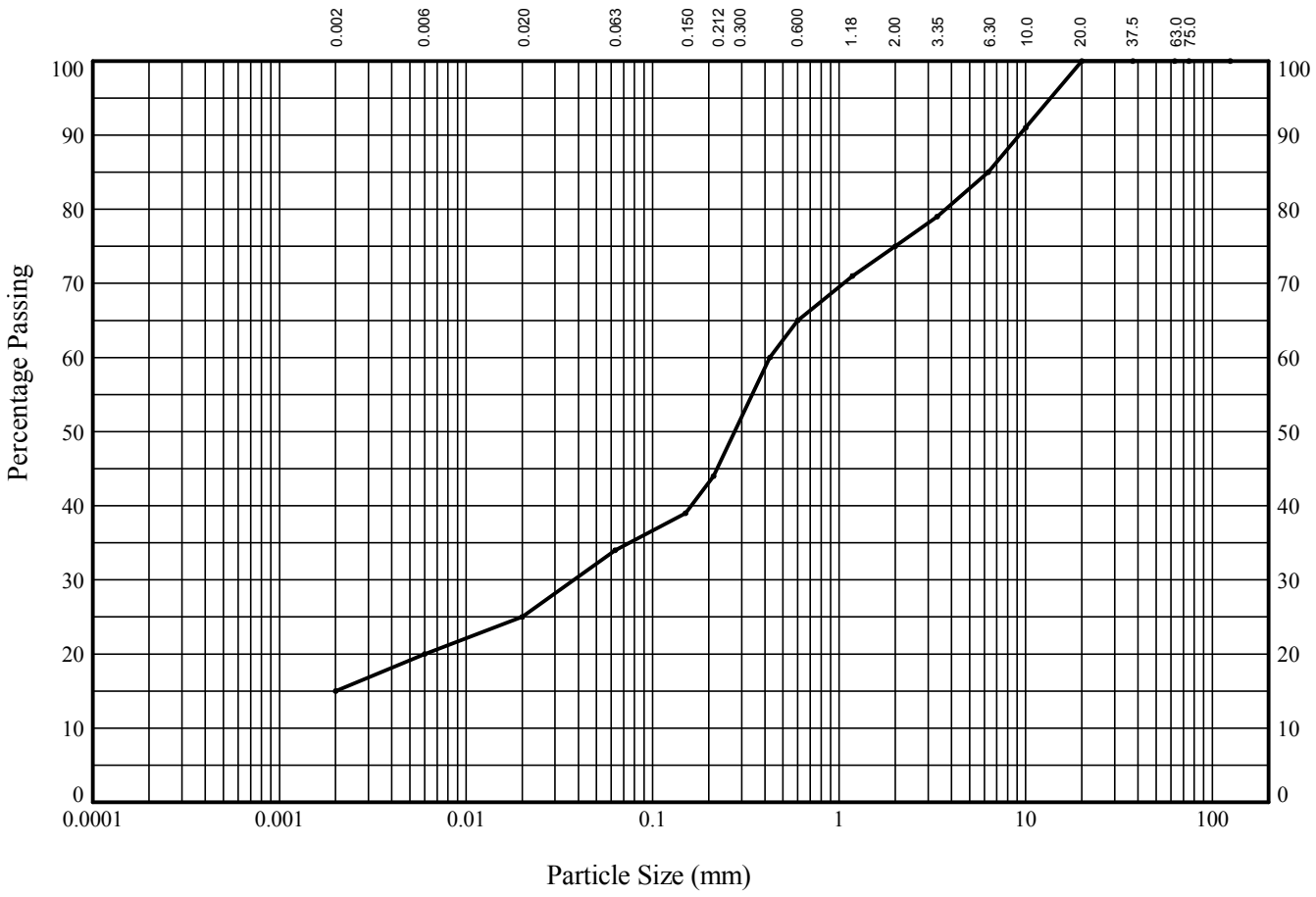
745985

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit: **TP01** Sample Ref: Sample Type: **LB** Depth (m): **2.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	91
6.30	85
3.35	79
2.00	75
1.18	71
0.600	65
0.425	60
0.212	44
0.150	39
0.063	34

Particle Diameter	Percentage Passing
0.02	**25**
0.006	**20**
0.002	**15**

Soil Fraction	Sieve Percentage
GRAVEL	**25**
SAND	**41**
SILT	**19**
CLAY	**15**

Soil Description:
Brown mottled grey clayey very gravelly SAND

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

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[redacted] ompiled By | Date

ALAN FROST | 13/10/15

Contract: **Willen Road, Newport Pagnell**

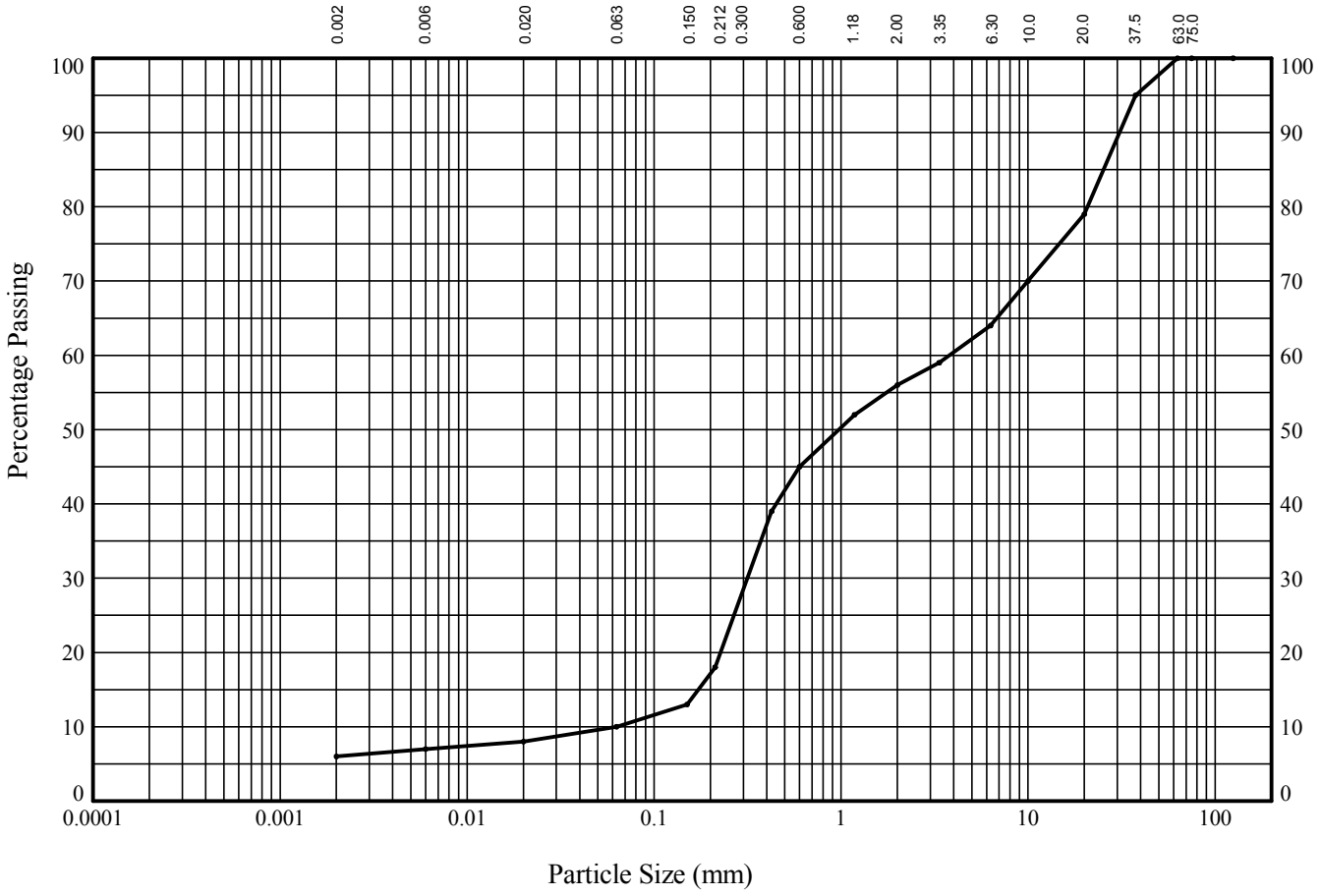
Contract Ref: **745985**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit: **TP02** Sample Ref: Sample Type: **B** Depth (m): **3.00**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	95
20.0	79
10.0	70
6.30	64
3.35	59
2.00	56
1.18	52
0.600	45
0.425	39
0.212	18
0.150	13
0.063	10

Particle Diameter	Percentage Passing
0.02	**8**
0.006	**7**
0.002	**6**

Soil Fraction	Sieve Percentage
GRAVEL	**44**
SAND	**46**
SILT	**4**
CLAY	**6**

Soil Description:
Orangish brown clayey SAND and GRAVEL

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

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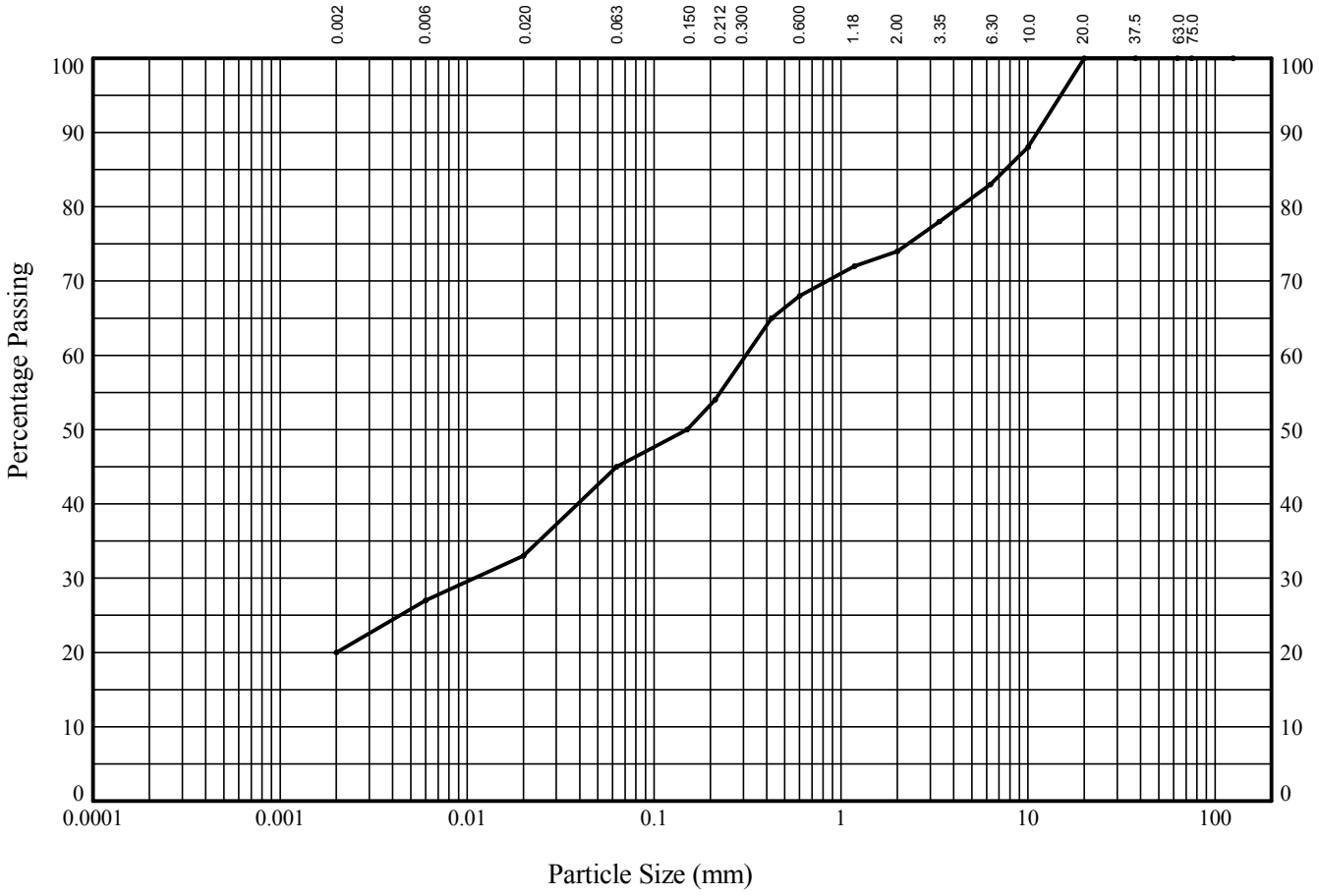
Contract: **Willen Road, Newport Pagnell**

Contract Ref: **745985**

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit: **TP06** Sample Ref: Sample Type: **LB** Depth (m): **1.90**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	100
20.0	100
10.0	88
6.30	83
3.35	78
2.00	74
1.18	72
0.600	68
0.425	65
0.212	54
0.150	50
0.063	45

Particle Diameter	Percentage Passing
0.02	**33**
0.006	**27**
0.002	**20**

Soil Fraction	Sieve Percentage
GRAVEL	**26**
SAND	**29**
SILT	**25**
CLAY	**20**

Soil Description:
Brown slightly gravelly slightly sandy CLAY

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

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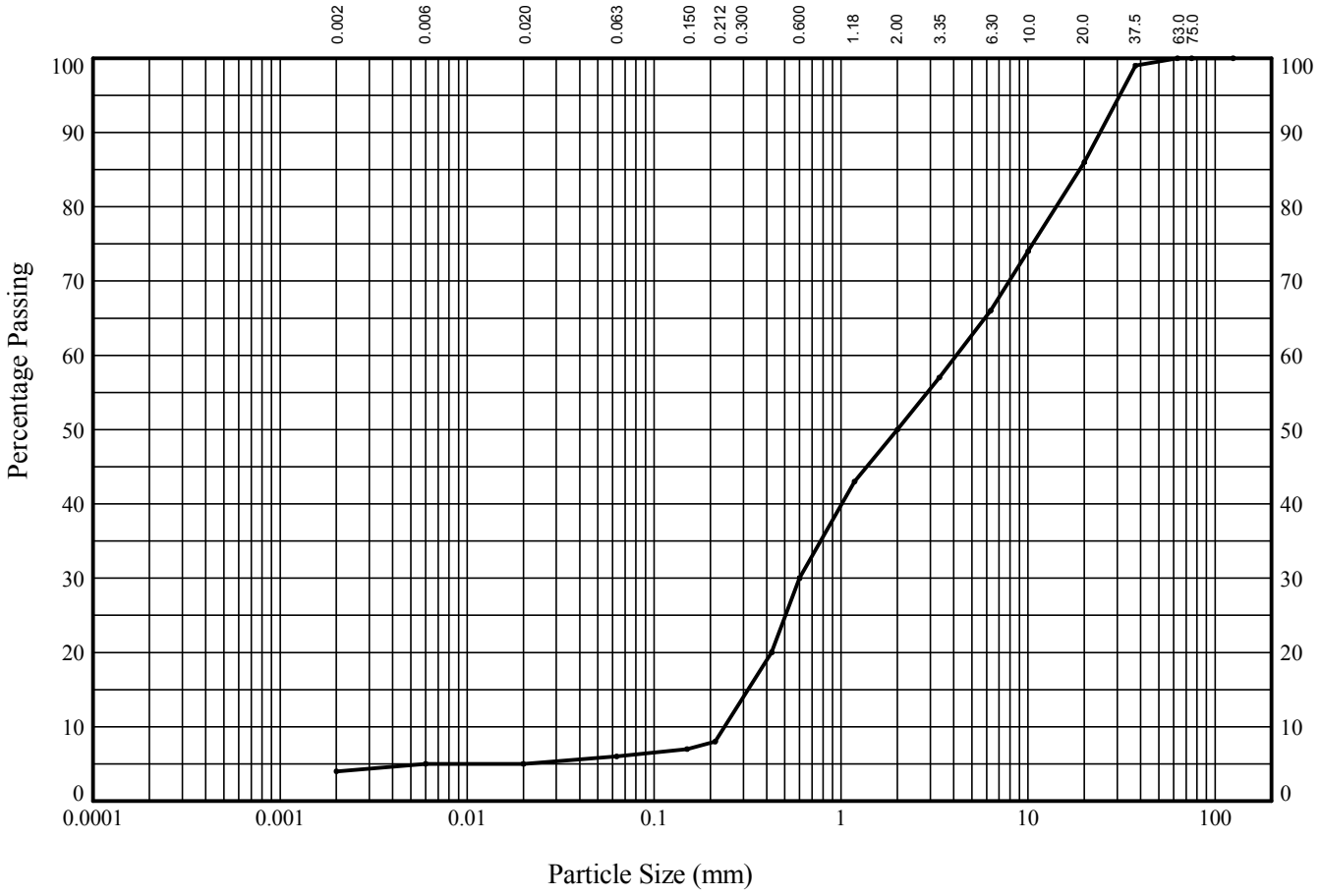
Compiled By	Date
ALAN FROST	**13/10/15**

Contract	Contract Ref:
Willen Road, Newport Pagnell	**745985**

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit: **TP07** Sample Ref: Sample Type: **B** Depth (m): **2.20**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	99
20.0	86
10.0	74
6.30	66
3.35	57
2.00	50
1.18	43
0.600	30
0.425	20
0.212	8
0.150	7
0.063	6

Particle Diameter	Percentage Passing
0.02	**5**
0.006	**5**
0.002	**4**

Soil Fraction	Sieve Percentage
GRAVEL	**50**
SAND	**44**
SILT	**2**
CLAY	**4**

Soil Description:
Light brown slightly clayey very sandy GRAVEL

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

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Bedminster
Bristol
BS3 4AG

Compiled By: [redacted] **ALAN FROST** Date: **13/10/15**

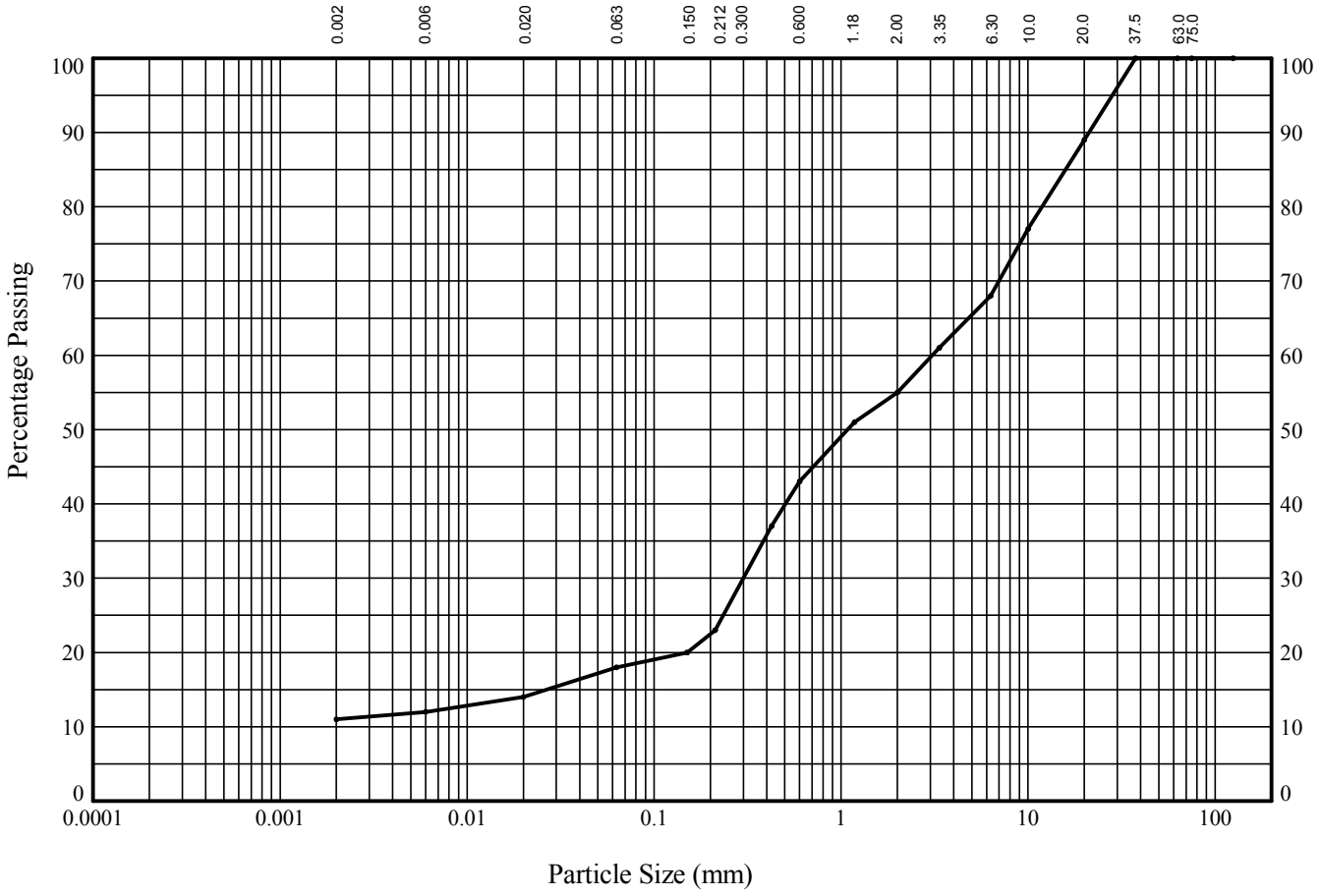
Contract: **Willen Road, Newport Pagnell**

Contract Ref: **745985**

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2,9.5 of BS1377:Part 2:1990

Trial Pit: **TP08** Sample Ref: Sample Type: **B** Depth (m): **1.50**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

BS Test Sieve (mm)	Percentage Passing
125.0	100
75.0	100
63.0	100
37.5	100
20.0	89
10.0	77
6.30	68
3.35	61
2.00	55
1.18	51
0.600	43
0.425	37
0.212	23
0.150	20
0.063	18

Particle Diameter	Percentage Passing
0.02	**14**
0.006	**12**
0.002	**11**

Soil Fraction	Sieve Percentage
GRAVEL	**45**
SAND	**37**
SILT	**7**
CLAY	**11**

Soil Description:
Dark brown clayey very sandy GRAVEL

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

STRUCTURAL SOILS
1a Princess Street
Bedminster
Bristol
BS3 4AG

Compiled By: [redacted] **ALAN FROST** Date: **13/10/15**

Contract: **Willen Road, Newport Pagnell**

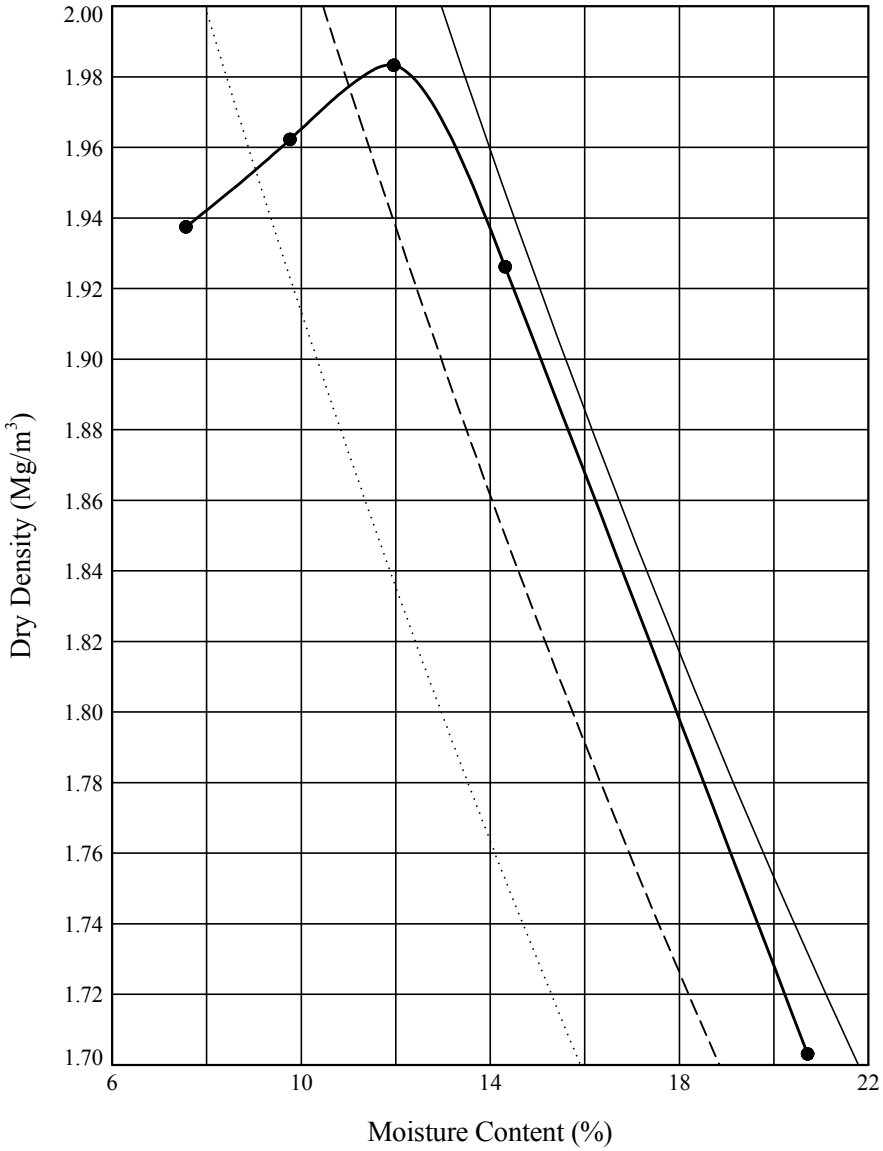
Contract Ref: **745985**

AGS

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: **TP01** Sample Ref: Sample Type: **LB** Depth (m): **2.00**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**21**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m³)	:	**1.98**
% Retained on 37.5mm BS Sieve	:	**3**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**12**
% Retained on 20.0mm BS Sieve	:	**4**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.70**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Brown mottled grey clayey very gravelly SAND	——— 0%	– – – – 5%	····· 10%

Approved Signatories: J.BARRETT A.FROST M.STOKES S.HANDCOCK S.PHILP J.SHALLCROSS M.STROWGER J.MAJOR

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BS3 4AG

Compiled By	Date
ALAN FROST	**13/10/15**

Contract	Contract Ref:
Willen Road, Newport Pagnell	**745985**

AGS

APPENDIX O
HAZWASTE TABLE

envirolab

Haswaste, developed by Dr. Iain Haslock.

Willen Road, Newport
Pagnell Ref: 313114

TP/WS/BH	WS02	WS04	WS06	TP01	TP02	TP04	TP05	TP07	
Depth (m)	1.80	0.50	0.40	0.50	0.20	0.60	0.50	0.20	
Envirolab reference	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/10	15/05909/12	15/05909/13	15/05909/15	
	mg/kg	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
% Moisture									
pH (soil)	8.40	7.89	9.36	8.28	7.48	7.93	8.33	7.88	
pH (leachate)									
Arsenic	10	12	12	11	12	14	25	11	
Cadmium	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
Copper	16	8	14	22	12	10	16	15	
CrVI or Chromium	1	1	1	1	1	1	1	1	
Lead	20	10	15	67	38	13	20	35	
Mercury	0.20	0.17	0.21	0.18	0.17	0.17	0.20	0.17	
Nickel	27	23	20	26	17	30	23	20	
Selenium	1	1	1	1	1	1	1	1	
Zinc	58	37	55	62	48	44	65	57	
Barium									
Beryllium									
Vanadium									
Cobalt									
Manganese									
Molybdenum									
PAH (Input Total PAH **OR** individual PAH results)									
Acenaphthene	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	
Acenaphthylene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Anthracene	0.02	0.02	0.05	0.02	0.02	0.02	0.03	0.02	
Benzo(a)anthracene	0.06	0.04	0.15	0.04	0.04	0.04	0.13	0.11	
Benzo(a)pyrene	0.05	0.04	0.12	0.04	0.10	0.04	0.13	0.14	
Benzo(b)fluoranthene	0.05	0.05	0.22	0.05	0.12	0.05	0.22	0.15	
Benzo(ghi)perylene	0.05	0.05	0.10	0.05	0.05	0.05	0.08	0.08	
Benzo(k)fluoranthene	0.07	0.07	0.12	0.07	0.07	0.07	0.13	0.10	
Chrysene	0.10	0.06	0.22	0.06	0.10	0.06	0.22	0.18	
Dibenzo(ah)anthracene	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
Fluoranthene	0.19	0.08	0.50	0.08	0.10	0.08	0.42	0.32	
Fluorene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Indeno(123cd)pyrene	0.03	0.03	0.09	0.03	0.03	0.03	0.08	0.05	
Naphthalene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Phenanthrene	0.06	0.03	0.20	0.03	0.03	0.03	0.12	0.05	
Pyrene	0.15	0.07	0.33	0.07	0.09	0.08	0.32	0.26	
Coronene									
Total PAHs (16 or 17)									
TPH									
Petrol									
Diesel									
Lube Oil									
White Spirit / Kerosene									
Creosote									
Unknown TPH with ID									
Unknown TPHCWG	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Total Sulphide									
Complex Cyanide									
Free (or Total) Cyanide									
Elemental/Free Sulphur									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.									
Phenol									
Cresols									
Xylenols									
Resourcinol									
Phenols Total by HPLC	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
BTEX Input Total BTEX **OR** individual BTEX results.									
Benzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Toluene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Ethylbenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Xylenes	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Total BTEX									
POPs									
PCBs Total (eg EC7/WHO12)									

envirolab

Haswaste, developed by Dr. Iain Haslock.

Willen Road, Newport
Pagnell Ref: 313114

TP/WS/BH	WS02	WS04	WS06	TP01	TP02	TP04	TP05	TP07	
Depth (m)	1.80	0.50	0.40	0.50	0.20	0.60	0.50	0.20	
Envirolab reference	15/05909/3	15/05909/5	15/05909/7	15/05909/8	15/05909/10	15/05909/12	15/05909/13	15/05909/15	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Asbestos in Soil	Thresholds								
Asbestos detected in Soil (enter Y or N)	Y	N	N	N	N	N	N	N	N	

Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7

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%	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 cannot use Asbestos % results when visual identifiable pieces are present.

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y								

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.

Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00134	0.00160	0.00160	0.00147	0.00160	0.00187	0.00332	0.00147	0.00000
Irritant HP4	≥20%	<1%	0.00552	0.00469	0.00417	0.00530	0.00348	0.00611	0.00476	0.00413	0.00000
Specifc Target Organ Toxicity HP5	≥10%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00002	0.00001	0.00003	0.00001	0.00001	0.00001	0.00003	0.00003	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00545	0.00465	0.00404	0.00525	0.00343	0.00606	0.00465	0.00404	0.00000
Specifc Target Organ Toxicity HP5	≥10%		0.00200	0.00100	0.00150	0.00670	0.00380	0.00130	0.00200	0.00350	0.00000
Aspiration Toxicity HP5	≥10%		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00134	0.00160	0.00161	0.00147	0.00160	0.00187	0.00332	0.00147	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00000
Acute Toxicity HP6	≥25%	<1%	0.00938	0.00664	0.00730	0.01453	0.00869	0.00858	0.00861	0.00937	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00009	0.00007	0.00010	0.00008	0.00008	0.00008	0.00010	0.00009	0.00000
Acute Toxicity HP6	≥3.5%	<0.1%	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00016	0.00000
Acute Toxicity HP6	≥22.5%	<1%	0.00749	0.00566	0.00563	0.01197	0.00726	0.00738	0.00672	0.00760	0.00000
Carcinogenic HP7	≥0.1%		0.00545	0.00465	0.00404	0.00670	0.00380	0.00606	0.00465	0.00404	0.00000
Carcinogenic HP7	≥1%		0.00001	0.00000	0.00002	0.00000	0.00000	0.00000	0.00001	0.00001	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		8.40	7.89	9.36	8.28	7.48	7.93	8.33	7.88	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		8.40	7.89	9.36	8.28	7.48	7.93	8.33	7.88	0.00
Toxic for Reproduction HP10	≥0.3%		0.00545	0.00465	0.00404	0.00670	0.00380	0.00606	0.00465	0.00404	0.00000
Toxic for Reproduction HP10	≥3%		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000
Mutagenic HP11	≥0.1%		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00545	0.00465	0.00404	0.00525	0.00343	0.00606	0.00465	0.00404	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00545	0.00465	0.00404	0.00525	0.00343	0.00606	0.00465	0.00404	0.00000
Ecotoxic HP14	≥1.0	<0.1%	0.07370	0.05329	0.06513	0.09682	0.06703	0.06561	0.08226	0.07385	0.00000
Ecotoxic HP14	≥25%	<0.1%	0.01845	0.01334	0.01632	0.02422	0.01678	0.01642	0.02059	0.01849	0.00000
Ecotoxic HP14	≥25%	<0.1%	0.01845	0.01335	0.01631	0.02423	0.01679	0.01643	0.02059	0.01849	0.00000
Ecotoxic HP14 individual substance specific thresholds	≥0.0025%		0.000006	0.000004	0.000015	0.000004	0.000004	0.000004	0.000013	0.000011	0.000000
Ecotoxic HP14 individual substance specific thresholds	≥0.025%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistant Organic Pollutant	>0.005%		0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000

APPENDIX F
EXPLORATORY HOLE RECORDS (2015 & 2017)

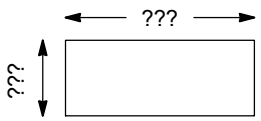
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP01**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487686.0 N:242153.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Soft light brown slightly gravelly sandy CLAY. Gravel is subrounded fine to coarse chalk with rare brick. (MIXED FILL - MADE GROUND)	(0.90)	
0.50	1	ES		≈			0.90	
						Soft brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse brick, flint and chalk and occasional rotten wood and metal wire with organic odour. (MIXED FILL - MADE GROUND)		
1.10	2	D						
2.00	3	B					(3.10)	
3.00	4	D						
							4.00	
						Brown SAND and GRAVEL. Gravel is angular to subangular fine to medium flint. (FELMERSHAM MEMBER)	4.10	
4.20		V	c_u=65			Firm brown silty CLAY. (PETERBOROUGH MEMBER)	(0.30)	
4.30	5	D					4.40	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit on West sidewall slightly unstable with minor collapsing.
3. Groundwater seepage encountered at 0.90m bgl.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

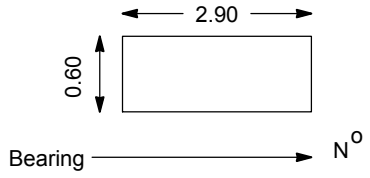
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP02**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487726.0 N:241995.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30)	
0.20	1	ES					0.30	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (OVERBURDEN FILL - MADE GROUND)		
1.00	2	D						
							(3.20)	
2.00	3	D						
3.00	4	B					3.50	
						Soft to firm initially brown dark grey CLAY with rare subrounded fine to medium chalk gravel. (GLACIAL DEPOSITS)		
3.60	5	D						
3.70		V	c_u=60				(0.50)	
3.90	6	D					4.00	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit became unstable from 1.60m bgl.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

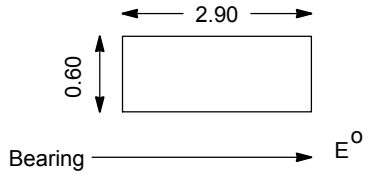
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP03**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487569.0 N:242139.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30)	
0.20	1	ES					0.30	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (OVERBURDEN FILL - MADE GROUND)	(1.30)	
1.30	2	D					1.60	
						Brown clayey SAND and GRAVEL. Gravel is subrounded fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(0.60)	
2.10	3	D					2.20	
						Orange brown slightly clayey SAND and GRAVEL. Gravel is subrounded fine to medium occasionally coarse flint. (FELMERSHAM MEMBER)	(0.60)	
							2.80	
						Firm dark gravelly CLAY. Gravel is subrounded to rounded fine to coarse chalk and flint. (GLACIAL DEPOSITS)	(0.40)	
3.00	4	D						
3.10		V	c_u=80				3.20	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit became unstable from 1.60m bgl and terminated due to collapsing.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

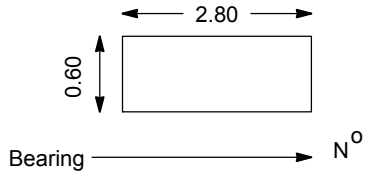
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP04**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487567.0 N:242270.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.60	1	ES				Firm brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MIXED FILL - MADE GROUND)	(0.60) 0.90	
1.10	2	D				Firm becoming soft grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse brick, flint and chalk. (ORGANIC CLAY - MADE GROUND)	(1.10) 2.00	
1.50		V	c_u=60					
1.80	3	D		1		Very soft orange brown silty CLAY. (QUARRY TAILINGS - MADE GROUND)	(1.30) 3.30	
3.00	4	D						
3.00		V	c_u=10					
						Orange brown fine to coarse GRAVEL of subrounded to rounded flint. (FELMERSHAM MEMBER)	3.40	
3.50	5	D				Firm dark grey brown mottled brown CLAY. (PETERBOROUGH MEMBER)	3.60	
3.50		V	c_u=80					

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater encountered at 2.10m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

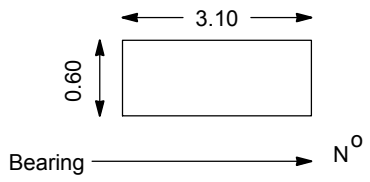
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP05**

Contract Ref:	Start: **07.09.15**	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	End: **07.09.15**	**---**	**E:487419.0 N:242292.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.50	1	ES				Firm grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MIXED FILL - MADE GROUND)	(1.40) 1.70	
2.00 2.00	2	D V	c_u=45			Soft to firm organic dark grey slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse chalk and flint. (MIXED FILL - MADE GROUND)	(0.70) 2.40	
						Firm orange brown slightly gravelly sandy CLAY. Gravel is subrounded to rounded fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	2.50	
2.70 2.70	3	D V	c_u=0	1		Very soft orange brown silty CLAY. (QUARRY TAILINGS - MADE GROUND)	(0.40) 2.90	
3.00 3.00	4	D V	c_u=75			Firm dark grey gravely CLAY. Gravel is subrounded fine to coarse chalk. (GLACIAL DEPOSITS)	3.10	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater encountered at 2.70m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

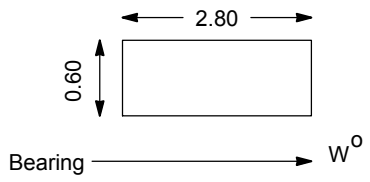
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP06**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487454.0 N:242439.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.50	1	ES				Firm grey brown gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk and flint. (MIXED FILL - MADE GROUND)	(1.20) 1.50	
1.10	2	D						
1.90	3	D				Soft to firm organic dark grey slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse chalk and flint. With occasional brick and concrete. (OVERBURDEN FILL - MADE GROUND)	(1.00)	
						. . . concrete obstruction at west end of pit at 2.20m and 2.40m bgl.	2.50	
2.40	4	D				Orange brown SAND and GRAVEL. Gravel is subrounded fine to coarse flint. (FELMERSHAM MEMBER)	2.70	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

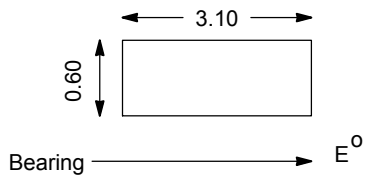
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP07**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487554.0 N:242476.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.50) 0.50	
1.00	2	D				Firm brown becoming dark grey mottled white gravelly CLAY. Gravel is subangular to subrounded fine to coarse brick and chalk. (MIXED FILL - MADE GROUND)	(1.20) 1.70	
2.20	3	B		▼1		Brown SAND and GRAVEL. Gravel is subangular to subrounded fine to medium occasionally coarse flint. (FELMERSHAM MEMBER)	(1.10) 2.80	
2.90 2.90	4	D V	c_u=70			Firm grey brown silty CLAY. (PETERBOROUGH MEMBER)	3.00	

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit becoming unstable from 1.70m bgl causing major collapses.
3. Groundwater encountered at 2.80m bgl with low flow.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

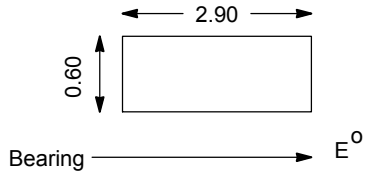
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP08**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**07.09.15** End: **07.09.15**	**---**	**E:487645.0 N:242417.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown fine to coarse SAND with rootlets. (TOPSOIL)	(0.30) 0.30	
0.60	1	ES				Firm to stiff brown mottled grey brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded flint and occasional chalk and brick. (MIXED FILL - MADE GROUND)	(1.00) 1.30	
1.50	2	B				Light brown slightly clayey SAND and GRAVEL. Gravel is subangular fine to coarse flint. (FELMERSHAM MEMBER)	(0.60) 1.90	
2.00	3	D				Firm dark grey brown slightly sandy silty CLAY. (PETERBOROUGH MEMBER)	(0.30) 2.20	
2.10		V	c_u=60					
2.50	4	D				Firm dark grey silty CLAY. (PETERBOROUGH MEMBER)	(0.50) 2.70	
2.60		V	c_u=80					

Plan (Not to Scale)



General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground.
2. Trial pit reamin stable during excavation.
3. Groundwater not encountered.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**MLawson**	

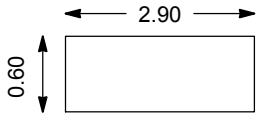
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP101**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17** End: **27.03.17**	**58.89**	**E:487390.1 N:242403.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark grey very sandy gravelly CLAY. Gravel of subrounded fine to medium flint and rare brick fragments. (AGRICULTURAL TOPSOIL)	(0.45)	
0.30	1	D					0.45	
0.45-0.50	2	ES				Orange brown very gravelly clayey SAND. Gravel is subrounded to subangular fine to coarse flint and occasional quartzite. (OVERBURDEN FILL - MADE GROUND)	0.70	
0.50-0.70	3	B				Black dark grey very sandy very gravelly CLAY. Sand is fine. Gravel is subrounded to angular fine to coarse flint and brick fragments. (MIXED FILL - MADE GROUND)	(1.50)	
0.90	4	ES						
1.40	5	D						
2.10	6	D					2.20	
2.30	7	D				Orange brown very sandy very gravelly CLAY. Sand is fine to medium. Gravel is subangular to angular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(1.30)	
2.50	8	B						
3.30	9	D					3.50	
3.50	10	D				Stiff blue grey sandy gravelly silty CLAY. Gravel is angular to subrounded fine to coarse shell fragments. (PETERBOROUGH MEMBER)	(0.40)	
3.70		V	c_u=98/92/94				3.90	
3.90	11	D				Dark grey fine clayey SAND. (PETERBOROUGH MEMBER)	4.00	
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable at 0.60m bgl.
3. Groundwater seepage encounted at 0.50m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

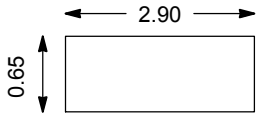
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP102**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17** End: **27.03.17**	**59.57**	**E:487324.0 N:242283.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown slightly gravelly very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.50)	
0.30	1	ES					0.50	
						Firm brown grey red brown sandy gravelly silty CLAY. Gravel is subrounded to angular fine to coarse flint and quartzite. Localised black mottling in middle of pit.		
0.70	2	D					(0.70)	
0.80		V	c_u=67/62/58					
							1.20	
						Orange brown clayey SAND AND GRAVEL. Sand is medium to coarse. Gravel is subrounded to angular flint and quartzite. (FELMERSHAM MEMBER)	(0.40)	
1.40-1.50	3	B					1.60	
						Orange brown slightly gravelly SAND. Sand is medium. Gravel is subrounded to angular fine to coarse flint and quartzite with pockets of light grey clay. (FELMERSHAM MEMBER)		
1.70	4	D				. . . from 2.00m bgl sand is medium to coarse.	(0.70)	
							2.30	
2.30	5	B				Trial pit terminated at 2.30m bgl due to collapse of side walls from 1.40m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated encountered instability from 1.40m bgl.
3. Groundwater seepage encounted at 1.40m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

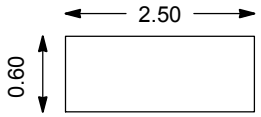
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP103**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17**	**59.39**	**E:487365.0 N:242293.9**	**1** of **1**
	End: **27.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very sandy slightly gravelly CLAY. Sand is medium. Gravel of subrounded fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.35)	
							0.35	
0.40	1	ES				Soft orange brown very sandy very gravelly CLAY. Sand is medium. Gravel is rounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)		
0.50	2	D					(0.75)	
							1.10	
1.10	3	ES				Soft dark grey mottled black/orange brown sandy very gravelly CLAY. Gravel is subangular to subrounded flint, tile, rare wood, brick fragments, cobble of brick, concrete and metal with an organic/rotten odour. (ORGANIC CLAY - MADE GROUND)		
1.20	4	B						
1.50		V	c_u=32/30					
				2			(2.00)	
2.60	5	D				. . . becoming orange brown and very sandy from 2.60m bgl.		
							3.10	
3.10	6	B				Orange brown clayey SAND AND GRAVEL. Sand is medium. Gravel is subrounded to angular fine to coarse flint and rare quartzite. (FELMERSHAM MEMBER)	(0.80)	
							3.90	
						Trial pit terminated at 3.90m bgl due to pit collapse from 1.80m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated encountered instability/collapse from 1.80m bgl.
3. Groundwater seepage encounted at 0.35m bgl and water strike at 2.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

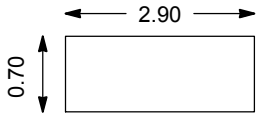
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP104**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17** End: **28.03.17**	**59.22**	**E:487397.0 N:242332.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very sandy slightly gravelly CLAY. Sand is medium. Gravel of subrounded fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.30)	
0.30	1	B					0.30	
						Soft orange brown very sandy very gravelly CLAY. Gravel is rounded to subangular fine to coarse flint and quartzite.	0.50	
0.50	2	D				Very soft to soft dark black grey sandy very gravely CLAY with a high cobble content. Gravel is angular to subrounded fine to coarse brick, flint, wood, wire and concrete. Cobble of concrete and brick. Organic matter and rotten smell. (ORGANIC CLAY - MADE GROUND)		
0.60	3	ES						
0.80-1.40	4	B						
0.80-1.40	5	D					(2.10)	
							2.60	
2.60-3.30	6	B				Very soft orange brown slightly gravelly sandy silty CLAY. Sand is medium to coarse. Gravel is rounded to subangular fine to coarse flint and quartzite. Very friable lithorelicts inclusions of blue grey clay in places. (QUARRY TAILINGS - MADE GROUND)		
2.60-3.30	7	D						
							(1.00)	
							3.60	
3.60-3.80	8	B				Firm to stiff blue grey silty CLAY. with very occasional shells. (PETERBOROUGH MEMBER)		
3.60-3.80	9	D						
3.60		V	c_u=90/68/88	▼			(0.40)	
						. . . at 3.90m bgl very friable and soft.		
							4.00	
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, collapse between 0.50m and 2.60m bgl.
3. Groundwater seepage encounted at 0.50m bgl and 3.90m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

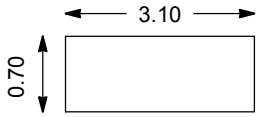
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP105**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17** End: **27.03.17**	**59.14**	**E:487461.0 N:242410.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
0.30	1	ES						
0.50-1.20	2	B				Soft to firm light grey mottled occasional orange brown very gravelly sandy CLAY. Gravel of angular to subangular fine to coarse flint, chalk, brick fragments, cobbles of brick, concrete and bituminous hardstanding. (MIXED FILL - MADE GROUND)		
0.50-1.20	3	D						
0.90	4	ES					(1.20) 1.60	
1.60-2.50	5	B				Cream white silty clayey GRAVEL. Gravel of subrounded to rounded fine to coarse chalk. Occasional cobble chalk. (OTHER MADE GROUND) (MADE GROUND)		
1.60-2.50	6	D					(0.90) 2.50	
2.50-3.70	7	B				Orange brown silty slightly gravelly SAND. Sand is fine occasionally medium. Gravel is subrounded to subangular fine to coarse flint and rare quartzite. (OVERBURDEN FILL - MADE GROUND)		
2.50-3.70	8	D					(1.20) 3.70	
3.70-4.00	10	D				Stiff blue grey sandy CLAY with frequent shells. (PETERBOROUGH MEMBER)		
3.70-4.00	9	B					(0.30) 4.00	
3.70		V	c_u=98/100/92					
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable and collapsing at 0.20m bgl.
3. Groundwater not encounted.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

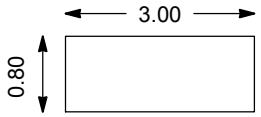
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP106**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17**	**58.87**	**E:487487.1 N:242442.0**	**1** of **1**
	End: **27.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
0.50	1	D				Orange brown mottled light grey clayey gravelly SAND. Sand is fine to medium. Gravel of angular to subangular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	0.60	
0.60-0.70	2	D						
0.60		V	c_u=62/58			Soft to firm brown sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse chalk and rare flint.	0.80	
0.90	3	ES				Firm dark grey black very gravelly sandy CLAY. Sand is fine. Gravel is subangular to angular fine to coarse flint, brick fragments, concrete, cobble sized brick, rare wood and concrete block. (ORGANIC CLAY/MIXED FILL - MADE GROUND)	(0.50) 1.30	
0.90-1.00	4	D						
						Orange brown very gravelly clayey SAND. Sand is medium. Gravel of angular to subangular fine to coarse flint and rare quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.90) 2.20	
1.90	5	B						
						Soft to firm dark grey sandy gravelly silty CLAY. Gravel of subrounded to rounded fine to medium chalk and occasional flint. (GLACIOLACUSTRINE DEPOSITS)	(1.60) 3.80	
2.40		V	c_u=44/39/64					
2.50	6	D						
3.00	7	D						
3.00		V	c_u=24/48/52					
3.80-3.90	8	D				Dark grey clayey silty SAND. (KELLAWAYS FORMATION)	4.00	
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated.
3. Groundwater not encounted.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

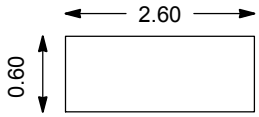
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP107**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**27.03.17** End: **27.03.17**	**59.34**	**E:487403.1 N:242261.9**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20-0.40	1	ES				Dark brown very sandy slightly gravelly CLAY. Sand is medium. Gravel is subrounded fine to medium flint. (AGRICULTURAL TOPSOIL) (MADE GROUND)	(0.40) 0.40	
0.60	2	D				Orange brown very sandy very gravelly CLAY. Sand is medium. Gravel is rounded to subangular fine to coase flitn and rare quartzite. Localised black mottling. (OVERBURDEN FILL - MADE GROUND) (MADE GROUND)	(0.45) 0.85	
1.60	3	D				Dark grey mottled black/orange brown very gravelly sandy CLAY. Gravel of subangular tyo subrounded flint, tile, rare wood, brick fragments, cobble of brick, concrete and metal. (ORGANIC CLAY - MADE GROUND) (MADE GROUND)	(1.55) 2.40	
2.40-2.70	4	D				Light brown silty very gravelly clayey SAND, with medium cobble content. Sand is medium. gravel os angular to subrounded brick, very clayey pockets, very friable. (MADE GROUND)	(0.30) 2.70	
						Trial pit terminated at 2.70m bgl die to instability from 2.00mm bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 2.00m bgl.
3. Groundwater seepage encounteredn at 0.40m and 1.10m and water encountered at 2.40m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

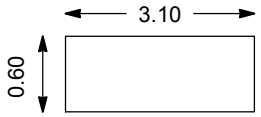
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP108**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17** End: **28.03.17**	**59.12**	**E:487498.3 N:242379.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Very soft dark brown sandy gravelly CLAY. Gravel of rounded to angular flint and rare tile. (AGRICULTURAL TOPSOIL/MADE GROUND)	(0.50)	
0.40	1	ES					0.50	
0.60	2	D				Soft to firm brown slightly gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse flint and brick fragments. (MIXED FILL - MADE GROUND)	(0.30)	
0.60		V	c_u=32/58/56				0.80	
						Firm orange brown/brown very sandy very gravelly CLAY. Gravel is subangular fine to coarse flint and quartzite. (MIXED FILL - MADE GROUND)		
1.00	3	B				. . . at 0.90m bgl brick, concrete and wood.	(0.60)	
							1.40	
1.40	4	ES				Firm dark grey/black/brown very gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint, quartzite, brick and concrete fragments, brick, concrete, plastic, building stone, and grass/roots. (MIXED FILL/ORGANIC CLAY - MADE GROUND)		
1.50-1.60	5	D					(1.60)	
2.80	6	B				. . . at 2.80m bgl chalk gravel.	3.00	
						Very soft orange brown sandy clayey SILT. Sand is medium. Gravel of rounded medium flint and quartzite. With lenses of slightly gravelly SAND. (QUARRY TAILINGS - MADE GROUND)	(0.40)	
3.20	7	D					3.40	
						Trial pit terminated at 3.40m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 2.00m bgl.
3. Groundwater seepage encounteredn at 0.40m and 1.1m and water encountered at 2.40m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

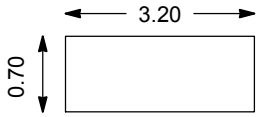
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP109**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.87**	**E:487401.9 N:242219.0**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Dark brown clayey SAND. Sand is fine. Occasional gravel of subrounded to angular fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.50)	
							0.50	
0.50-0.70	2	B				Brown clayey gravelly SAND. Sand is medium. Gravel of rounded to subangular fine to coarse flint and rare quartzite. Pockets of clay. (OVERBURDEN - MADE GROUND)		
0.50-0.70	3	D					0.70	
0.90-1.40	4	B				Orange brown SAND AND GRAVEL. Sand is coarse. Gravel of angular to subrounded fine to coarse flint and quartzite. Occasional cobble flint and possible gravel of mudstone. (OVERBURDEN FILL - MADE GROUND)		
0.90-1.40	5	D					(1.30)	
							2.00	
						Trial pit terminated at 2.00m bgl due to pit collapsing from 0.70m to 2.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 0.80m bgl.
3. Groundwater seepage encountered at 0.80m and water encountered at 1.20m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

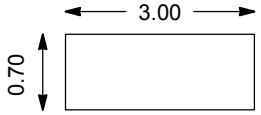
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP110**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.28**	**E:487474.1 N:242268.9**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Very soft sandy slightly gravelly CLAY. Sand is fine. Gravel of subangular medium flint. (AGRICULTURAL TOPSOIL)	(0.60)	
0.50-0.60	1	ES					0.60	
0.70-0.90	2	B				Firm orange brown very sandy gravelly CLAY. Sand is medium. Gravel of subangular to subrounded fine to coarse flint, quartzite and rare brick. (QUARRY TAILINGS - MADE GROUND)	(0.70)	
0.70-0.90	3	D						
0.70		V	c_u=60			. . . becoming very gravelly from 1.20m bgl.	1.30	
				2		Firm dark grey very gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse chalk, flint, quartzite and brick fragments. Localised pockets of clayey gravel, recovered building stone, concrete, brick, wood, organic matter/grass with localised black mottling. (ORGANIC CLAY - MADE GROUND)	(1.60)	
2.00-2.50	4	B					2.90	
2.90-3.00	5	B				Red brown clayey gravelly SAND. Sand is medium. Gravel of subangular fine to medium flint. (OTHER MADE GROUND)	3.00	
2.90-3.00	6	D				Trial pit terminated at 3.00m bgl due to instability from 1.20m to 3.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 1.70m bgl.
3. Groundwater seepage encountered at 0.60m and water strike at 1.70m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

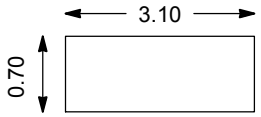
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP112**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17**	**59.39**	**E:487563.9 N:242377.9**	**1** of **1**
	End: **28.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Very soft dark brown sandy gravelly CLAY. Gravel of rounded to angular flint and rare tile. (AGRICULTURAL TOPSOIL)	0.25	
0.40	1	ES		≈		Orange brown clayey very gravelly SAND. Sand is medium. Gravel is angular to subrounded fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	0.50	
0.40	2	B				Soft dark grey/black very gravelly sandy CLAY. Gravel is subrounded fine to coarse flint, fragments of brick, concrete, wood, metal wire, organic matter, bricks and plastic. (ORGANIC FILL - MADE GROUND)		
0.90	3	ES						
1.20	4	D					(1.40)	
				≈		. . . at 1.70m bgl large concrete block.	1.90	
2.00	5	B				Very wet yellow brown clayey sandy GRAVEL. Gravel is subangular to subrounded fine to coarse flint and rare brick. Dark grey clay inclusions throughout. Sand is medium. (MIXED FILL - MADE GROUND) (POCKETS OF ORGANIC CLAY)	(1.70)	
3.40	6	B					3.60	
						Yellow brown clayey gravelly SAND. Sand is coarse. Gravel is subangular to subrounded fine to coarse flint. Pockets of grey clay. (OVERBURDEN FILL - MADE GROUND)	3.70	
						Trial pit terminated at 3.70m bgl due to instability.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable between 0.00m and 2.60m bgl.
3. Groundwater seepage encounteredn at 0.50m and 1.90m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

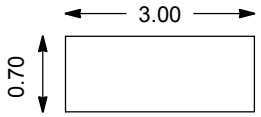
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP113**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.67**	**E:487481.1 N:242197.8**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey SAND. Rare gravel of subangular to subrounded fine to medium flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.60)	
							0.60	
0.60	1	ES				Firm orange brown gravelly very sandy CLAY. Sand is medium.Gravel is subrounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.40)	
0.80	2	B					1.00	
						Firm dark grey slightly gravelly sandy CLAY. Gravel of subrounded to angular fine to coarse flint, concrete, chalk, brick with rare brick and concrete cobbles. (ORGANIC CLAY - MADE GROUND)		
1.40		V	c_u=60/58/60					
1.60	3	D					(1.50)	
2.00	4	D				. . . becoming very sandy t 2.10m bgl.		
							2.50	
2.60	5	ES				Orange brown gravelly clayey SAND. Sand is coarse. Gravel is rounded to subangular fine to coarse flint and quartzite with rare cobbles flint. (OVERBURDEN FILL - MADE GROUND)	(0.60)	
2.70-2.70	6	B						
						. . . pockets of soft orange brown sandy clay from 3.00m bgl with inclusions of firm blue grey clay.	3.10	
3.10	7	D				Stiff dark grey gravely CLAY. Gravel is rounded fine to medium chalk. Very rare cobble chalk. (GLACIOLACUSTRINE DEPOSITS)		
3.10		V	c_u=128/126/120				(0.90)	
3.60	8	B						
3.60	9	D					4.00	
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during an easy excavation.
3. Groundwater seepage encountered at 2.40m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

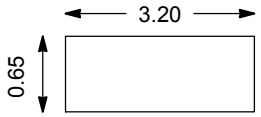
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP114**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17**	**59.32**	**E:487576.1 N:242313.9**	**1** of **1**
	End: **29.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
				≈		Very soft dark brown sandy gravelly CLAY. Gravel of rounded to angular flint and rare tile. (AGRICULTURAL TOPSOIL)	(0.50) 0.50	
1.00		V	c_u=40/42/28			Firm dark grey, black, brown sandy very gravelly CLAY. Sand is medium. Gravel of rounded to subangular fine to coarse brick fragments, flint, chalk, quartzite and wood. Black mottling rotten smell recovery of wood, organic matter, brick and some intermittent sands and gravels. (ORGANIC CLAY - MADE GROUND) . . . between 1.00m and 1.30m bgl orange brown very clayey very gravelly SAND. Gravel of angular to subrounded fine to coarse quartzite and flint. . . . at 1.70m bgl stiff.	(2.30) 2.80	
				≈		Orange brown clayey gravelly SAND. Gravel of angular to subrounded fine to coarse flint and quartzite with pockets of grey clay. (OVERBURDEN FILL - MADE GROUND)	(0.30) 3.10	
3.50		V	c_u=110/85/98	≈		Stiff blue grey silty CLAY. Occasional gravel of rounded fine chalk until 3.30m bgl. (GLACIOLACUSTRINE DEPOSITS) . . . at 3.80m bgl softer.	(0.90) 4.00	

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during an easy excavation.
3. Groundwater seepage encounted at 0.50m, 2.80m and 3.80m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

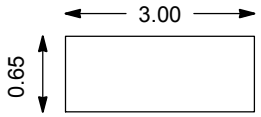
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP115**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17**	**58.68**	**E:487640.1 N:242391.0**	**1** of **1**
	End: **28.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown slighty gravelly clayey silty SAND. Sand is fine. Gravel of rounded fine to medium quartzite and flint. (AGRICULTURAL TOPSOIL)	(0.60)	
0.30	1	ES						
0.50	2	D					0.60	
						Soft dark grey mottled black brown very sandy very gravelly CLAY. Gravel is angular to subrounded fine to coarse flint, quartzite, brick, wood, organic matter and rare plastic. (ORGANIC CLAY - MADE GROUIND)	(1.50)	
1.00	3	ES						
1.00	4	D						
1.00		V	c_u=42/40					
1.80	5	D						
							2.10	
2.10	6	B				Orange brown clayey very gravelly SAND. Gravel is rounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.70)	
							2.80	
2.80	7	D				Firm locally stiff dark grey CLAY with occasional shell fragments. (PETERBOROUGH MEMBER)		
2.90		V	c_u=88/82/84					
						. . . at 3.20m bgl firm.		
3.30	8	D					(1.20)	
3.30		V	c_u=56/68/52					
							4.00	
4.00	9	D				. . . at 4.00m bgl stiff.		
4.00		V	c_u=88/120			Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during an easy excavation, slightly instability between 1.20m and 2.80m bgl.
3. Groundwater seepage encounted at 2.10m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB 8052 midi excavator**	**HBovenizer**	

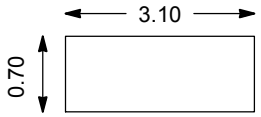
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP116**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.89**	**E:487480.9 N:242154.9**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey sandy gravelly SAND. Gravel of rounded fine to medium quartzite. (AGRICULTURAL TOPSOIL)	(0.50) 0.50	
0.50 0.55	1 2	D ES				Soft brown sandy CLAY. Sand is medium. (QUARRY TAILINGS - MADE GROUND)	0.70	
1.10	3	B				Orange brown very gravelly clayey SAND. Gravel is rounded to subangular fine to coarse flint and quartzite. Sand is coarse. Pockets of clay. (OVERBURDEN FILL - MADE GROUND)	(0.80)	
1.40	4	D					1.50	
						Trial pit terminated at 1.50m bgl due to collapse of pit from 0.00m to 1.50m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 0.80m bgl.
3. Groundwater encountered at 0.80m bgl.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

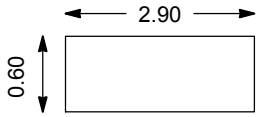
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP117**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**60.05**	**E:487519.4 N:242166.9**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Dark brown slightly gravelly clayey SAND. Sand is medium. Gravel is rounded to subangular fine to medium flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.55) 0.55	
0.60	2	D				Firm light orange brown very sandy very gravelly CLAY. Gravel is subangular to rounded fine to coarse flint and quartzite. Rare brick and rare chalk. (MIXED FILL - MADE GROUND)		
0.80	3	B				(MADE GROUND)	(0.65) 1.20	
1.50	4	B				Firm dark grey mottled brown very gravely very sandy CLAY. Gravel is angular to subangular fine to coarse brick, concrete, flint, tile, rare wire, wood, and organic matter with black staining. (ORGANIC CLAY - MADE GROUND)		
1.60	5	ES				(MADE GROUND)	(1.70) 2.90	
2.90-3.00	6	B				Orange brown clayey very gravelly SAND. Frequent pockets of sandy clay. Sand is medium. Gravel of medium to coarse subangular to rounded flint and quartzite. (FELMERSHAM MEMBER)	3.10 3.20	
3.20	7	D				Stiff blue grey sandy gravelly CLAY. Gravel of rounded fine to medium chalk. (GLACIOLACUSTRINE DEPOSITS)		
						Trial pit terminated at 3.20m bgl due to pit collapsing from 2.20m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 2.20m bgl.
3. Groundwater seepage encountered at 1.20m and water strike at 3.00m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

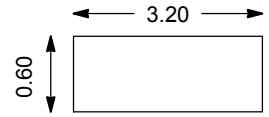
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP118**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.64**	**E:487550.7 N:242205.0**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Very soft dark brown very sandy slightly gravelly CLAY. Sand is medium. Gravel is angular to subrounded fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.60) 0.60	
0.60-1.20	2	D				Soft to firm very sandy very gravelly CLAY. Sand is medium. Gravel of subangular to subrounded fine to coarse flint and quartzite with pockets of sandy gravel. (OVERBURDEN FILL - MADE GROUND)	(0.60) 1.20	
0.60-1.20	3	B						
1.20-1.50	4	B				Firm locally soft dark grey brown gravelly sandy silty CLAY. Sand is medium. Gravel of fine to coarse angular to subrounded brick fragments (rare), concrete (rare), shells, chalk and flint. Pockets of clay with recovery of wood, plastic and black mottling. (ORGANIC CLAY - MADE GROUND)	(1.30) 2.50	
1.20-1.30	5	ES						
1.20-1.50	6	D						
1.80		V	c_u=70/60					
2.30		V	c_u=62/30/58			. . . at 2.30m bgl soft.		
2.60-3.20	7	B				Dark grey brown gravelly sandy silty CLAY. Sand is medium. Gravel of fine to coarse angular to subrounded brick fragments (rare), concrete (rare), shells, chalk and flint. Pockets of clay with recovery of wood, plastic and black mottling. (ORGANIC CLAY - MADE GROUND) . . . at 2.50m bgl becoming sandy gravel.	2.60	
2.60-3.20	8	D				Orange brown clayey silty SAND. Sand is fine. Occasional gravel of sandy fine to medium flint and quartzite. Laminated and grey mottling. (FELMERSHAM MEMBER)	(1.30) 3.90	
4.00	10	D				Very stiff dark grey gravelly CLAY. Gravel of rounded fine to medium chalk with rare cobbles of chalk. (GLACIOLACUSTRINE DEPOSITS)	4.00	
4.00	9	B						
4.00		V	c_u=150/132/142			Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 0.00m to 1.20m bgl.
3. Groundwater seepage encountered at 0.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

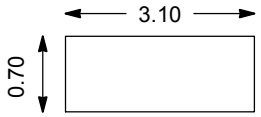
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP119**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17**	**59.39**	**E:487615.4 N:242282.0**	**1** of **1**
	End: **29.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey slightly gravelly SAND. Sand is fine. Gravel of subrounded fine to medium quartzite. (AGRICULTURAL TOPSOIL)	0.25	
0.20	1	ES						
0.30-0.80	2	D				Firm light grey brown/red brown very gravelly sandy CLAY. Sand is medium. Gravel of angular to subrounded fine to coarse flint and quartzite. Occasional pockets of subangular gravel of subrounded fine to medium quartzite and flint. (OVERBURDEN FILL - MADE GROUND)	(1.15)	
0.30-0.80	3	B		≈				
							1.40	
1.40	4	D				Light orange brown clayey SAND AND GRAVEL with pockets of clay. Sand is medium. Gravel is angular to subrounded fine to medium flint and rare quartzite. (OVERBURDEN FILL -MADE GROUND)	1.50	
1.40	5	B						
1.60-2.10	6	D				Firm dark grey brown very gravelly sandy CLAY. Gravel of angular to subrounded fine to coarse flint, chalk, brick fragments and wood. (ORGANIC CLAY - MADE GROUND)	(1.20)	
1.60-2.10	7	B						
				≈		. . . at 2.20m bgl concrete block 1.00m in size with brick, concrete, slate wood, organic matter, tile and occasional glass.		
							2.70	
2.80-3.00	10	D				Very soft light orange brown clayey SILT. Occasional gravel of angular to subrounded fine to coarse flint. (QUARRY TAILINGS - MADE GROUND)	(1.20)	
2.80-3.00	9	B						
						. . . at 3.85m bgl lense of very gravelly sand.	3.90	
3.90-4.00	10	D				Stiff blue grey silty CLAY. (PETERBOROUGH MEMBER)	4.00	
3.90-4.00	11	B						
						Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable from 2.50m bgl.
3. Groundwater seepage encounted at 0.50m, and 2.20m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

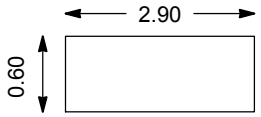
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP120**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17**	**58.74**	**E:487642.8 N:242316.1**	**1** of **1**
	End: **21.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Dark brown very gravelly sandy CLAY. Gravel of angular to subrounded fine to coarse flint, brick, concrete and rare clinker. (AGRICULTURAL TOPSOIL)	0.15	
						Orange brown black very gravelly SAND. Sand is fine to coarse. Gravel of subangular to angular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	0.40	
						Soft black grey very gravelly sandy CLAY. Gravel of angular to subrounded fine to coarse flint, brick fragments and wood. (ORGANIC CLAY - MADE GROUND)	(0.60)	
0.90	2	D					1.00	
						Brown very sandy GRAVEL. Gravel of rounded to subrounded rare sandstone, flint, occasional cobbles of flint and rare brick. MIXED FILL - MADE GROUND)	1.10	
1.10	3	B						
1.20	4	ES				Soft black grey sandy very gravelly CLAY. Gravel of angular to subrounded fine to coarse wood, flint, concrete, brick and black staining with organic odour. (ORGANIC CLAY - MADE GROUND)	(2.10)	
2.20	5	D						
2.20	6	D						
						. . . at 3.00m bgl soft/very soft and feels wet.	3.20	
3.20	7	D				Firm to stiff blue grey CLAY with blocky structure. (PETERBOROUGH MEMBER)		
3.20		V	c_u=98/80/80				(0.70)	
3.70	8	D						
3.70		V	c_u=140/122/120				3.90	

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during excavation.
3. Groundwater seepage encounted at 1.70m and 3.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

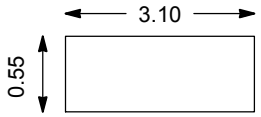
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP121**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17**	**58.64**	**E:487665.4 N:242347.3**	**1** of **1**
	End: **21.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey SAND. Sand is fine. Gravel of subangular to subrounded fine rare flint. (AGRICULTURAL TOPSOIL)	0.15	
0.20	1	ES				Brown clayey sandy gravelly SAND. Sand is fine to medium. Gravel of subangular to subrounded fine to coarse flint with occasional rootlets. (OVERBURDEN FILL - MADE GROUND)	(0.70)	
0.50	2	B					0.85	
0.50	3	D						
0.90	4	B				Light brown clayey very gravelly SAND. Sand is medium. Gravel of subangular to rounded fine to coarse flint, quartzite and rare brick fragments. MIXED FILL - MADE GROUND)	(0.45)	
0.90	5	D					1.30	
1.40	2	ES				Soft light grey black very gravelly very sandy CLAY with some black staining. Gravel of subrounded to angular fine to coarse flint, concrete, roots and grass with occasional brick fragments with a strong organic odour. (ORGANIC CLAY - MADE GROUND)	(0.50)	
1.40-1.80	6	B					1.80	
1.40-1.80	7	D						
1.80-3.00	8	D				Orange brown black SAND AND GRAVEL. Gravel of subrounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(1.10)	
							2.90	
						Stiff blue grey CLAY with block structure. (PETERBOROUGH MEMBER)	(0.90)	
							3.80	
						Trial pit terminated at 3.80m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit collapse of sides from 1.50m to 3.00m bgl, became stable from 3.00m bgl.
3. Groundwater seepage encounted at 1.90m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

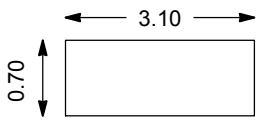
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP122**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17**	**59.82**	**E:487589.0 N:242172.9**	**1** of **1**
	End: **30.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very soft very sandy CLAY. Sand is medium. Gravel of rounded to subangular fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.30) 0.30	
0.40 0.40-0.80	1 2	ES B				Dark orange brown clayey very gravelly SAND. Sand is medium. Gravel of angular to subrounded fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(1.00) 1.30	
1.20-1.30	3	ES						
1.50	4	D				Very soft to firm brown/dark grey/black sandy silty very gravelly CLAY. Gravel of rounded to angular fine to coarse chalk (abundant), rare brick, flint and quartzite with lenses of very gravelly SILT. Gravel of fine to medium chalk rare plastic and brick. Very friable. (ORGANIC CLAY - MADE GROUND)	(0.70) 2.00	
						Trial pit terminated at 2.00m bgl due to pit collapse fro surface to 2.00m, pit dept 1.40m.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, became unstable from 2.30m bgl.
3. Groundwater encountered at 1.30m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

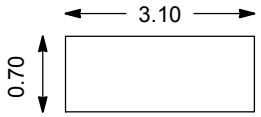
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP123**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**30.03.17** End: **30.03.17**	**59.61**	**E:487621.2 N:242212.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown very soft very sandy CLAY. Sand is medium. GRavel of rounded to subangular fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.40)	
							0.40	
0.45	1	ES				Dark orange brown clayey very gravelly SAND. Sand is medium. Gravel of angular to subrounded fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.40)	
0.60	2	D						
							0.80	
0.90	3	ES				Dark grey clayey very gravelly fine to coarse flint, chalk, quartzite, brick fragments, concrete fragments, with wood, concrete, organic matter, building stone, black stone gravel and wood. (ORGANIC CLAY - MADE GROUND)		
1.20-1.30	4	B					(0.90)	
							1.70	
1.80-2.00	5	D				Very soft orange brown silty CLAY. Pockets of sandy gravelly clayey SAND. Inclusions of stiff blue grey clay. (QUARRY TAILINGS - MADE GROUND)		
							(2.00)	
3.00	6	D						
							3.70	
3.70	7	D				Stiff blue grey silty CLAY. Occasional shell fragments. (PETERBOROUGH MEMBER)	3.80	
						Trial pit terminated at 3.80m bgl due to collapse of pit from 1.50m to 2.50m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, layer between 1.70m to 3.70m bgl sticky.
3. Groundwater seepage encountered at 1.50m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

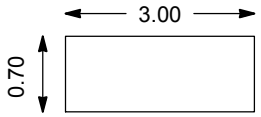
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP124**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17**	**59.33**	**E:487652.8 N:242249.8**	**1** of **1**
	End: **29.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Very soft dark brown very sandy slightly gravelly CLAY. Gravel of subangular to subrounded fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.50)	
							0.50	
0.60	1	B				Firm red brown very gravelly sandy CLAY. Gravel is subangular to rounded fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	0.70	
0.80-0.90 0.80	2	D V	c_u=138			Firm to stiff dark brown/black very gravelly sandy CLAY. Gravel of angular to subangular fine to coarse quartzite, flint, brick fragments and concrete. (ORGANIC CLAY - MADE GROUND)		
1.20	3	ES				. . . very black frequent wood, cloth, brick, concrete and metal.	(1.70)	
						. . . at 2.20m soft plastic.	2.40	
2.40 2.40	4	D V	c_u=10/12			Very soft orange brown clayey SILT. (QUARRY TAILINGS - MADE GROUND)	(1.50)	
3.80 3.80	5	D V	c_u=90/78/80				3.90	
4.10	6	D				Stiff blue grey very sandy CLAY. Gravel of shell angular fine to coarse and mudstone. (PETERBOROUGH MEMBER)	4.10	
						. . . at 3.80m bgl becoming firm silty clay with fine sand.		
						Trial pit terminated at 4.10m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable from 2.00m bgl.
3. Groundwater seepage encounted at 0.50m, 1.50m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

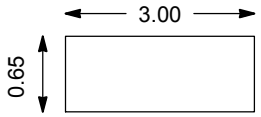
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP125**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17** End: **29.03.17**	**58.79**	**E:487679.5 N:242281.6**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Soft to firm light brown very gravelly CLAY. Gravel is subangular fine to coarse flint, chalk and rare brick fragments. (AGRICULTURAL TOPSOIL)	(0.40)	
							0.40	
0.40	2	D				Stiff dark grey black gravelly CLAY. Gravel of angular to subrounded fine to coarse chalk, brick fragments, flint, wood and concrete. (ORGANIC CLAY - MADE GROUND)		
0.60		V	c_u=85/90/85			. . . cobble of concrete at 0.60m bgl.		
1.10	3	D						
1.10		V	c_u=45/78			. . . becoming firm and plastic at 1.10m bgl.		
1.80	4	D					(2.70)	
2.50	5	D				. . . at 2.50m bgl lenses of orange brown sand and gravel. Sand is medium. Gravel is angular to subrounded fine to coarse flint and quartzite. Reworked gravels.		
							3.10	
3.20	6	D				Firm to stiff locally stiff sandy gravelly CLAY. Gravel of rounded fine to medium chalk. (GLACIOLACUSTRINE DEPOSITS)		
3.20		V	c_u=88/70				(0.80)	
							3.90	
3.90	7	D				. . . stiff from 3.90m bgl.		
3.90		V	c_u=112/110/114			Trial pit terminated at 3.90m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during excavation.
3. Groundwater seepage encounted at 1.80m.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

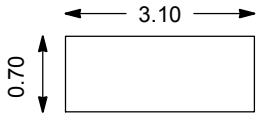
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP126**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17** End: **29.03.17**	**58.64**	**E:487705.2 N:242302.2**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Soft light brown sandy very gravelly CLAY. Gravel of rounded to angular fine to coarse brick and flint. Recovery of fencing, brick, wood, wire and plastic. (OTHER MADE GROUND)	(0.80)	
0.50	2	D					0.80	
0.90	3	B		≈		Orange brown sandy GRAVEL. Sand is coarse. Gravel is rounded to subrounded fine to coarse quartzite and flint. Occasional cobbles of quartzite. (OVERBURDEN FILL - MADE GROUND)	1.00	
1.20	4	ES				Stiff dark grey black very gravelly slightly sandy CLAY. Gravel is angular to subrounded fine to coarse flint, brick and concrete. Brick, wood and organic material recovered. (ORGANIC CLAY - MADE GROUND)		
1.20		V	c_u=85/90					
1.30	5	D					(1.60)	
2.30	6	D		≈			2.60	
2.80	7	B				Orange brown very gravelly SAND. Sand is coarse. Gravel is angular to subrounded fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(0.50)	
3.10	8	D					3.10	
3.30		V	c_u=145/150/140			Stiff to very stiff blue grey sandy gravelly CLAY. Gravel is subrounded fine to medium flint. (GLACIOLACUSTRINE DEPOSITS)	(0.70)	
3.50	9	D						
3.80	10	D					3.80	
						Trial pit terminated at 3.80m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated with some collapse between 0.00m and 1.00m bgl, slight instability from 2.60m and 3.10m bgl.
3. Groundwater seepage encounted at 1.00m and 2.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

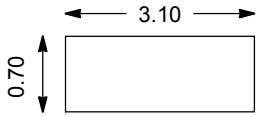
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP127**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**31.03.17**	**61.30**	**E:487575.0 N:242077.0**	**1** of **1**
	End: **31.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	ES				Dark brown clayey gravelly SAND. Sand is medium. Gravel of subangular to subrounded fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.60) 0.60	
0.70-1.00	2	B				Dark orange brown clayey sandy gravelly SAND. Gravel of rounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.60) 1.20	
0.70-1.00	3	D						
1.30		V	c_u=90/72/80			Firm to stiff orange brown mottled light grey sandy gravelly very sandy CLAY. Gravel is rounded to subangular fine to coarse flint and quartzite. Occasional cobble quartzite. (OVERBURDEN FILL - MADE GROUND)	(1.20) 2.40	
1.38		V	c_u=98					
1.50-2.20	4	B						
1.80		V	c_u=70/91					
2.50-3.00	5	D				Orange brown clayey SAND AND GRAVEL. Gravel of subangular to subrounded fine to coarse flint and quartzite. Sand is coarse. Occasional pockets of soft clay. (FELMERSHAM MEMBER)	(0.70) 3.10	
2.50-3.00	6	B						
2.50-3.00	7	D						
3.10	8	D				Stiff blue grey gravelly sandy CLAY. Gravel of rounded fine to medium chalk and occasional cobble chalk. (GLACIOLACUSTRINE DEPOSITS) Trial pit terminated at 3.10m bgl.		
3.10	9	D						

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated unable to progress further due to instability from 2.40m and 3.10m bgl.
3. Groundwater not encountered.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

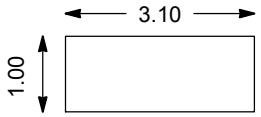
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP128**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**31.03.17** End: **31.03.17**	**60.33**	**E:487628.3 N:242142.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey gravelly SAND. Sand is medium. Gravel of subangular to subrounded fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.50)	
							0.50	
0.50-0.90	2	B				Orange brown very gravelly clayey SAND. Sand is medium. Gravel of subangular to subrounded fine to coarse flint and quartzite. Rare pockets of sandy clay. (OVERBURDEN FILL - MADE GROUND)	(0.40)	
0.50-0.90	3	D						
0.60	1	ES					0.90	
1.00	4	ES				Firm dark grey slighty gravelly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse flint, chalk, quartzite, concrete and rare brick. with wood, concrete, building stone, brick and organic matter. (OVERBURDEN FILL - MADE GROUND)		
1.00-2.00	5	B						
1.00-2.00	6	D						
1.40		V	c_u=72/56			. . . at 1.70m bgl very soft.	(1.20)	
							2.10	
						Trial pit terminated at 2.10m bgl due to collapse of pit to 1.70m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, unable to progress further due to pit collapse.
3. Groundwater seepage encountered at 1.70m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

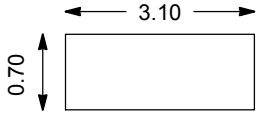
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP129**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17** End: **29.03.17**	**58.94**	**E:487691.9 N:242218.7**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown soft sandy CLAY. Rare gravel of subangular fine to medium flint. (AGRICULTURAL TOPSOIL)	0.10	
0.20	1	ES				Soft to firm black/grey very gravelly sandy CLAY. Gravel is subrounded to subangular fine to coarse flint and quartzite. (ORGANIC CLAY - MADE GROUND)		
0.20-0.60	2	B						
0.20-0.60	3	D				. . . from 0.10m to 0.30m bgl concrete and wood.	(1.00)	
0.80		V	c_u=68/42/68			. . . at 0.80m bgl becoming more plasticity/soft.		
1.00-2.10	4	B					1.10	
1.00-2.10	5	D				Soft to firm dark grey black very gravelly sandy CLAY, high cobble content. Gravel is angular to subrounded fine to coarse flint, wood, quartzite, chalk, brick fragments, brick, wood, and concrete. Rotten smell and black staining. (ORGANIC CLAY - MADE GROUND)		
1.10	6	ES				. . . at 1.20, bgl cobble concrete.	(1.70)	
						. . . at 2.20m bgl soft.		
							2.80	
2.90-3.00	7	B				Orange brown clayey SAND AND GRAVEL. Gravel is angular to subrounded fine to coarse flint and quartzite. Sand is medium to coarse. Pockets of firm clay. (FELMERSHAM MEMBER)	(0.30)	
2.90-3.00	8	D					3.10	
						Trial pit terminated at 3.10m bgl due to pit collapse from 2.10m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable from 2.10m bgl.
3. Groundwater seepage encounted at 2.10m and water strike encountered at 2.80m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

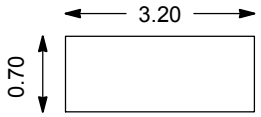
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP130**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**31.03.17**	**61.15**	**E:487634.2 N:242069.9**	**1** of **1**
	End: **31.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey gravelly SAND. Sand is medium. Gravel of subangular to subrounded fine to coarse flint and quartzite. (AGRICULTURAL TOPSOIL)	(0.65)	
0.40	1	ES					0.65	
0.70-1.40	2	B				Dark orange brown clayey gravelly SAND. Sand is medium. Gravel of rounded to subangular fine to coarse flint and quartzite. Pockets of light grey sandy clay. (OVERBURDEN FILL - MADE GROUND)	(0.75)	
							1.40	
1.50-3.00	3	D				Light orange brown gravelly medium SAND. Gravel of subangular to subrounded fine to medium flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(2.10)	
1.50-3.00	4	B						
							3.50	
3.50-3.70	5	D				Very soft dark grey slightly sandy slighty gravelly CLAY. Gravel is rounded to subrounded fine to medium chalk, rare flint and dark grey sandstone. Cobble of sandstone. (QUARRY TAILINGS - MADE GROUND)	3.70	
3.50-3.70	6	B						
3.50-3.70	7	D						
						Trial pit terminated at 3.70m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated, unable to progress futher dur to running sand from 3.40m bgl.
3. Groundwater seepage encountered at 2.20m and 3.40m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

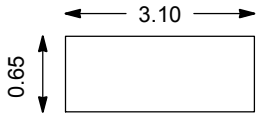
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP131**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**20.03.17** End: **20.03.17**	**59.30**	**E:487730.3 N:242188.7**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Soft light brown very gravelly very sandy CLAY. Gravel of subrounded fine to coarse flint. (AGRICULTURAL TOPSOIL)	(0.50)	
						. . . at 0.40m bgl boulder of tarmac.	0.50	
0.50-1.00	1	ES				Soft dark brown very gravelly sandy CLAY. Sand is fine to medium. Gravel of angular to subrounded fine to coarse brick fragments with occasional wood, flint. With rotten organic odour. (ORGANIC CLAY - MADE GROUND)		
0.60	2	D						
				≈		. . . 1.50m to 2.00m bgl concrete, brick and wood.		
2.00	3	D					(3.10)	
2.50	4	ES				. . . at 2.50m bgl brick and wood recovered with black staining on wood.		
				≈			3.60	
3.70	5	D				Orange brown SAND AND GRAVEL. Sand is medium to coarse. Gravel of angular to subangular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(0.40)	
							4.00	
4.00	6	D				Stiff blue grey sandy gravelly CLAY. Gravel of subrounded fine to medium chalk/possible limestone. (GLACIOLACUSTRINE DEPOSITS)	4.10	
4.00		V	c_u=98/96/92					

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit remained stable during excavation.
3. Groundwater seepage encounted at 1.70m and 3.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

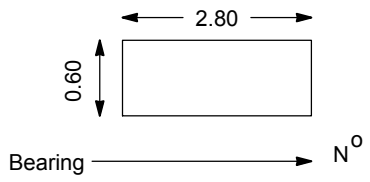
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP132**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**20.03.17**	**62.13**	**E:487651.6 N:242013.3**	**1** of **1**
	End: **20.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	ES				Dark brown very sandy slightly gravelly CLAY. Sand is fine. Gravel of subangular to subrounded fine to coarse flint. (AGRICULTURAL TOPSOIL)	(0.60)	
0.60	2	D					0.60	
						Brown fine to medium clayey SAND. (GLACIOLACUSTRINE DEPOSITS)	(0.50)	
							1.10	
1.20	3	ES				Orange brown clayey sandy gravelly SAND. Sand is medium. Gravel is subangular to subrounded rare flint. (GLACIOLACUSTRINE DEPOSITS)		
1.20	4	ES				. . . at 1.20m bgl occasional black staining.	(0.70)	
							1.80	
1.90	5	D				Light brown medium SAND. (GLACIOLACUSTRINE DEPOSITS)		
							(0.70)	
2.40	6	D				. . . at 2.40m bgl pockets of light grey/black sandy clay.	2.50	
2.50	7	D				Trial pit terminated at 2.50m bgl due to hole collapse due to presence of water/running sands.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit unstable and collasped at 2.30m bgl.
3. Groundwater encounted at 2.50m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

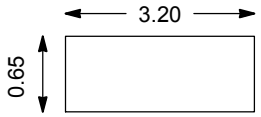
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP133**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**20.03.17** End: **20.03.17**	**60.82**	**E:487704.2 N:242078.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES				Brown/dark brown very clayey very gravelly SAND. Sand is fine to medium. Gravel of angular to subrounded fine to coarse flint, raised brick and occasional cobble flint. (AGRICULTURAL TOPSOIL)	(0.40)	
							0.40	
0.40	2	B				Firm brown very sandy very gravelly CLAY. Sand is medium. Gravel of angular to subrounded fine to coarse flint, chalk and occasional brick fragments. (MIXED FILL - MADE GROUND)		
0.80	3	D						
1.20	4	ES				. . . at 1.20m bgl black staining. . . . at 1.30m bgl brick.	(1.80)	
						. . . at 1.80m becoming soft.		
							2.20	
2.30	5	D				Orange brown SAND AND GRAVEL. Sand is coarse to medium. Gravel of subangular fine to coarse flint and shell. (FELMERSHAM MEMBER)	(0.50)	
							2.70	
2.90	6	D				Firm to stiff blue grey CLAY. (PETERBOROUGH MEMBER)		
2.90		V	c_u=98/88/80					
3.30	7	D				. . . becoming stiff/friable and rare gravel of chalk.	(1.30)	
3.30		V	c_u=98/101/118			. . . at 3.60m bgl blocks with occasional brown grey mottling.		
							4.00	
4.00	8	D				Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit became unstable during excavation.
3. Groundwater seepage encounted at 2.20m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

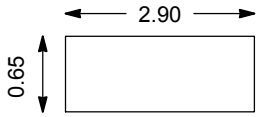
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP134**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17** End: **28.03.17**	**58.63**	**E:487610.3 N:242516.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey sandy gravelly SAND. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint and occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.45)	
0.40	1	ES					0.45	
0.50	2	D				Firm orange brown slightly gravelly silty CLAY. Gravel is subangular to angular fine to medium flint and rare chalk. (OVERBURDEN FILL - MADE GROUND)	0.60	
0.50		V	c_u=37/56					
0.70	3	B				Dark orange brown clayey gravelly SAND. Sand is medium. Gravel is rounded to subangular fine to coarse flint and rare quartzite. localised pockets of very sandy clay. (OVERBURDEN FILL - MADE GROUND)	(0.60)	
							1.20	
						Orange brown mottled light gravelly clayey gravelly SAND. Sand is coarse. Gravel of angular to subrounded fine to coarse flint, rare quartzite and occasional cobble flint. (OVERBURDEN FILL - MADE GROUND)	(0.40)	
1.40	4	D					1.60	
						Light orange brown clayey SAND AND GRAVEL. Sand is coarse. gravel is rounded subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(1.00)	
1.70	5	B						
							2.60	
						Soft dark grey CLAY. (GLACIOLACUSTRINE DEPOSITS) . . . from 2.60, to 2.90m bgl rounded medium quartzite gravel. . . . at 2.80m bgl firm.	(0.40)	
2.70	6	D					3.00	
						Soft dark grey CLAY. (PETERBOROUGH MEMBER)	(1.00)	
3.10	7	D						
3.50		V	c_u=37/58/68			. . . soft to firm from 3.50m bgl.		
						. . . at 3.80m bgl becoming very sandy clay.	4.00	
4.00	8	D				Trial pit terminated at 4.00m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became unstable between 2.20m and 2.60m bgl.
3. Groundwater seepage encounted at 0.50m, and 1.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

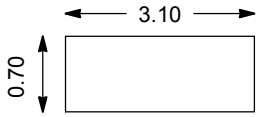
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP135**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17**	**58.48**	**E:487678.0 N:242489.1**	**1** of **1**
	End: **28.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
				≈		Dark brown clayey slightly gravelly SAND. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint and occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.55) 0.55	
0.60	1	ES				Red brown very gravelly clayey SAND. Sand is medium. Gravel os rounded fine to coarse quartzite and flint. Localised grey mottling and pockets of stiff light grey clay. (OTHER MADE GROUND)	(1.55)	
0.80	2	D						
0.90	3	B						
2.10	4	D					2.10	
						Soft to firm blue grey very sandy very gravelly CLAY. (GLACIOLACUSTRINE DEPOSITS) . . . from 2.10m to 2.90m bgl lenses of orange brown sandy and gravel of rounded to subangular fine to coarse quartzite.	(0.80) 2.90	
3.00	5	D				Stiff blue grey blocky very sandy very gravelly CLAY and occaisonal shell fragments. (PETERBOROUGH MEMBER)	3.10	
						Trial pit terminated at 3.10m bgl due to collapse.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated pit collapse fro 0.00m to 2.10m bgl.
3. Groundwater seepage encounted at 0.60m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

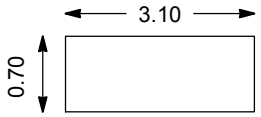
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP136**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17** End: **28.03.17**	**58.59**	**E:487679.2 N:242439.6**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Dark brown clayey gravelly SAND. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint and occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.90)	
0.60	2	B					0.90	
1.00	3	D				Soft dark grey brown very gravelly sandy CLAY. Sand is medium. Gravel of angular to subrounded fine to coarse flint and rare quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.35)	
							1.25	
1.90	4	B				Yellow brown clayey SAND AND GRAVEL. Sand is medium. Gravel is rounded to subangular fine to coarse flint and quartzite. (OVERBURDEN FILL - MADE GROUND)	(1.05)	
							2.30	
2.40	5	D				Firm to stiff dark blue grey silty CLAY. (PETERBOROUGH MEMBER) . . . between 2.30m and 2.60m bgl frequent rounded coarse quartzite.		
2.70		V	c_u=88/82/78					
2.80-3.00	6	D						
2.80		V	c_u=102/94/88			. . . at 3.00m bgl stiff, blocky structure and occasional shell fragments.	(1.50)	
						. . . at 3.60m bgl frequent shells.		
3.70	7	D					3.80	
3.80		V	c_u=90/100/105			Trial pit terminated at 3.80m bgl.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit easily excavated became slightly unstable between 1.25m and 2.30m bgl.
3. Groundwater not encountered.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

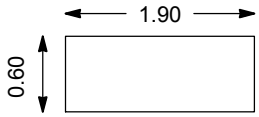
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP137**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17** End: **21.03.17**	**57.92**	**E:487689.8 N:242571.9**	**1** of **1**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
						Dark brown clayey gravelly SAND. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint and occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.30)	
0.25	1	ES					0.30	
0.40	2	ES				Orange brown clayey SAND AND GRAVEL. Sand is medium. Gravel is subrounded to subangular fine to coarse flint, rare sandstone gravel. (FELMERSHAM MEMBER)	(0.50)	
0.60-0.70	3	B					0.80	
0.80	4	B		≈		Orange brown SAND AND GRAVEL. Sand is medium to coarse. Gravel of subangular to subrounded fine to medium flint and quartzite and rare cobbles of flint. (FELMERSHAM MEMBER)		
1.10	5	D				. . . pocket of clayey sand. Sand is fine.	(1.10)	
1.80	6	D					1.90	
1.90	7	B				Trial pit terminated at 1.90m bgl due to collapsing of pit from 0.60m to 1.50m bgl in wall. Soakaway not completed due to instability.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit became unstable from 0.60m to base of pit during excavation.
3. Groundwater seepage encounted at 1.10m bgl.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS01**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**61.39**	**E:487654.5 N:242056.9**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.40) 0.40	
	0.50	1	ES				Orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (OVERBURDEN FILL - MADE GROUND)		
	0.50	2	D						
	0.90	3	D						
	1.00-1.45	1	SPT	N=23	1		. . . medium dense from 1.00m bgl.	(1.40) 1.80	
1.00 - 2.00 (115mm dia) 100% rec									
	1.90	4	D				Very loose orange brown slightly gravelly SAND. Gravel is subangular fine to medium flint. (FELMERSHAM MEMBER)		
	2.00-2.45	2	SPT	N=2				(1.40) 3.20	
2.00 - 3.00 (99mm dia) 100% rec									
3.00 - 4.00 (85mm dia) 100% rec	3.50	5	D				Stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to medium chalk. (GLACIOLACUSTRINE DEPOSITS)	(0.80) 4.00	
	4.00-4.45	3	SPT	N=59			Window sample hole terminated at 4.00m bgl upon completion.		

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

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 1.60m bgl.
4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MHocking**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS02**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**60.70**	**E:487553.7 N:242128.2**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.45) 0.45	
	0.60	1	D				Loose orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (OVERBURDEN FILL - MADE GROUND)	(0.95)	
	1.00-1.38	1	SPT	N=6				1.40	
1.00 - 2.00 (115mm dia) 100% rec	1.60	2	D				Firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MIXED FILL - MADE GROUND)	(0.60) 2.00	
	1.80	3	ES						
	2.00-2.45	2	SPT	N=2			Very soft brown occasional black slightly gravelly silty CLAY. Gravel is subangular fine to medium flint, chalk and brick. (MIXED FILL - MADE GROUND)	(1.00) 3.00	
2.00 - 3.00 (99mm dia) 100% rec	2.80	4	D		▼1				
	3.00-3.45	3	SPT	N=12			Medium dense orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded to rounded fine to medium flint. (FELMERSHAM MEMBER)	(1.25) 4.25	
3.00 - 4.00 (85mm dia) 0% rec	4.00-4.45	4	SPT	N=55					
4.00 - 4.45 (75mm dia) 100% rec	4.30	5	D				Stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to medium chalk. (GLACIAL DEPOSITS)	4.45	

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 2.50m bgl.
4. Gas and groundwater monitoring well installed to 3.00m bgl upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MDixon**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS02**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114		**60.70**	**E:487553.7 N:242128.2**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Window sample hole terminated at 4.45m bgl upon completion.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MDixon**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS03**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**---**	**E:487355.0 N:242351.0**	**1** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.50	1	ES				Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.90) 0.90	
1.00 - 2.00 (115mm dia) 100% rec	1.00-1.45	1	SPT	N=7			Soft brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MIXED FILL - MADE GROUND)		
	1.50	2	D						
	2.00-2.45	2	SPT	N=16			. . . firm grom 2.00m bgl.	(2.00)	
2.00 - 3.00 (99mm dia) 100% rec	2.50	3	D		▼1		. . . becoming soft from 2.20m bgl.	2.90	
	3.00-3.45	3	SPT	N=5			Lose dark grey slightly gravelly SAND. Gravel is subangular fine chalk. (QUARRY TAILINGS - MADE GROUND) (MADE GROUND)	(1.00) 3.90	
3.00 - 4.00 (85mm dia) 0% rec									
	4.00-4.45	4	SPT	N=10			Orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded fine to medium flint. (FELMERSHAM MEMBER)	(0.55) 4.45	
4.00 - 4.45 (75mm dia) 100% rec	4.40	4	D						

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater encountered at 2.90m bgl.
4. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS03**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114		**---**	**E:487355.0 N:242351.0**	**2** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Firm dark grey silty CLAY. Window sample hole terminated at 4.45m bgl upon completion.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS04**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**59.28**	**E:487525.3 N:242338.7**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.40) 0.40	
	0.50	1	ES				Orange brown slightly clayey gravelly SAND. Gravel is subangular fine to medium occasionally clayey flint. (OVERBURDEN FILL - MADE GROUND)	(0.90)	
	0.90	2	D					1.30	
1.00 - 2.00 (115mm dia) 100% rec	1.00-1.45	1	SPT	N=9			Soft to firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (ORGANIC CLAY - MADE GROUND)	(1.40)	
	1.70	3	D					2.70	
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.38	2	SPT	N=4			Orange brown SAND and GRAVEL. Sand is fine to medium. Gravel is subrounded fine to medium flint. (OVERBURDEN FILL - MADE GROUND)		
	2.50	4	D					(1.30)	
3.00 - 4.00 (85mm dia) 0% rec	3.00-3.45	3	SPT	N=10				4.00	
	4.00-4.45	4	SPT	N=24			Firm to stiff brown becoming dark grey silty CLAY. (PETERBOROUGH MEMBER)	(0.45)	
4.00 - 4.45 (75mm dia) 100% rec	4.10	5	D					4.45	

Window sample hole terminated at 4.45m bgl upon completion.

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m 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:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS04**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**59.28**	**E:487525.3 N:242338.7**	**2** of **2**
	End: **08.09.15**			

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions Ltd**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS05**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15** End: **08.09.15**	**58.08**	**E:487680.8 N:242544.6**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (TOPSOIL)	(0.30) 0.30	
	0.50	1	ES				Orange brown slightly gravelly SAND. Gravel is subangular fine to medium flint and chalk. (OVERBURDEN FILL - MADE GROUND)	(0.60) 0.90	
	1.00-1.45	1	SPT	N=9			Firm light brown slightly gravelly CLAY. Gravel is subrounded fine to medium chalk. (OVERBURDEN FILL - MADE GROUND)	1.00	
1.00 - 2.00 (115mm dia) 100% rec	1.50	2	D				Soft to firm orange brown mottled grey brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium flint and chalk. (GLACIOLACUSTRINE DEPOSITS)	(0.90) 1.90	
	2.00-2.45	2	SPT	N=13			Firm becoming stiff dark grey brown silty CLAY. (PETERBOROUGH MEMBER)		
	2.10	3	D						
2.00 - 3.00 (99mm dia) 100% rec	2.70	4	D						
	3.00-3.45	3	SPT	N=24				(2.40)	
	3.30	5	D						
	3.40-3.85	4	SPT	N=25					
3.00 - 4.30 (85mm dia) 100% rec									
	3.85-4.30	5	SPT	N=47				4.30	
							Window sample hole terminated at 4.30m bgl upon completion.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m 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:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**Borehole Solutions**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS06**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**08.09.15**	**---**	**E:487670.0 N:242306.0**	**1** of **2**
	End: **08.09.15**			

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.40	1	ES				Firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (MIXED FILL - MADE GROUND)	(1.10)	
	0.80	2	D						
	1.00-1.38	1	SPT	N=5				1.10	
1.00 - 2.00 (115mm dia) 100% rec	1.40	3	D				Soft brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium chalk. (OVERBURDEN FILL - MADE GROUND)	(0.60)	
	1.90	4	D					1.70	
	2.00-2.38	2	SPT	N=4			Soft to firm brown occasional mottled black slightly gravelly silty CLAY. With organic odour throughout. Gravel is subangular fine to medium flint, chalk and brick. (ORGANIC CLAY - MADE GROUND)	(1.30)	
2.00 - 3.00 (99mm dia) 100% rec	2.80	5	D					3.00	
	3.00-3.45	3	SPT	N=14			Firm dark grey brown silty CLAY with rare subangular fine to medium chalk gravel. (GLACIOLACUSTRINE DEPOSITS)	(1.45)	
3.00 - 4.00 (85mm dia) 100% rec	3.70	6	D						
	4.00-4.45	4	SPT	N=23				4.45	
4.00 - 4.45 (75mm dia) 100% rec									

Window sample hole terminated at 4.45m bgl upon completion.

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

General Remarks

1. Location scanned with a CAT and Signal Generator prior to breaking ground. No services encountered.
2. Hand dug pit excavated to 1.00m bgl.
3. Groundwater not encountered.
4. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**???**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS06**

Contract Ref:	Start: **08.09.15** End: **08.09.15**	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114		**---**	**E:487670.0 N:242306.0**	**2** of **2**

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**???**	**MLawson**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS101**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**59.40**	**E:487288.0 N:242357.3**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.45) 0.45	
							Brown clayey gravelly SAND. Sand is fine. Gravel of subangular to rounded fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(0.30) 0.75	
	0.80-1.00	3	D				Soft orange brown mottled brown sandy gravelly CLAY. Sand is fine to medium. Gravel of subangular to angular fine to coarse flint. Rare cobble fill. (MIXED FILL - MADE GROUND)		
	0.90	2	ES				. . . localised black mottling - clinker?		
1.20 - 2.00 (115mm dia) 100% rec	1.20-1.65	1	SPT	N=8				(1.05)	
	1.50	4	D		▼1		. . . becoming soft reworked natural.	1.80	
	1.90-2.00	5	D				Very soft orange brown mottled light grey slightly gravelly sandy SILT. Gravel is angular to subangular fine to coarse of flint. (QUARRY TAILINGS - MADE GROUND)	2.00	
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.45	2	SPT	N=0			Very loose yellow brown SAND. Sand is medium. (QUARRY TAILINGS - MADE GROUND)	(0.60)	
							. . . from 2.40m bgl becoming silty.	2.60	
	2.70	6	D				Very soft grey sandy SILT. (QUARRY TAILINGS - MADE GROUND)	2.80	
	3.00-3.45	3	SPT	N=9			Yellow brown clayey silty slightly gravelly SAND. Gravel of angular to subangular fine to medium flint. Sand is coarse to fine. (OVERBURDEN FILL - MADE GROUND)	3.00	
	3.00	7	D				Loose grey medium SAND. (OVERBURDEN FILL - MADE GROUND)		
3.00 - 4.00 (85mm dia) 95% rec							. . . pocket of very sandy silty clay from 3.40m to 3.60m bgl.	(1.20)	
							. . . from 3.60m bgl sand is coarse.		
	4.00-4.45	4	SPT	N=8			. . . pocket of soft grey clay from 3.90m to 3.95m bgl.		
	4.00	8	D				. . . at 3.95m bgl frequent angular to subangular fine to medium flint gravel until 4.00m bgl.	4.20	
4.00 - 4.50 (75mm dia) 100% rec							Loose brown yellow sandy GRAVEL. Sand is coarse. Gravel of subrounded fine to medium flint and quartzite. (FELMERSHAM MEMBER)	4.40	
								4.50	

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

General Remarks

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 1.80m bgl.
4. Gas and groundwater monitoring well installed to 4.50m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS101**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**59.40**	**E:487288.0 N:242357.3**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	4.50-4.89 4.50	5 9	SPT D	N=45			Very dense grey SAND. Sand is fine. (FELMERSHAM MEMBER) Window sample borehole terminated at 4.50m bgl due to barrel refusal.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS103**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**58.37**	**E:487496.1 N:242510.1**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20	1	ES				Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	0.25	
	0.50	2	D				Orange brown very sandy very gravelly CLAY. Gravel of subangular to subrounded fine to medium flint. (OVERBURDEN FILL - MADE GROUND)	(0.35) 0.60	
1.20 - 2.00 (115mm dia) 100% rec	1.20-1.65 1.20 1.20-2.00	1 3 4	SPT ES B	N=37	≈		Orange brown SAND AND GRAVEL. Sand is course. Gravel of subangular to angular fine to coarse flint and quartzite with occasional cobbles of flint. (FELMERSHAM MEMBER) . . . dense from 1.20m bgl.	(2.30)	
2.00 - 3.00 (99mm dia) 80% rec	2.00-2.45 2.50	2 5	SPT D	N=25			. . . medium dense from 2.00m bgl.	2.90	
3.00 - 4.00 (85mm dia) 100% rec	3.00-3.45 3.50	3 6	SPT D	N=14			Firm blue grey silty CLAY with localised pockets of sand. (KELLAWAYS FORMATION)	(0.40) 3.30	
4.00 - 5.00 (75mm dia) 100% rec	4.00-4.45 4.00-4.30	4 7	SPT D	N=11			Blue grey clayey SAND. Sand is fine. (KELLAWAYS FORMATION) . . . at 4.00m bgl medium dense and pocket of wet grey sandy gravel. Gravel of subangular to angular fine to coarse sandstone.	(1.60)	

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

General Remarks

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 1.10m bgl.
4. Gas and groundwater monitoring well installed to 6.00m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS103**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**58.37**	**E:487496.1 N:242510.1**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 100% rec	4.50	8	D				Blue grey clayey SAND. Sand is fine. (KELLAWAYS FORMATION) *(stratum copied from 3.30m from previous sheet)* . . . at 4.50m bgl laminated with frequent shells and belemnite.	4.90	
	5.00-5.45	5	SPT	N=29			Stiff to very stiff blue grey silty sandy CLAY. Sand is fine. (KELLAWAYS FORMATION)	(1.10)	
5.00 - 6.00 (65mm dia) 100% rec	5.50	9	D						
	6.00-6.45	6	SPT	N=31			Window sample borehole terminated at 6.00m bgl.	6.00	

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS104**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17**	**57.98**	**E:487638.2 N:242564.4**	**1** of **1**
	End: **22.03.17**			

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.35)	
								0.35	
	0.40	1	ES				Light brown clayey very gravelly SAND. Sand is medium. Gravel of angular to subrounded fine to coarse flint. (FELMERSHAM MEMBER)	(0.30)	
	0.65-1.00	2	B					0.65	
							Orange brown SAND AND GRAVEL. Sand is course. Gravel is subangular to angular fine to coarse flint and quartzite with occasional cobbles of flint. (FELMERSHAM MEMBER)		
1.20 - 2.00 (115mm dia) 100% rec	1.20-1.65	1	SPT	N=24			. . . medium dense from 1.20m bgl.		
							. . . at 1.60m bgl localised pockets of light grey clay.		
							. . . at 1.80m bgl frequent cobbles flint.	(2.45)	
2.00 - 3.00 (99mm dia) 100% rec	2.00-2.45	2	SPT	N=29					
	2.60	3	D						
	3.00-3.45	3	SPT	N=29					
3.00 - 3.70 (85mm dia) 100% rec	3.00	4	D				Stiff blue grey slightly sandy CLAY. Sand is fine. Localised pockets of fine grey sand. (KELLAWAYS FORMATION)	(0.60)	
	3.50	5	D					3.70	
	3.70-4.15	4	SPT	N=24			Window sample borehole terminated at 3.70m bgl due to casing refusal.		
	3.70	6	D						

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

General Remarks

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 1.10m bgl.
4. Gas and groundwater monitoring well installed to 3.70m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS108**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**59.74**	**E:487416.6 N:242193.7**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Dark brown slightly gravelly sandy CLAY. Gravel of subangular to angular fine to coarse flint. (AGRICULTURAL TOPSOIL)	(0.30)	
								0.30	
	0.40	1	ES				Light brown gravelly sandy CLAY. Sand is fine. Gravel of subangular to angular fine to coarse flint. (FELMERSHAM MEMBER)	(0.30)	
								0.60	
	0.70	2	D				Orange brown clayey SAND AND GRAVEL. Sand is medium. Gravel of subrounded to angular fine to coarse flint. (FELMERSHAM MEMBER)		
1.20 - 2.00 (115mm dia) 100% rec	1.20-1.65	1	SPT	N=24			. . . medium dense from 1.20m bgl rare chalk and quartzite gravel, possible limestone. . . . at 1.50m bgl rare cobble flint <10mm no longer clayey and sand becoming coarse.		
2.00 - 3.00 (99mm dia) 45% rec	2.00-2.45 2.00	2 3	SPT D	N=23				(2.80)	
3.00 - 4.00 (85mm dia) 90% rec	3.00-3.45 3.00	3 4	SPT D	N=32			. . . dense from 3.00m bgl with very angular course flint.		
								3.40	
							Firm to stiff grey gravelly silty CLAY. Gravel of rounded to subrounded fine chalk. (GLACIOLACUSTRINE DEPOSITS) . . . at 3.60m bgl very stiff.		
4.00 - 5.00 (75mm dia) 80% rec	4.00-4.45 4.00	4 5	SPT D	N=35				(1.50)	

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

General Remarks

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. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS108**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**59.74**	**E:487416.6 N:242193.7**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 80% rec	4.80	6	D				Firm to stiff grey gravelly silty CLAY. Gravel of rounded to subrounded fine chalk. (GLACIOLACUSTRINE DEPOSITS) *(stratum copied from 3.40m from previous sheet)*	4.90	
	5.00-5.45	5	SPT	N=23			Medium dense grey silty fine SAND. (KELLAWAYS FORMATION)	(1.10)	
5.00 - 6.00 (65mm dia) 0% rec								6.00	
	6.00-6.45	6	SPT	N=34			Window sample borehole terminated at 6.00m bgl.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS110**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**59.10**	**E:487617.5 N:242344.5**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.35)	
								0.35	
	0.40	1	ES				Soft orange brown mottled light grey slightly gravely sandy CLAY. Gravel of subangular to angular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND)	(0.35)	
	0.50	2	D					0.70	
	0.70-0.90	3	ES		≈		Light orange brown very soft gravelly sandy CLAY. Gravel of angular to subrounded fine to coarse flint, brick fragments, rare concrete, and rare plastic. (MIXED FILL - MADE GROUND)		
	0.90	4	D				. . . concrete obstruction at 0.90m bgl inside pit.		
1.20 - 2.00 (128mm dia) 100% rec	1.20-1.65	1	SPT	N=6			. . . soft from 1.20m bgl.	(2.25)	
	2.00-2.45	2	SPT	N=0			. . . very soft from 2.00m bgl.		
	2.00	5	D						
	2.20	6	ES				. . . very sandy and black stains at 2.20m bgl.		
2.00 - 3.00 (115mm dia) 100% rec	2.50	7	D						
							. . . black staining, wood, grass and organic matter at 2.80m bgl.	2.95	
	3.00-3.45	3	SPT	N=0			Very soft brown silty CLAY. (QUARRY TAILINGS - MADE GROUND) (KELLAWAYS FORMATION)		
	3.00	8	D				. . . at 3.00m shell fragments.	(0.65)	
3.00 - 4.00 (98mm dia) 100% rec	3.50	9	D				. . . grey at 3.20m bgl.	3.60	
							Firm grey silty CLAY. (KELLAWAYS FORMATION)		
	4.00-4.45	4	SPT	N=21			. . . becoming stiff at 4.00m bgl.		
4.00 - 5.00 (85mm dia) 100% rec									

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

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 1.10m bgl.
4. Gas and groundwater monitoring well installed to 3.50m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS110**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**59.10**	**E:487617.5 N:242344.5**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (85mm dia) 100% rec	5.00-5.45 5.00	5 10	SPT D	N=24			Firm grey silty CLAY. (KELLAWAYS FORMATION) *(stratum copied from 3.60m from previous sheet)*	(2.40)	
5.00 - 6.00 (75mm dia) 100% rec	5.50	11	D				. . . becoming sandy at 5.40m bgl.	6.00	
	6.00-6.45 6.00	6 12	SPT D	N=41			Window sample borehole terminated at 6.00m bgl.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS112**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**59.81**	**E:487659.4 N:242180.2**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				Dark brown clayey fine SAND. Rare gravel of subangular to angular fine flint. (AGRICULTURAL TOPSOIL)	(0.70)	
	0.50	3	D					0.70	
	0.80	4	D				Orange brown very clayey gravely SAND/ very sandy CLAY. Sand is fine. Gravel is angular to subangular fine to coarse flint with Occasional quartzite. (OVERBURDEN FILL - MADE GROUND)	0.90	
	1.00-1.45	1	SPT	N=9			Firm grey brown orange very sandy CLAY. Gravel of subangular to angular fine to coarse flint, slate, rare concrete and wood. (MIXED FILL - MADE GROUND)		
	1.10	2	ES						
1.20 - 2.00 (115mm dia) 100% rec	1.10	5	D				. . . at 1.50m bgl cobble, sandstone and brick.	(1.90)	
	2.00-2.45	2	SPT	N=5	≈				
2.00 - 3.00 (99mm dia) 100% rec	2.00	6	D				. . . at 2.30m bgl becoming soft.	2.80	
	3.00-3.45	3	SPT	N=0			Very loose orange brown fine to medium clayey SAND. Locally pockets of very soft sandy gravelly CLAY. Gravel of subangular to angular fine to coarse flint. (QUARRY TAILINGS - MADE GROUND)		
3.00 - 4.00 (85mm dia) 50% rec	3.00	7	D					(1.40)	
	4.00-4.45	4	SPT	N=4			. . . very loose to loose from 4.00m bgl.		
4.00 - 5.00 (75mm dia) 80% rec	4.00	8	D					4.20	
							Description on next sheet		

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

General Remarks

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 2.30m bgl.
4. Gas and groundwater monitoring well installed to 5.60m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS112**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**59.81**	**E:487659.4 N:242180.2**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 80% rec	4.60	9	D				Soft light grey/light brown very sandy SILT. Sand is fine to medium. (QUARRY TAILINGS - MADE GROUND) . . . at 4.20m bgl pockets of light grey clay.*(stratum* copied from 4.20m from previous sheet)	(0.70) 4.90	
	5.00-5.45	5	SPT	N=29			Medium dense firm to stiff blue grey CLAY locally fine sand. Friable. (KELLAWAYS FORMATION)		
5.00 - 6.00 (65mm dia) 60% rec	5.00	10	D				. . . becoming stiff at 5.50m bgl.	(1.10) 6.00	
	6.00-6.45	6	SPT	N=33			Window sample borehole terminated at 6.00m bgl.		
	6.00	11	D						

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS113**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**61.09**	**E:487671.6 N:242117.0**	**1** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20-1.00	1	ES				Soft orange brown slightly gravelly sandy CLAY. Medium cobble content. Gravel of rounded to subangular fine to coarse flint, concrete and brick fragments. (MIXED FILL - MADE GROUND)	(1.50)	
	1.20-1.65	1	SPT	N=12			. . . Concrete block with fragments of possible asbestos containing material. Confirmed to not contain asbestos in laboratory identification. . . . medium dense from 1.20m bgl.	1.50	
	1.80	2	D		▼1		Orange brown SAND AND GRAVEL. Sand is fine to coarse. gravel os subangular to rounded fine to coarse flint and occasional quartzite. (OVERBURDEN FILL - MADE GROUND)	(0.90)	
	2.00-2.45	2	SPT	N=7			. . . loose from 2.00m bgl.	2.40	
	2.50	3	D				Orange brown clayey sandy SILT. Sand is medium. (QUARRY TAILINGS - MADE GROUND)	(0.60)	
	3.00-3.45	3	SPT	N=8			Loose orange brown gravelly clayey SAND. Gravel of angular to rounded fine to medium flint and quartzite. (FELMERSHAM MEMBER)	3.00	
	4.00-4.36 4.00	4 4	SPT D	N:50 for 268mm			. . . very dense from 4.00m bgl.	(1.40)	
							Description on next sheet	4.40 4.50	

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

General Remarks

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 1.60m bgl.
4. Gas and groundwater monitoring well installed to 3.50m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS113**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**61.09**	**E:487671.6 N:242117.0**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	4.50	5	D				Stiff blue grey slightly gravelly CLAY. Gravel of subrounded medium chalk. (GLACIOLACUSTRINE DEPOSITS)		
							Window sample borehole terminated at 4.50m bgl due to SPT refusal.		

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS114**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**62.44**	**E:487671.1 N:241985.5**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.30	1	ES				Dark brown very sandy slightly gravelly CLAY. Sand is fine. Gravel of subangular to subrounded fine to coarse flint. (AGRICULTURAL TOPSOIL)	(0.60) 0.60	
	0.70	2	D				Soft to firm orange brown mottled grey slightly gravelly sandy CLAY. Gravel is angular to subangular fine to medium flint. Sand is medium. Localised black mottling. (GLACIOLACUSTRINE DEPOSITS)		
	1.10	3	D		▼1			(1.20)	
	1.20-1.65	1	SPT	N=12			. . . at 1.30m bgl firm.		
1.20 - 2.00 (115mm dia) 100% rec							. . . at 1.40m bgl stiff.		
	1.50	4	D				. . . at 1.60m bgl sand is coarse.		
							. . . at 1.70m bgl soft.	1.80	
	2.00-2.45	2	SPT	N=7			Loose orange brown locally grey mottled clayey slightly gravelly SAND. Sand is fine. Gravel of angular fine to medium flint. (GLACIOLACUSTRINE DEPOSITS)		
	2.00	5	D					(1.10)	
2.00 - 3.00 (99mm dia) 95% rec	2.50	6	D						
								2.90	
	3.00-3.45	3	SPT	N=8			Loose orange brown coarse SAND. (GLACIOLACUSTRINE DEPOSITS)		
	3.00	7	D					(0.85)	
3.00 - 4.00 (85mm dia) 70% rec							. . . from 3.40m bgl becoming gravelly SAND.		
								3.75	
	3.90	8	D				Orange brown mottled brown gravelly clayey SAND. Sand is fine to medium. Gravel of subangular fine chalk and quartzite. (GLACIOLACUSTRINE DEPOSITS)	3.95	
	4.00-4.36	4	SPT	N:50 for 268mm			very stiff grey CLAY. (GLACIOLACUSTRINE DEPOSITS)	4.00	
							. . . at 4.00m bgl cobble of chalk. Window sample borehole terminated at 4.00m bgl due to refusal with sampler due to possible cobbles at 4.00m bgl.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

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 1.20m bgl.
4. Gas and groundwater monitoring well installed to 3.00m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS115**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**24.03.17** End: **24.03.17**	**61.92**	**E:487748.1 N:241974.8**	**1** of **1**

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Dark brown clayey gravelly SAND. Sand is fine to medium. Gravel of angular to subangular fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.50)	
	0.40	1	ES					0.50	
	0.60	2	D				Orange brown clayey gravelly SAND. Sand is medium. Gravel of subangular to angular fine to coarse flint and quartzite, rare gravel chalk and rare cobble flint. (FELMERSHAM MEMBER)		
1.20 - 2.00 (115mm dia) 100% rec	1.20-1.65 1.20	1 3	SPT D	N=14			. . . becoming medium dense at 1.20m bgl feels damp.	(2.00)	
	1.80	4	D				. . . at 1.80m bgl becoming medium to coarse sand. . . . at 1.90m bgl pocket of flint gravel and cobbles.		
	2.00-2.45	2	SPT	N=18					
2.00 - 3.00 (99mm dia) 75% rec	2.50	5	D		▼1			2.50	
							Orange brown clayey SAND AND GRAVEL. Gravel is subrounded to angular fine to medium flint and quartzite. (FELMERSHAM MEMBER)		
	3.00-3.45	3	SPT	N=9			. . . becoming loose from 3.00m bgl.	(1.00)	
3.00 - 4.00 (85mm dia) 100% rec	3.50	6	D					3.50	
							Soft brown very sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint and quartzite. (FELMERSHAM MEMBER)	(0.45)	
	3.80-4.20 3.80	4 7	SPT D	N:50 for 247mm			. . . at 3.80m cobble of mudstone to 3.95m bgl.	3.95	
							Very stiff dark grey gravelly sandy CLAY. Sand is coarse. Gravel is rounded fine chalk and quartzite. (GLACIOLACUSTRINE DEPOSITS)	4.00	
							. . . at 4.00m bgl becoming very sandy.		

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

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 2.70m bgl.
4. Gas and groundwater monitoring well installed to 3.70m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS116**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17**	**58.52**	**E:487724.8 N:242403.7**	**1** of **2**
	End: **22.03.17**			

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
							Dark brown clayey sandy gravelly SAND. Sand is fine to medium. Gravel is angular to subrounded fine to medium flint and occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
	0.50	1	ES				Soft light brown very sandy CLAY. Sand is fine. Occasional gravel of subangular to angular fine to medium flint. (OVERBURDEN FILL - MADE GROUND)	(0.50) 0.90	
	0.60	2	D						
	1.20-1.65	1	SPT	N=14			Soft orange brown very sandy sandy gravelly CLAY. Sand is fine to medium. Gravel of subrounded to subangular fine to coarse flint. (OVERBURDEN FILL - MADE GROUND) . . . at 1.20m bgl becoming light grey and firm.	(0.60) 1.50	
	1.20	3	D						
1.20 - 2.00 (115mm dia) 100% rec	1.50-2.00	4	D				Orange brown light grey very sandy clayey GRAVEL. (OVERBURDEN FILL - MADE GROUND)	(0.70) 2.20	
	2.00-2.45	2	SPT	N=9			Firm dark grey silty CLAY. (OTHER MADE GROUND) . . . at 2.60m shell fragments.	(0.80) 3.00	
2.00 - 3.00 (99mm dia) 90% rec	2.50	5	D						
	3.00-3.45	3	SPT	N=18			Medium dense orange brown medium SAND. Gravel is subrounded fine to medium quartzite and flint. (FELMERSHAM MEMBER) . . . at 3.20m bgl becoming coarse and gravelly. . . . from 3.30m bgl becoming very gravelly SAND.	(0.80) 3.80	
	3.00	6	D						
3.00 - 4.00 (85mm dia) 90% rec	3.50	7	D						
	4.00-4.45	4	SPT	N=27			Stiff blue grey CLAY. Occasional shell fragments. Locally fine sand pockets. (PETERBOROUGH MEMBER)	(1.20)	
4.00 - 5.00 (75mm dia) 85% rec									

Drilling Progress and Water Observations

Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)

General Remarks

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 bgl.
4. Gas and groundwater monitoring well installed to 5.00m bgl.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	

DRAFT
WINDOW SAMPLE LOG

Contract:	Client:	Window Sample:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**WS116**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**58.52**	**E:487724.8 N:242403.7**	**2** of **2**

Progress	Samples / Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 85% rec	4.50-5.00	8	D				Stiff blue grey CLAY. Occasional shell fragments. Locally fine sand pockets. (PETERBOROUGH MEMBER) *(stratum copied from 3.80m from previous sheet)* . . . at 4.50m bgl becoming stiff. . . . at 4.70m bgl becoming very stiff.	5.00	
	5.00-5.45	5	SPT	N:50 for 295mm					

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

General Remarks

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Tracked window sampling	**Premier Compact 110**	**DSUK Ltd**	**HBovenizer**	AGS

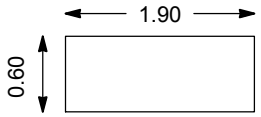
DRAFT
TRIAL PIT LOG

Contract:	Client:	Trial Pit:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**TP138**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17**	**61.66**	**E:487756.0 N:241990.2**	**1** of **1**
	End: **21.03.17**			

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.25	1	ES				Dark brown very sandy slightly gravelly CLAY very clayey SAND. Sand is fine. Gravel of subangular to subrounded fine to coarse flint. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
0.45	2	ES				Orange brown clayey silty SAND AND GRAVEL. Sand is medium to coarse. Gravel of angular to subrounded fine to coarse flint and occasional cobbles of flint. (OVERBURDEN FILL - MADE GROUND)	(1.90) 2.30	
0.60	3	B						
1.10	4	D						
2.30	5	D				Trial pit terminated at 2.30m bgl for soakaway test.		

Plan (Not to Scale)



General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Trial pit became unstable during excavation.
3. Groundwater not encounted.
4. Trial pit back filled with arisings upon completion.

All dimensions in metres | Scale: **1:25**

Method Used:	Plant Used:	Logged By:	Checked By:
Machine dug	**JCB-3CX**	**HBovenizer**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP102**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17** End: **29.03.17**	**59.46**	**E:487583.0 N:242243.9**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-1.20	1	B				Dark brown very sandy slightly gravelly CLAY. Sand is medium. Gravel of subrounded fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.60)	
0.50	2	D					0.60	
						Orange brown slightly gravelly very sandy silty CLAY. Sand is fine to coarse. Gravel is subrounded to rounded fine to medium quartzite and chalk. (OVERBURDEN FILL - MADE GROUND)	(0.60)	
1.00	3	D					1.20	
1.20-1.65	1	SPT	N=8			Very soft yellow grey silty CLAY. (QUARRY TAILINGS - MADE GROUND)		
1.20	4	D						
1.50	5	D					(1.50)	
2.00-2.45	2	SPT	N=4					
2.00	6	D						
2.00-3.00	7	B						
2.50	8	D					2.70	
						Very soft grey silty CLAY. (QUARRY TAILINGS - MADE GROUND)		
3.00-3.45	3	SPT	N=5				(0.90)	
3.00	9	D						
3.50	10	D					3.60	
						Soft grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium brick, flint and quartzite. (MIXED FILL - MADE GROUND)		
4.00-4.45	4	SPT	N=14				4.00	
4.00	11	D				Firm dark grey mottled light white grey laminated silty CLAY. (PETERBOROUGH MEMBER)		
4.00-5.00	12	B						
4.50	13	D						
5.00-5.45	5	SPT	N=18			. . . becoming stiff from 5.00m bgl.		
5.00	14	D		1				
6.00	15	D						
6.00-7.00	16	B						
6.50	17	D						
6.50	18	U	72 blows				(5.50)	
7.00	19	D						
7.50	20	U	68 blows					
8.00-8.45	6	SPT(c)	N=43					
8.00	21	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
0.00	1.20	00:45
7.10	7.40	01:00
9.10	9.30	02:30

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 9.50m bgl.
3. Cased to 6.50m bgl.
4. Groundwater not encountered.
5. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**HBovenizer**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP102**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**29.03.17** End: **29.03.17**	**59.46**	**E:487583.0 N:242243.9**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.23 9.00	7 22	SPT(c) D	N:50 for 75mm			Firm dark grey mottled light white grey laminated silty CLAY. (PETERBOROUGH MEMBER) *(stratum copied from 4.00m from previous sheet)*	9.50	
						Borehole terminated at 9.50m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**HBovenizer**	AGS

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP103**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**20.03.17** End: **20.03.17**	**59.57**	**E:487291.8 N:242301.1**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
						Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (AGRICULTURAL TOPSOIL)	0.20	
0.20-1.20	1	B						
0.50	2	D				Brown slightly gravely very silty SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and sandstone. (FELMERSHAM MEMBER)	(1.00)	
1.00	3	D					1.20	
1.20-1.65	1	SPT	N=9			Brown slightly gravely SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and sandstone. (FELMERSHAM MEMBER)	1.50	
1.20	4	D						
1.50	5	D						
						Soft light brown orange mottled light grey with dark brown patches slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse flint, chalk, quartzite. (FELMERSHAM MEMBER)	(1.00)	
2.00-2.45	2	SPT	N=16					
2.00	6	D					2.50	
2.50	7	D				Orange sandy GRAVEL and high cobble content. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse quartzite. Cobbles are subangular to subrounded upto 75x65x40mm of quartzite. (FELMERSHAM MEMBER)	(1.00)	
3.00-3.45	3	SPT	N=13					
3.00	8	D						
3.00-4.00	9	B					3.50	
3.50	10	D				Very soft to soft slightly silty slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (GLACIOLACUSTRINE DEPOSITS)	(0.50)	
							4.00	
4.00-4.45	4	SPT	N=15			Grey clayey gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine chalk. (GLACIOLACUSTRINE DEPOSITS)		
4.00	11	D						
4.50	12	D					(2.00)	
5.00-5.45	5	SPT	N=15					
5.00	13	D						
5.00-6.00	14	B					6.00	
6.00	15	D				Stiff to very stiff grey slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse chalk. (PETERBOROUGH MEMBER)		
6.50-6.88	6	SPT	N:50 for 227mm				(1.78)	
6.50	16	D						
7.00	17	D						
7.40-7.67	7	SPT	N:50 for 120mm				7.78	
						Borehole terminated at 7.78m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)
7.20	7.40	02:00

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 7.40m bgl.
3. Groundwater not encountered.
4. Gas and groundwater monitoring well installed to 7.00m bgl upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP104**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**60.16**	**E:487743.7 N:242104.3**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
						Brown dark brown very clayey very gravelly SAND. Sand is fine to medium. Gravel of angular to subrounded fine to coarse flint, rare brick and occasional cobble flint.	(0.50)	
0.50	1	D				(AGRICULTURAL TOPSOIL)	0.50	
						Soft grey brown slightly sandy slightly gravelly clayey SILT. Sand is fine. Gravel is angular to subangular fine to medium of flint and occasional brick.	(0.60)	
1.00	2	D				(MIXED FILL - MADE GROUND)	1.10	
1.00-2.00	3	B				. . . with black rootlets from 1.00m bgl.		
1.20-1.65	1	SPT	N=8			Brown orange sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint and quartzite with pockets of soft grey brown slightly gravelly very sandy CLAY.		
1.20	4	D						
1.50	5	D						
2.00-2.45	2	SPT(c)	N=15				(2.20)	
2.00	6	D						
2.50-3.00	7	B						
2.50	8	D						
3.00-3.45	3	SPT	N=17	1			3.30	
3.00	9	D						
3.50-4.50	10	B				Soft to firm grey slightly gravelly CLAY. Gravel is subangular to subrounded fine chalk.		
3.50	11	D				(GLACIOLACUSTRINE DEPOSITS)		
4.00-4.45	4	SPT	N=13					
4.00	12	D						
4.50	13	D					(3.20)	
5.00-5.45	5	SPT	N=20					
5.00	14	D						
6.00-7.00	15	B						
6.00	16	D					6.50	
6.50-6.95	6	SPT	N=20			Very stiff dark grey CLAY.		
6.50	17	D				(PETERBOROUGH MEMBER)		
7.00	18	D						
8.00-8.45	7	SPT	N=31				(3.23)	
8.00	19	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 9.50m bgl.
3. Cased to 4.50m bgl.
4. Groundwater not encountered.
5. Gas and groundwater monitoring well installed to 9.50m bgl upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP104**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**60.16**	**E:487743.7 N:242104.3**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00-9.50	20	B				Very stiff dark grey CLAY.		
9.00	21	D				(PETERBOROUGH MEMBER)		
						(stratum copied from 6.50m from previous sheet)		
9.50-9.73	8	SPT	N:50 for 75mm				9.73	
						Borehole terminated at 9.73m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP105**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17** End: **28.03.17**	**59.03**	**E:487591.8 N:242448.0**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-1.20	1	B				Dark brown very sandy CLAY. Sand is fine. Gravel of subangular medium flint with rootlets. (AGRICULTURAL TOPSOIL)	(0.90)	
0.50	2	D					0.90	
1.00	3	D				Orange brown slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium quartzite. (OVERBURDEN FILL - MADE GROUND)		
1.20-1.65	1	SPT	N=18					
1.20	4	D						
1.50	5	D					(2.00)	
2.00-2.45	2	SPT	N=21					
2.00	6	D						
2.50	7	D					2.90	
3.00-3.45	3	SPT	N=24			Stiff dark grey slightly sandy silty CLAY. Sand is fine to medium. (KELLAWAYS FORMATION)		
3.00	10	U	68 blows					
3.00-4.00	8	B						
3.00	9	D						
3.50	11	D						
4.00-4.45	4	SPT	N=31					
4.00	12	D						
4.50	13	D					(3.40)	
5.00-5.38	5	SPT	N:50 for 229mm					
5.00-6.00	14	B						
5.00	15	D						
5.00	16	U	79 blows					
5.50	17	D						
5.70	18	D						
6.00-6.31	6	SPT	N:50 for 158mm				6.30	
6.50	19	D				Weak dark grey silty medium SANDSTONE. (KELLAWAYS FORMATION)	(0.60)	
							6.90	
7.00-7.38	7	SPT	N:50 for 227mm			Very stiff dark grey slightly sandy silty CLAY. (PETERBOROUGH MEMBER)		
7.00-8.00	20	B						
7.00	21	D					(1.60)	
8.00-8.30	8	SPT	N:50 for 152mm					
8.00	22	D					8.50	
8.50-8.65	9	SPT	NP			Weak dark grey silty MUDSTONE. (PETERBOROUGH MEMBER)	8.73	
						Borehole terminated at 8.73m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 8.50m bgl.
3. Cased to 6.00m bgl.
4. Groundwater encountered at 1.10m bgl.
5. Gas and groundwater monitoring well installed to 9.50m bgl upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP105**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**28.03.17**	**59.03**	**E:487591.8 N:242448.0**	**2** of **2**
	End: **28.03.17**			

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions Ltd**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP106**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**22.03.17** End: **22.03.17**	**58.34**	**E:487442.2 N:242481.0**	**1** of **1**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-1.20	15	B				Soft brown slightly gravelly sandy SILT. Sand is fine to medium. Gravel is subangular to rounded fine to coarse quartzite and flint. (AGRICULTURAL TOPSOIL)		
0.50	1	D					(1.20)	
1.00	2	D					1.20	
1.20-1.65	1	SPT(c)	N=18			Brown slightly sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint and quartzite. (FELMERSHAM MEMBER)		
1.20	3	D						
1.50	4	D		1				
2.00-2.45	2	SPT(c)	N=18				(1.90)	
2.00	5	D						
2.50	6	D						
3.00-3.45	3	SPT(c)	N=13				3.10	
3.00	7	D				Soft dark grey silty CLAY. (KELLAWAYS FORMATION)		
3.50	8	D						
3.50-4.50	16	B						
4.00-4.45	4	SPT	N=15					
4.00	9	D						
4.50	10	D						
5.00-5.45	5	SPT	N=13				(3.90)	
5.00	11	D						
6.00	12	D						
6.50-6.95	6	SPT	N=20			. . . very stiff from 6.50m bgl.		
6.50	13	D					7.00	
7.00-7.15	7	SPT	NP			Weak grey silty MUDSTONE.		
7.00	14	D					7.38	
						Borehole terminated at 7.38m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 7.00m bgl.
3. Cased to 6.00m bgl.
4. Groundwater not encountered.
5. Gas and groundwater monitoring well installed to 7.00m bgl upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP107**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17** End: **21.03.17**	**58.91**	**E:487726.8 N:242240.7**	**1** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-1.20	1	B				Dark brown soft sandy CLAY. Rare gravel of subangular fine to medium flint. (AGRICULTURAL TOPSOIL)	(0.60)	
0.50	2	D					0.60	
						Soft grey brown silty gravelly CLAY. Gravel is angular to subrounded fine to coarse flint, brick and chalk. (MIXED FILL - MADE GROUND)	(0.90)	
1.00	3	D						
1.20-1.65	1	SPT	N=9					
1.20	4	D					1.50	
1.50	5	D				Soft grey brown silty slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint, brick and chalk. (MIXED FILL - MADE GROUND)		
2.00-2.45	2	SPT	N=13			. . . with black patches from 2.00m to 2.45m bgl.		
2.00-3.00	6	B					(1.70)	
2.00	7	D						
2.50	8	D						
3.00-3.45	3	SPT	N=13				3.20	
3.00	9	D				Stiff grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk. (PETERBOROUGH MEMBER)		
3.50	10	D						
4.00-4.45	4	SPT	N=20					
4.00-5.00	11	B						
4.00	12	D						
4.50	13	D						
5.00-5.45	5	SPT	N=22					
5.00	14	D		1				
6.00	15	D						
6.50	16	D						
6.50	17	U	66 blows					
7.00-8.00	18	B				. . . becoming dark grey from 7.00m bgl.		
7.00	19	D					(8.80)	
8.00-8.45	6	SPT	N=21					
8.00	20	D						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 12.00m bgl.
3. Cased to 4.00m bgl.
4. Groundwater not encountered.
5. Borehole backfilled with arisings upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP107**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**21.03.17** End: **21.03.17**	**58.91**	**E:487726.8 N:242240.7**	**2** of **2**

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	21	D				Stiff grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse chalk. (PETERBOROUGH MEMBER) *(stratum copied from 3.20m from previous sheet)*		
9.50	26	U	71 blows					
10.00-11.00	22	B						
10.00	23	D						
11.00-11.45	7	SPT	N=23					
11.00	24	D						
							12.00	
12.00	25	D				Borehole terminated at 12.00m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP108**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**60.79**	**E:487627.0 N:242113.6**	**1** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.00-1.20	1	B				Grass over brown slightly gravelly clayey SAND. Gravel is subangular fine to medium flint with occasional rootlets. (AGRICULTURAL TOPSOIL)	(0.80)	
0.50	1	D					0.80	
1.00	2	D				Brown slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint and quartzite.	(0.50)	
1.20-1.65	1	SPT	N=11				1.30	
1.20	4	D				Soft to firm orange brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint and chalk. (GLACIOLACUSTRINE DEPOSITS)		
1.50	5	D						
2.00-2.45	2	SPT	N=20			. . . with pockets of orange silty gravelly sand from 2.00m bgl.		
2.00	7	D						
2.00-3.00	8	B						
2.50	9	D					(2.70)	
3.00-3.45	3	SPT	N=17					
3.00	11	D						
3.50	12	D						
							4.00	
4.00-4.45	4	SPT	N=26			Stiff to very stiff slightly silty gravelly CLAY. Gravel is fine to medium angular chalk. (PETERBOROUGH MEMBER)		
4.00	14	D						
4.50	15	D						
5.00-5.45	5	SPT	N=30					
5.00	17	D						
5.00-6.00	18	B						
6.00	19	D						
6.50-6.95	6	SPT	N=39					
6.50	21	D						
7.00	22	D				. . . becoming firm to stiff from 7.00m to 11.00m bgl.		
							(8.05)	
8.00-8.45	7	SPT	N=45					
8.00	24	D						
8.00-9.00	25	B						

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

1. Location scaned with GPR prior to breaking ground. No services encountered.
2. Borehole advanced to 12.20m bgl.
3. Groundwater not encountered.
4. Gas and groundwater monitoring well installed to 11.00m bgl upon completion.

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

DRAFT
BOREHOLE LOG

Contract:	Client:	Borehole:
Willen Road, Newport Pagnell	**Roxhill Developments Ltd**	**CP108**

Contract Ref:	Start:	Ground Level (m AD):	National Grid Co-ordinate:	Sheet:
313114	**23.03.17** End: **23.03.17**	**60.79**	**E:487627.0 N:242113.6**	**2** of **2**

Samples and In-situ Tests				Water	Backfill & Instru-mentation	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
9.00	26	D				Stiff to very stiff slightly silty gravelly CLAY. Gravel is fine to medium angular chalk. (PETERBOROUGH MEMBER) *(stratum copied from 4.00m from previous sheet)*		
9.50-9.95	8	SPT	N=50					
9.50	28	D						
10.00	29	D						
11.00-11.39	9	SPT(c)	N:50 for 241mm					
11.00	30	D						
12.00	31	D				. . . becoming very soft from 12.00m bgl.	12.05	
						Weak dark grey silty MUDSTONE. (PETERBOROUGH MEMBER)	12.20	
						Borehole terminated at 12.20m bgl.		

Boring Progress and Water Observations					
Date	Time	Borehole Depth	Casing Depth	Borehole Diameter (mm)	Water Depth

Chiselling / Slow Progress		
From	To	Duration (hh:mm)

General Remarks

All dimensions in metres | Scale: **1:50**

Method Used:	Plant Used:	Drilled By:	Logged By:	Checked By:
Cable percussion	**Dando 150**	**Borehole Solutions**	**adamjones**	

APPENDIX G
GROUND GAS & WATER MONITORING DATA (2015 & 2017)

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	Falling	Constant	1005	1005	
Round 2	Constant	Constant	1026	1026	
Round 3	Fluctuating	Fluctuating	1025	1025	Ground: Dry + Wind: Light + Air Temp: 9DegC
Round 4	Fluctuating	Rising	1010	1012	Ground: Dry + Wind: Strong + Air Temp: 3DegC

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)
CP102	1	50	3	9.50	---	#REF! to #REF!	21/04/2017 10:02:00	1026	1026	$0.1_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	3		---	#REF! to #REF!	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	3	9.50	---	#REF! to #REF!	21/04/2017 10:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	15 secs	-	-	-	-	0.2	0.1	20.9	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	30 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	60 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	90 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	120 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	180 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	240 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	#REF! to #REF!	300 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		9.39	#REF! to #REF!	360 secs	-	-	-	0.71	-	-	-	-	-	-
CP102	1	50	4	9.50	---	#REF! to #REF!	26/04/2017 11:45:00	1013	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	4		---	#REF! to #REF!	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	4	9.50	---	#REF! to #REF!	26/04/2017 11:46:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	4		---	#REF! to #REF!	15 secs	-	-	-	-	1.7	0.0	20.3	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	60 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	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

[redacted] | Date: 22/05/17 | Checked By | Date

Contract Ref: 313114

Cont

Willen Road, Newport Pagnell

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)
CP102	1	50	4		---	#REF! to #REF!	90 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	120 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	180 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	240 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	#REF! to #REF!	300 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		9.34	#REF! to #REF!	360 secs	-	-	-	0.49	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:53:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:54:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		4.49	5.00 to 7.00	360 secs	-	-	-	1.29	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:19:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:20:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.6	0.0	20.8	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	20.6	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0

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

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)
CP103	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		4.48	5.00 to 7.00	360 secs	-	-	-	1.32	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	3		---	6.00 to 9.50	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	60 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	90 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	120 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	240 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		9.14	6.00 to 9.50	360 secs	-	-	-	1.28	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:12:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:13:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	4		---	6.00 to 9.50	15 secs	-	-	-	-	0.6	0.0	20.3	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP104	1	50	4		---	6.00 to 9.50	90 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	120 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	180 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	240 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	300 secs	-	-	-	-	0.6	0.0	19.7	0.0	1.0	0.0
CP104	1	50	4		9.14	6.00 to 9.50	360 secs	-	-	-	1.42	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:33:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:34:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
CP105	1	50	3		---	6.00 to 8.50	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		8.69	6.00 to 8.50	360 secs	-	-	-	1.44	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:52:00	996	1011	$25.2_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	$3.1_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:53:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP105	1	50	4		---	6.00 to 8.50	15 secs	-	-	-	-	0.7	0.0	20.7	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	60 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0

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

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)
CP105	1	50	4		---	6.00 to 8.50	90 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	120 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	180 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	240 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	300 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		8.78	6.00 to 8.50	360 secs	-	-	-	2.09	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.1	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		6.48	5.00 to 7.00	360 secs	-	-	-	1.35	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:54:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:55:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP106	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.4	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP106	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		6.49	5.00 to 7.00	360 secs	-	-	-	1.58	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:46:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:47:00	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	60 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	90 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	120 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	180 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	1.0
CP108	1	50	3		---	9.00 to 11.00	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	1.0
CP108	1	50	3		---	9.00 to 11.00	300 secs	-	-	-	-	0.2	0.0	20.5	0.0	1.0	1.0
CP108	1	50	3		10.48	9.00 to 11.00	360 secs	-	-	-	1.37	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:23:00	1011	1012	$0.1_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	$0.8_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:24:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP108	1	50	4		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0

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

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)
CP108	1	50	4		---	9.00 to 11.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	240 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	1.0	0.0
CP108	1	50	4		10.54	9.00 to 11.00	360 secs	-	-	-	1.67	-	-	-	-	-	-
WS01	1	50	1	3.00	3.07	1.00 to 3.00	23/09/2015	1005	1005	$0.1_{(I)}$	1.43	0.1	0.0	20.8	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	18.7	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	18.4	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
	Remarks: Samples taken.																
WS01	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 11:17:00	1026	1026	$0.2_{(I)}$	1.42	0.1	0.0	20.4	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	2.6	0.0	18.8	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0

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

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)
WS01	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS02	1	50	1	3.00	3.16	1.00 to 3.00	23/09/2015 14:06:00	1005	1005	$0.1_{(I)}$	1.62	0.1	0.0	20.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	18.4	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	16.9	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	2	3.00	3.15	1.00 to 3.00	01/10/2015 11:03:00	1026	1026	$0.2_{(I)}$	1.65	0.1	0.0	20.3	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	3.5	0.0	17.4	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	3	3.00	2.85	1.00 to 3.00	21/04/2017	-	-	-	0.58	-	-	-	-	-	-
	Remarks: Unable to monitor due to pipe being bent and gas escaping from sides.																
WS04	1	50	1	3.00	3.10	1.00 to 3.00	23/09/2015 13:40:00	1005	1005	$0.1_{(I)}$	0.78	0.1	0.0	20.8	0.0	0.0	0.0
WS04	1	50	1		---	1.00 to 3.00	15 secs	-	-	$-0.1_{(SS)}$	-	0.5	0.0	20.5	0.0	4.0	0.0
WS04	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.5	0.0	20.5	0.0	3.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LEL = [redacted] it = 5% v/v.

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)
WS04	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.5	0.0	20.1	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.1	0.0	19.6	0.0	1.0	0.0
WS04	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	16.2	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	360 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	420 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
	Remarks: Borehole ran dry after 6L purged.																
WS04	1	50	2	3.00	3.10	1.00 to 3.00	01/10/2015 10:42:00	1026	1026	$1.9_{(I)}$	0.90	0.3	0.0	20.4	0.0	0.0	0.0
WS04	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	1.3	0.0	19.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	1.4	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	18.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	17.3	0.0	1.0	0.0
WS05	1	50	1	3.00	3.08	1.00 to 3.00	23/09/2015	1005	1005	$0.0_{(I)}$	2.24	0.1	0.0	20.9	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.2	0.0	20.8	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0

Key: I = Initial, P = Peak, SS = Steady State. Note: LE [redacted] it = 5% v/v.

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)
WS05	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
	Remarks: Borehole ran dry after 2L purged.																
WS05	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 10:01:00	1026	1026	$10.3_{(I)}$	2.29	0.1	0.0	20.8	0.0	0.0	0.0
WS05	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	3.2	0.0	17.0	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.2	0.0	15.3	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:11:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:12:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	15 secs	-	-	-	-	3.3	0.0	17.8	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	-	-	3.1	0.0	16.3	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	60 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	90 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	120 secs	-	-	-	-	3.1	0.0	16.1	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	180 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	240 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	300 secs	-	-	-	-	3.1	0.0	16.0	0.0	0.0	0.0

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

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)
WS101	1	50	3		4.30	1.00 to 4.50	360 secs	-	-	-	2.23	-	-	-	-	-	-
WS101	1	50	4	4.50	---	1.00 to 4.50	26/04/2017 09:39:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	75 secs	-	-	-	-	3.4	0.0	18.7	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	90 secs	-	-	-	-	3.2	0.0	16.8	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	120 secs	-	-	-	-	3.2	0.0	16.5	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	150 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	180 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	240 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	300 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	1.0
WS101	1	50	4		---	1.00 to 4.50	360 secs	-	-	-	-	3.3	0.0	16.2	0.0	0.0	1.0
WS101	1	50	4		3.82	1.00 to 4.50	420 secs	-	-	-	1.81	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:27:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:28:00	-	-	-	-	0.2	0.0	20.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	15 secs	-	-	-	-	0.9	0.0	19.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	60 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	90 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	120 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	180 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	240 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	300 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0

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

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)
WS103	1	50	3		5.63	1.00 to 6.00	360 secs	-	-	-	1.52	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:06:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:07:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	15 secs	-	-	-	-	1.3	0.0	20.1	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	-	-	1.2	0.0	19.5	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	60 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	90 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	120 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	180 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	240 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	300 secs	-	-	-	-	1.3	0.0	19.3	0.0	0.0	0.0
WS103	1	50	4		5.63	1.00 to 6.00	360 secs	-	-	-	1.53	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:41:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:42:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0

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

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)
WS104	1	50	3		3.66	1.00 to 3.70	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:21:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:22:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.6	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.4	0.0	0.0	0.0
WS104	1	50	4		3.66	1.00 to 3.70	360 secs	-	-	-	1.08	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:34:00	1024	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	$0.5_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:35:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	15 secs	-	-	-	-	1.2	0.0	20.6	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	60 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	90 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	120 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	180 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	240 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	300 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0

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

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)
WS108	1	50	3		4.81	0.60 to 5.00	360 secs	-	-	-	0.52	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 08:59:00	1012	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 09:00:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	4		---	0.60 to 5.00	15 secs	-	-	-	-	2.0	0.0	20.3	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	-	-	1.8	0.0	19.9	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	60 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	90 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	120 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	180 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	240 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	300 secs	-	-	-	-	1.9	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		4.83	0.60 to 5.00	360 secs	-	-	-	0.55	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:32:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:33:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	15 secs	-	-	-	-	4.6	0.0	18.2	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	-	-	4.4	0.0	16.7	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	60 secs	-	-	-	-	4.3	0.0	16.6	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	90 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	120 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	180 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	240 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	300 secs	-	-	-	-	4.3	0.0	16.4	0.0	0.0	1.0

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

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)
WS110	1	50	3		3.46	0.50 to 3.50	360 secs	-	-	-	0.69	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:31:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:32:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	15 secs	-	-	-	-	3.0	0.0	19.8	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	-	-	2.9	0.0	19.1	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	60 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	90 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	120 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	180 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	240 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	300 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		3.47	0.50 to 3.50	360 secs	-	-	-	0.67	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 10:57:00	1028	1026	$-5.0_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	3		---	1.60 to 5.60	510 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 11:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	3		---	1.60 to 5.60	15 secs	-	-	-	-	0.8	0.0	20.3	0.0	2.0	0.0
WS112	1	50	3		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.1	0.0	3.0	0.0
WS112	1	50	3		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	240 secs	-	-	-	-	1.0	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	300 secs	-	-	-	-	1.0	0.0	19.9	0.0	3.0	1.0

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

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)
WS112	1	50	3		5.58	1.60 to 5.60	360 secs	-	-	-	0.97	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:05:00	1011	1012	$2.6_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	$0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	4		---	1.60 to 5.60	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	240 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	300 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		5.58	1.60 to 5.60	360 secs	-	-	-	0.93	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:01:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:02:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	3		---	1.50 to 3.50	15 secs	-	-	-	-	0.4	0.0	20.8	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0

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

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)
WS113	1	50	3		3.53	1.50 to 3.50	360 secs	-	-	-	1.82	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:57:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:58:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	4		---	1.50 to 3.50	15 secs	-	-	-	-	0.6	0.0	20.9	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	60 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	90 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	120 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	180 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	240 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	300 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		3.53	1.50 to 3.50	360 secs	-	-	-	1.77	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:15:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:16:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	15 secs	-	-	-	-	2.5	0.0	19.4	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	60 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	90 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	120 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	180 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	240 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	300 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0

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

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)
WS114	1	50	3		2.82	1.00 to 3.00	360 secs	-	-	-	1.56	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:40:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:41:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	15 secs	-	-	-	-	2.9	0.0	19.2	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	-	-	2.7	0.0	17.7	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	60 secs	-	-	-	-	2.7	0.0	17.5	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	15.8	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	240 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	300 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		2.83	1.00 to 3.00	360 secs	-	-	-	1.62	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:02:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	15 secs	-	-	-	-	2.1	0.0	18.8	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	-	-	2.0	0.0	16.7	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	60 secs	-	-	-	-	2.0	0.0	16.6	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	90 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	120 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	180 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	240 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	300 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0

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

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)
WS115	1	50	3		3.60	0.90 to 3.70	360 secs	-	-	-	1.45	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:27:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:28:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	15 secs	-	-	-	-	2.2	0.0	18.5	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	-	-	2.1	0.0	16.3	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	60 secs	-	-	-	-	2.1	0.0	16.0	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	90 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	120 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	180 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	240 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	300 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		3.58	0.90 to 3.70	360 secs	-	-	-	1.50	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:33:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:34:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	3		---	0.80 to 4.20	15 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	60 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	90 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	120 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	180 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	240 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	300 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0

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

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)
WS116	1	50	3		4.84	0.80 to 4.20	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:16:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:17:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	15 secs	-	-	-	-	2.5	0.0	19.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	60 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	90 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	120 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	180 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	240 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	300 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	1.0
WS116	1	50	4		4.81	0.80 to 4.20	360 secs	-	-	-	1.06	-	-	-	-	-	-
WSA	#REF!	#REF!	1	NDA	1.88	No Installation	23/09/2015	1005	1005	$0.0_{(I)}$	1.61	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	19.3	0.0	1.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1	NDA	9.53	No Installation	23/09/2015 15:03:00	1005	1005	$0.0_{(I)}$	2.13	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0

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

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)
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.2	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	1.89	No Installation	01/10/2015 10:16:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	1.5	0.0	20.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	1.7	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	1.8	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	1.9	0.0	19.5	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	2.3	0.0	19.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	2.9	0.0	18.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	3.1	0.0	18.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	9.02	No Installation	01/10/2015 10:22:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0

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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)
WSB	#REF!	#REF!	1	NDA	1.66	No Installation	23/09/2015	1005	1005	0.1$_{(I)}$	0.89	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	15 secs	-	-	0.1$_{(SS)}$	-	0.6	0.0	20.4	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1	NDA	3.29	No Installation	23/09/2015 00:06:00	1005	1005	0.2$_{(I)}$	2.19	0.1	0.0	20.9	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	375 secs	-	-	0.0$_{(SS)}$	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	390 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	420 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	450 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	480 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	540 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	600 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	660 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	1.66	No Installation	01/10/2015 11:27:00	1026	1026	0.2$_{(I)}$	1.14	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	0.1$_{(SS)}$	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	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:
[redacted]	22/05/17			313114

Contract: **Willen Road, Newport Pagnell**

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)
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.5	0.0	20.3	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	3.30	No Installation	01/10/2015 11:35:00	1026	1026	$0.2_{(I)}$	2.23	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	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

[redacted] | Date: 22/05/17 | Checked By: | Date:

Contract: Willen Road, Newport Pagnell

Contract Ref: 313114

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	Falling	Constant	1005	1005	
Round 2	Constant	Constant	1026	1026	
Round 3	Fluctuating	Fluctuating	1025	1025	Ground: Dry + Wind: Light + Air Temp: 9DegC
Round 4	Fluctuating	Rising	1010	1012	Ground: Dry + Wind: Strong + Air Temp: 3DegC

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)
CP102	1	50	3	9.50	---	7.50 to 9.50	21/04/2017 10:02:00	1026	1026	$0.1_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	3		---	7.50 to 9.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	3	9.50	---	7.50 to 9.50	21/04/2017 10:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	15 secs	-	-	-	-	0.2	0.1	20.9	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	30 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	60 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	90 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	120 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	180 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	240 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	300 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		9.39	7.50 to 9.50	360 secs	-	-	-	0.71	-	-	-	-	-	-
CP102	1	50	4	9.50	---	7.50 to 9.50	26/04/2017 11:45:00	1013	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	4		---	7.50 to 9.50	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	4	9.50	---	7.50 to 9.50	26/04/2017 11:46:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	4		---	7.50 to 9.50	15 secs	-	-	-	-	1.7	0.0	20.3	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	60 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	0.0

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

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)
CP102	1	50	4		---	7.50 to 9.50	90 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	120 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	180 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	240 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	300 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		9.34	7.50 to 9.50	360 secs	-	-	-	0.49	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:53:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:54:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		4.49	5.00 to 7.00	360 secs	-	-	-	1.29	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:19:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:20:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.6	0.0	20.8	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	20.6	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0

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

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)
CP103	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		4.48	5.00 to 7.00	360 secs	-	-	-	1.32	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	3		---	6.00 to 9.50	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	60 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	90 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	120 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	240 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		9.14	6.00 to 9.50	360 secs	-	-	-	1.28	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:12:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:13:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	4		---	6.00 to 9.50	15 secs	-	-	-	-	0.6	0.0	20.3	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP104	1	50	4		---	6.00 to 9.50	90 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	120 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	180 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	240 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	300 secs	-	-	-	-	0.6	0.0	19.7	0.0	1.0	0.0
CP104	1	50	4		9.14	6.00 to 9.50	360 secs	-	-	-	1.42	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:33:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:34:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
CP105	1	50	3		---	6.00 to 8.50	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		8.69	6.00 to 8.50	360 secs	-	-	-	1.44	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:52:00	996	1011	$25.2_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	$3.1_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:53:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP105	1	50	4		---	6.00 to 8.50	15 secs	-	-	-	-	0.7	0.0	20.7	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	60 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0

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

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)
CP105	1	50	4		---	6.00 to 8.50	90 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	120 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	180 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	240 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	300 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		8.78	6.00 to 8.50	360 secs	-	-	-	2.09	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.1	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		6.48	5.00 to 7.00	360 secs	-	-	-	1.35	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:54:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:55:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP106	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.4	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP106	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		6.49	5.00 to 7.00	360 secs	-	-	-	1.58	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:46:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:47:00	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	60 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	90 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	120 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	180 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	1.0
CP108	1	50	3		---	9.00 to 11.00	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	1.0
CP108	1	50	3		---	9.00 to 11.00	300 secs	-	-	-	-	0.2	0.0	20.5	0.0	1.0	1.0
CP108	1	50	3		10.48	9.00 to 11.00	360 secs	-	-	-	1.37	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:23:00	1011	1012	$0.1_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	$0.8_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:24:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP108	1	50	4		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0

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

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)
CP108	1	50	4		---	9.00 to 11.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	240 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	1.0	0.0
CP108	1	50	4		10.54	9.00 to 11.00	360 secs	-	-	-	1.67	-	-	-	-	-	-
WS01	1	50	1	3.00	3.07	1.00 to 3.00	23/09/2015	1005	1005	$0.1_{(I)}$	1.43	0.1	0.0	20.8	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	18.7	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	18.4	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
	Remarks: Samples taken.																
WS01	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 11:17:00	1026	1026	$0.2_{(I)}$	1.42	0.1	0.0	20.4	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	2.6	0.0	18.8	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0

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

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)
WS01	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS02	1	50	1	3.00	3.16	1.00 to 3.00	23/09/2015 14:06:00	1005	1005	$0.1_{(I)}$	1.62	0.1	0.0	20.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	18.4	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	16.9	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	2	3.00	3.15	1.00 to 3.00	01/10/2015 11:03:00	1026	1026	$0.2_{(I)}$	1.65	0.1	0.0	20.3	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	3.5	0.0	17.4	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	3	3.00	2.85	1.00 to 3.00	21/04/2017	-	-	-	0.58	-	-	-	-	-	-
	Remarks: Unable to monitor due to pipe being bent and gas escaping from sides.																
WS04	1	50	1	3.00	3.10	1.00 to 3.00	23/09/2015 13:40:00	1005	1005	$0.1_{(I)}$	0.78	0.1	0.0	20.8	0.0	0.0	0.0
WS04	1	50	1		---	1.00 to 3.00	15 secs	-	-	$-0.1_{(SS)}$	-	0.5	0.0	20.5	0.0	4.0	0.0
WS04	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.5	0.0	20.5	0.0	3.0	0.0

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

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)
WS04	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.5	0.0	20.1	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.1	0.0	19.6	0.0	1.0	0.0
WS04	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	16.2	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	360 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	420 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
	Remarks: Borehole ran dry after 6L purged.																
WS04	1	50	2	3.00	3.10	1.00 to 3.00	01/10/2015 10:42:00	1026	1026	$1.9_{(I)}$	0.90	0.3	0.0	20.4	0.0	0.0	0.0
WS04	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	1.3	0.0	19.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	1.4	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	18.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	17.3	0.0	1.0	0.0
WS05	1	50	1	3.00	3.08	1.00 to 3.00	23/09/2015	1005	1005	$0.0_{(I)}$	2.24	0.1	0.0	20.9	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.2	0.0	20.8	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0

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

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)
WS05	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
	Remarks: Borehole ran dry after 2L purged.																
WS05	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 10:01:00	1026	1026	$10.3_{(I)}$	2.29	0.1	0.0	20.8	0.0	0.0	0.0
WS05	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	3.2	0.0	17.0	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.2	0.0	15.3	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:11:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:12:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	15 secs	-	-	-	-	3.3	0.0	17.8	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	-	-	3.1	0.0	16.3	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	60 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	90 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	120 secs	-	-	-	-	3.1	0.0	16.1	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	180 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	240 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	300 secs	-	-	-	-	3.1	0.0	16.0	0.0	0.0	0.0

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

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)
WS101	1	50	3		4.30	1.00 to 4.50	360 secs	-	-	-	2.23	-	-	-	-	-	-
WS101	1	50	4	4.50	---	1.00 to 4.50	26/04/2017 09:39:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	75 secs	-	-	-	-	3.4	0.0	18.7	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	90 secs	-	-	-	-	3.2	0.0	16.8	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	120 secs	-	-	-	-	3.2	0.0	16.5	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	150 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	180 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	240 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	300 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	1.0
WS101	1	50	4		---	1.00 to 4.50	360 secs	-	-	-	-	3.3	0.0	16.2	0.0	0.0	1.0
WS101	1	50	4		3.82	1.00 to 4.50	420 secs	-	-	-	1.81	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:27:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:28:00	-	-	-	-	0.2	0.0	20.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	15 secs	-	-	-	-	0.9	0.0	19.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	60 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	90 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	120 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	180 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	240 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	300 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0

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

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)
WS103	1	50	3		5.63	1.00 to 6.00	360 secs	-	-	-	1.52	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:06:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:07:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	15 secs	-	-	-	-	1.3	0.0	20.1	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	-	-	1.2	0.0	19.5	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	60 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	90 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	120 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	180 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	240 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	300 secs	-	-	-	-	1.3	0.0	19.3	0.0	0.0	0.0
WS103	1	50	4		5.63	1.00 to 6.00	360 secs	-	-	-	1.53	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:41:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:42:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0

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

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)
WS104	1	50	3		3.66	1.00 to 3.70	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:21:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:22:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.6	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.4	0.0	0.0	0.0
WS104	1	50	4		3.66	1.00 to 3.70	360 secs	-	-	-	1.08	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:34:00	1024	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	$0.5_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:35:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	15 secs	-	-	-	-	1.2	0.0	20.6	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	60 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	90 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	120 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	180 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	240 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	300 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0

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

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)
WS108	1	50	3		4.81	0.60 to 5.00	360 secs	-	-	-	0.52	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 08:59:00	1012	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 09:00:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	4		---	0.60 to 5.00	15 secs	-	-	-	-	2.0	0.0	20.3	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	-	-	1.8	0.0	19.9	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	60 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	90 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	120 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	180 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	240 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	300 secs	-	-	-	-	1.9	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		4.83	0.60 to 5.00	360 secs	-	-	-	0.55	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:32:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:33:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	15 secs	-	-	-	-	4.6	0.0	18.2	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	-	-	4.4	0.0	16.7	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	60 secs	-	-	-	-	4.3	0.0	16.6	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	90 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	120 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	180 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	240 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	300 secs	-	-	-	-	4.3	0.0	16.4	0.0	0.0	1.0

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

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)
WS110	1	50	3		3.46	0.50 to 3.50	360 secs	-	-	-	0.69	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:31:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:32:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	15 secs	-	-	-	-	3.0	0.0	19.8	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	-	-	2.9	0.0	19.1	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	60 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	90 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	120 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	180 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	240 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	300 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		3.47	0.50 to 3.50	360 secs	-	-	-	0.67	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 10:57:00	1028	1026	$-5.0_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	3		---	1.60 to 5.60	510 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 11:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	3		---	1.60 to 5.60	15 secs	-	-	-	-	0.8	0.0	20.3	0.0	2.0	0.0
WS112	1	50	3		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.1	0.0	3.0	0.0
WS112	1	50	3		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	240 secs	-	-	-	-	1.0	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	300 secs	-	-	-	-	1.0	0.0	19.9	0.0	3.0	1.0

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

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)
WS112	1	50	3		5.58	1.60 to 5.60	360 secs	-	-	-	0.97	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:05:00	1011	1012	$2.6_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	$0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	4		---	1.60 to 5.60	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	240 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	300 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		5.58	1.60 to 5.60	360 secs	-	-	-	0.93	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:01:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:02:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	3		---	1.50 to 3.50	15 secs	-	-	-	-	0.4	0.0	20.8	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0

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

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)
WS113	1	50	3		3.53	1.50 to 3.50	360 secs	-	-	-	1.82	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:57:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:58:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	4		---	1.50 to 3.50	15 secs	-	-	-	-	0.6	0.0	20.9	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	60 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	90 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	120 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	180 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	240 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	300 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		3.53	1.50 to 3.50	360 secs	-	-	-	1.77	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:15:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:16:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	15 secs	-	-	-	-	2.5	0.0	19.4	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	60 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	90 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	120 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	180 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	240 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	300 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0

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

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)
WS114	1	50	3		2.82	1.00 to 3.00	360 secs	-	-	-	1.56	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:40:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:41:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	15 secs	-	-	-	-	2.9	0.0	19.2	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	-	-	2.7	0.0	17.7	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	60 secs	-	-	-	-	2.7	0.0	17.5	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	15.8	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	240 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	300 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		2.83	1.00 to 3.00	360 secs	-	-	-	1.62	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:02:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	15 secs	-	-	-	-	2.1	0.0	18.8	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	-	-	2.0	0.0	16.7	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	60 secs	-	-	-	-	2.0	0.0	16.6	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	90 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	120 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	180 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	240 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	300 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0

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

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)
WS115	1	50	3		3.60	0.90 to 3.70	360 secs	-	-	-	1.45	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:27:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:28:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	15 secs	-	-	-	-	2.2	0.0	18.5	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	-	-	2.1	0.0	16.3	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	60 secs	-	-	-	-	2.1	0.0	16.0	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	90 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	120 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	180 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	240 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	300 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		3.58	0.90 to 3.70	360 secs	-	-	-	1.50	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:33:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:34:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	3		---	0.80 to 4.20	15 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	60 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	90 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	120 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	180 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	240 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	300 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0

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

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)
WS116	1	50	3		4.84	0.80 to 4.20	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:16:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:17:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	15 secs	-	-	-	-	2.5	0.0	19.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	60 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	90 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	120 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	180 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	240 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	300 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	1.0
WS116	1	50	4		4.81	0.80 to 4.20	360 secs	-	-	-	1.06	-	-	-	-	-	-
WSA	#REF!	#REF!	1	NDA	1.88	No Installation	23/09/2015	1005	1005	$0.0_{(I)}$	1.61	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	19.3	0.0	1.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1	NDA	9.53	No Installation	23/09/2015 15:03:00	1005	1005	$0.0_{(I)}$	2.13	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0

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RSK Environment Ltd
Abbey Park
Humber Road
Coventry
CV3 4AQ

Compiled By	Date	Checked By	Date	Contract Ref:
[redacted]	26/05/17			313114

Contract: **Willen Road, Newport Pagnell**

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)
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.2	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	1.89	No Installation	01/10/2015 10:16:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	1.5	0.0	20.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	1.7	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	1.8	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	1.9	0.0	19.5	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	2.3	0.0	19.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	2.9	0.0	18.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	3.1	0.0	18.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	9.02	No Installation	01/10/2015 10:22:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0

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

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)
WSB	#REF!	#REF!	1	NDA	1.66	No Installation	23/09/2015	1005	1005	$0.1_{(I)}$	0.89	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.6	0.0	20.4	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1	NDA	3.29	No Installation	23/09/2015 00:06:00	1005	1005	$0.2_{(I)}$	2.19	0.1	0.0	20.9	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	375 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	390 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	420 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	450 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	480 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	540 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	600 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	660 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	1.66	No Installation	01/10/2015 11:27:00	1026	1026	$0.2_{(I)}$	1.14	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0

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

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)
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.5	0.0	20.3	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	3.30	No Installation	01/10/2015 11:35:00	1026	1026	$0.2_{(I)}$	2.23	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0

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RSK Environment Ltd
Abbey Park
Humber Road
Coventry
CV3 4AQ

Compiled By	Date	Checked By	Date	Contract Ref:
[redacted]	26/05/17			313114

Contract: **Willen Road, Newport Pagnell**

Page: **23** of **23**

IN-SITU GAS MONITORING RESULTS

[Pressures]	Previous	During	Start	End	Equipment Used & Remarks
Round 1	Falling	Constant	1005	1005	
Round 2	Constant	Constant	1026	1026	
Round 3	Fluctuating	Fluctuating	1025	1025	Ground: Dry + Wind: Light + Air Temp: 9DegC
Round 4	Fluctuating	Rising	1010	1012	Ground: Dry + Wind: Strong + Air Temp: 3DegC

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)
CP102	1	50	3	9.50	---	7.50 to 9.50	21/04/2017 10:02:00	1026	1026	$0.1_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	3		---	7.50 to 9.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	3	9.50	---	7.50 to 9.50	21/04/2017 10:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	15 secs	-	-	-	-	0.2	0.1	20.9	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	30 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	60 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	90 secs	-	-	-	-	0.3	0.1	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	120 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	180 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	240 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		---	7.50 to 9.50	300 secs	-	-	-	-	0.3	0.0	20.8	0.0	0.0	0.0
CP102	1	50	3		9.39	7.50 to 9.50	360 secs	-	-	-	0.71	-	-	-	-	-	-
CP102	1	50	4	9.50	---	7.50 to 9.50	26/04/2017 11:45:00	1013	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
CP102	1	50	4		---	7.50 to 9.50	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
CP102	1	50	4	9.50	---	7.50 to 9.50	26/04/2017 11:46:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP102	1	50	4		---	7.50 to 9.50	15 secs	-	-	-	-	1.7	0.0	20.3	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	60 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	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:
[redacted]	**26/05/17**			**313114**

Contract: **Willen Road, Newport Pagnell**

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)
CP102	1	50	4		---	7.50 to 9.50	90 secs	-	-	-	-	1.7	0.0	19.8	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	120 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	180 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	240 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		---	7.50 to 9.50	300 secs	-	-	-	-	1.7	0.0	19.7	0.0	1.0	0.0
CP102	1	50	4		9.34	7.50 to 9.50	360 secs	-	-	-	0.49	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:53:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 08:54:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
CP103	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
CP103	1	50	3		4.49	5.00 to 7.00	360 secs	-	-	-	1.29	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:19:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP103	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:20:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP103	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.6	0.0	20.8	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	20.6	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0

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

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)
CP103	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.6	0.0	20.5	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.6	0.0	20.4	0.0	1.0	0.0
CP103	1	50	4		4.48	5.00 to 7.00	360 secs	-	-	-	1.32	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	3	9.50	---	6.00 to 9.50	21/04/2017 13:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	3		---	6.00 to 9.50	15 secs	-	-	-	-	0.2	0.0	20.8	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	30 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	60 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	90 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	120 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	240 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		---	6.00 to 9.50	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP104	1	50	3		9.14	6.00 to 9.50	360 secs	-	-	-	1.28	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:12:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP104	1	50	4	9.50	---	6.00 to 9.50	26/04/2017 08:13:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP104	1	50	4		---	6.00 to 9.50	15 secs	-	-	-	-	0.6	0.0	20.3	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP104	1	50	4		---	6.00 to 9.50	90 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	120 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	180 secs	-	-	-	-	0.6	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	240 secs	-	-	-	-	0.5	0.0	19.8	0.0	1.0	0.0
CP104	1	50	4		---	6.00 to 9.50	300 secs	-	-	-	-	0.6	0.0	19.7	0.0	1.0	0.0
CP104	1	50	4		9.14	6.00 to 9.50	360 secs	-	-	-	1.42	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:33:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	3	8.50	---	6.00 to 8.50	21/04/2017 11:34:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
CP105	1	50	3		---	6.00 to 8.50	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		---	6.00 to 8.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP105	1	50	3		8.69	6.00 to 8.50	360 secs	-	-	-	1.44	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:52:00	996	1011	$25.2_{(I)}$	-	-	-	-	-	-	-
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	$3.1_{(SS)}$	-	-	-	-	-	-	-
CP105	1	50	4	8.50	---	6.00 to 8.50	26/04/2017 10:53:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP105	1	50	4		---	6.00 to 8.50	15 secs	-	-	-	-	0.7	0.0	20.7	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	30 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	60 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0

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

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)
CP105	1	50	4		---	6.00 to 8.50	90 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	120 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	180 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	240 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		---	6.00 to 8.50	300 secs	-	-	-	-	0.7	0.0	20.5	0.0	1.0	0.0
CP105	1	50	4		8.78	6.00 to 8.50	360 secs	-	-	-	2.09	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:17:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	3	7.00	---	5.00 to 7.00	21/04/2017 11:18:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.1	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	30 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.7	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.6	0.0	0.0	0.0
CP106	1	50	3		6.48	5.00 to 7.00	360 secs	-	-	-	1.35	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:54:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP106	1	50	4	7.00	---	5.00 to 7.00	26/04/2017 09:55:00	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
CP106	1	50	4		---	5.00 to 7.00	15 secs	-	-	-	-	0.5	0.0	20.4	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	30 secs	-	-	-	-	0.6	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	60 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0

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

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)
CP106	1	50	4		---	5.00 to 7.00	90 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	120 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	180 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	240 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		---	5.00 to 7.00	300 secs	-	-	-	-	0.5	0.0	19.9	0.0	1.0	0.0
CP106	1	50	4		6.49	5.00 to 7.00	360 secs	-	-	-	1.58	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:46:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	3	11.00	---	9.00 to 11.00	21/04/2017 12:47:00	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	30 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	60 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	90 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	0.0
CP108	1	50	3		---	9.00 to 11.00	120 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
CP108	1	50	3		---	9.00 to 11.00	180 secs	-	-	-	-	0.2	0.0	20.6	0.0	1.0	1.0
CP108	1	50	3		---	9.00 to 11.00	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	1.0
CP108	1	50	3		---	9.00 to 11.00	300 secs	-	-	-	-	0.2	0.0	20.5	0.0	1.0	1.0
CP108	1	50	3		10.48	9.00 to 11.00	360 secs	-	-	-	1.37	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:23:00	1011	1012	$0.1_{(I)}$	-	-	-	-	-	-	-
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	$0.8_{(SS)}$	-	-	-	-	-	-	-
CP108	1	50	4	11.00	---	9.00 to 11.00	26/04/2017 12:24:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
CP108	1	50	4		---	9.00 to 11.00	15 secs	-	-	-	-	0.2	0.0	20.7	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0

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

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)
CP108	1	50	4		---	9.00 to 11.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	240 secs	-	-	-	-	0.3	0.0	20.5	0.0	1.0	0.0
CP108	1	50	4		---	9.00 to 11.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	1.0	0.0
CP108	1	50	4		10.54	9.00 to 11.00	360 secs	-	-	-	1.67	-	-	-	-	-	-
WS01	1	50	1	3.00	3.07	1.00 to 3.00	23/09/2015	1005	1005	$0.1_{(I)}$	1.43	0.1	0.0	20.8	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	18.7	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	2.2	0.0	18.4	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
WS01	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	2.3	0.0	18.3	0.0	0.0	0.0
	Remarks: Samples taken.																
WS01	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 11:17:00	1026	1026	$0.2_{(I)}$	1.42	0.1	0.0	20.4	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	2.6	0.0	18.8	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	2.6	0.0	18.0	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS01	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0

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

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)
WS01	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.6	0.0	18.1	0.0	0.0	0.0
WS02	1	50	1	3.00	3.16	1.00 to 3.00	23/09/2015 14:06:00	1005	1005	$0.1_{(I)}$	1.62	0.1	0.0	20.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	18.4	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	3.3	0.0	16.9	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	3.3	0.0	16.8	0.0	1.0	0.0
WS02	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.3	0.0	16.8	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.4	0.0	16.9	0.0	0.0	0.0
WS02	1	50	2	3.00	3.15	1.00 to 3.00	01/10/2015 11:03:00	1026	1026	$0.2_{(I)}$	1.65	0.1	0.0	20.3	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.1_{(SS)}$	-	3.5	0.0	17.4	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.6	0.0	15.9	0.0	0.0	0.0
WS02	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.6	0.0	16.0	0.0	0.0	0.0
WS02	1	50	3	3.00	2.85	1.00 to 3.00	21/04/2017	-	-	-	0.58	-	-	-	-	-	-
	Remarks: Unable to monitor due to pipe being bent and gas escaping from sides.																
WS04	1	50	1	3.00	3.10	1.00 to 3.00	23/09/2015 13:40:00	1005	1005	$0.1_{(I)}$	0.78	0.1	0.0	20.8	0.0	0.0	0.0
WS04	1	50	1		---	1.00 to 3.00	15 secs	-	-	$-0.1_{(SS)}$	-	0.5	0.0	20.5	0.0	4.0	0.0
WS04	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.5	0.0	20.5	0.0	3.0	0.0

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

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)
WS04	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.5	0.0	20.1	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.5	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.7	0.0	20.0	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	3.1	0.0	19.6	0.0	1.0	0.0
WS04	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	16.2	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	360 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
WS04	1	50	1		---	1.00 to 3.00	420 secs	-	-	-	-	3.4	0.0	15.9	0.0	2.0	0.0
	Remarks: Borehole ran dry after 6L purged.																
WS04	1	50	2	3.00	3.10	1.00 to 3.00	01/10/2015 10:42:00	1026	1026	$1.9_{(I)}$	0.90	0.3	0.0	20.4	0.0	0.0	0.0
WS04	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	1.3	0.0	19.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	1.3	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	1.4	0.0	19.6	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	2.0	0.0	18.9	0.0	1.0	0.0
WS04	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	2.0	0.0	17.3	0.0	1.0	0.0
WS05	1	50	1	3.00	3.08	1.00 to 3.00	23/09/2015	1005	1005	$0.0_{(I)}$	2.24	0.1	0.0	20.9	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	15 secs	-	-	$0.0_{(SS)}$	-	0.2	0.0	20.8	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	120 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0

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

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)
WS05	1	50	1		---	1.00 to 3.00	180 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	240 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
WS05	1	50	1		---	1.00 to 3.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	0.0	0.0
	Remarks: Borehole ran dry after 2L purged.																
WS05	1	50	2	3.00	3.08	1.00 to 3.00	01/10/2015 10:01:00	1026	1026	$10.3_{(I)}$	2.29	0.1	0.0	20.8	0.0	0.0	0.0
WS05	1	50	2		---	1.00 to 3.00	15 secs	-	-	$0.3_{(SS)}$	-	3.2	0.0	17.0	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	30 secs	-	-	-	-	3.2	0.0	15.3	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	60 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	90 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	120 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	180 secs	-	-	-	-	3.2	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	240 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS05	1	50	2		---	1.00 to 3.00	300 secs	-	-	-	-	3.3	0.0	15.1	0.0	2.0	0.0
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:11:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	3	4.50	---	1.00 to 4.50	21/04/2017 09:12:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	15 secs	-	-	-	-	3.3	0.0	17.8	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	30 secs	-	-	-	-	3.1	0.0	16.3	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	60 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	90 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	120 secs	-	-	-	-	3.1	0.0	16.1	0.0	0.0	0.0
WS101	1	50	3		---	1.00 to 4.50	180 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	240 secs	-	-	-	-	3.1	0.0	16.1	0.0	1.0	0.0
WS101	1	50	3		---	1.00 to 4.50	300 secs	-	-	-	-	3.1	0.0	16.0	0.0	0.0	0.0

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

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)
WS101	1	50	3		4.30	1.00 to 4.50	360 secs	-	-	-	2.23	-	-	-	-	-	-
WS101	1	50	4	4.50	---	1.00 to 4.50	26/04/2017 09:39:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS101	1	50	4		---	1.00 to 4.50	60 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	75 secs	-	-	-	-	3.4	0.0	18.7	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	90 secs	-	-	-	-	3.2	0.0	16.8	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	120 secs	-	-	-	-	3.2	0.0	16.5	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	150 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	180 secs	-	-	-	-	3.2	0.0	16.4	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	240 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	0.0
WS101	1	50	4		---	1.00 to 4.50	300 secs	-	-	-	-	3.3	0.0	16.3	0.0	0.0	1.0
WS101	1	50	4		---	1.00 to 4.50	360 secs	-	-	-	-	3.3	0.0	16.2	0.0	0.0	1.0
WS101	1	50	4		3.82	1.00 to 4.50	420 secs	-	-	-	1.81	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:27:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	3	6.00	---	1.00 to 6.00	21/04/2017 09:28:00	-	-	-	-	0.2	0.0	20.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	15 secs	-	-	-	-	0.9	0.0	19.9	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	30 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	60 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	90 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	120 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	180 secs	-	-	-	-	0.9	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	240 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0
WS103	1	50	3		---	1.00 to 6.00	300 secs	-	-	-	-	1.0	0.0	19.5	0.0	0.0	0.0

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

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)
WS103	1	50	3		5.63	1.00 to 6.00	360 secs	-	-	-	1.52	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:06:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS103	1	50	4	6.00	---	1.00 to 6.00	26/04/2017 10:07:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	15 secs	-	-	-	-	1.3	0.0	20.1	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	30 secs	-	-	-	-	1.2	0.0	19.5	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	60 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	90 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	120 secs	-	-	-	-	1.2	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	180 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	240 secs	-	-	-	-	1.3	0.0	19.4	0.0	0.0	0.0
WS103	1	50	4		---	1.00 to 6.00	300 secs	-	-	-	-	1.3	0.0	19.3	0.0	0.0	0.0
WS103	1	50	4		5.63	1.00 to 6.00	360 secs	-	-	-	1.53	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:41:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	3	3.70	---	1.00 to 3.70	21/04/2017 09:42:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0
WS104	1	50	3		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.2	0.0	0.0	0.0

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

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)
WS104	1	50	3		3.66	1.00 to 3.70	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:21:00	1011	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS104	1	50	4	3.70	---	1.00 to 3.70	26/04/2017 10:22:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	15 secs	-	-	-	-	1.0	0.0	20.6	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	30 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	60 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	90 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	120 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	180 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	240 secs	-	-	-	-	1.0	0.0	20.3	0.0	0.0	0.0
WS104	1	50	4		---	1.00 to 3.70	300 secs	-	-	-	-	1.0	0.0	20.4	0.0	0.0	0.0
WS104	1	50	4		3.66	1.00 to 3.70	360 secs	-	-	-	1.08	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:34:00	1024	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	$0.5_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	3	5.00	---	0.60 to 5.00	21/04/2017 08:35:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	15 secs	-	-	-	-	1.2	0.0	20.6	0.0	0.0	0.0
WS108	1	50	3		---	0.60 to 5.00	30 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	60 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	90 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	120 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	180 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	240 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0
WS108	1	50	3		---	0.60 to 5.00	300 secs	-	-	-	-	1.2	0.0	20.2	0.0	1.0	0.0

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

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)
WS108	1	50	3		4.81	0.60 to 5.00	360 secs	-	-	-	0.52	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 08:59:00	1012	1011	$0.0_{(I)}$	-	-	-	-	-	-	-
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS108	1	50	4	5.00	---	0.60 to 5.00	26/04/2017 09:00:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS108	1	50	4		---	0.60 to 5.00	15 secs	-	-	-	-	2.0	0.0	20.3	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	30 secs	-	-	-	-	1.8	0.0	19.9	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	60 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	90 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	120 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	180 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	240 secs	-	-	-	-	1.8	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		---	0.60 to 5.00	300 secs	-	-	-	-	1.9	0.0	19.8	0.0	1.0	0.0
WS108	1	50	4		4.83	0.60 to 5.00	360 secs	-	-	-	0.55	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:32:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	3	3.50	---	0.50 to 3.50	21/04/2017 12:33:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	15 secs	-	-	-	-	4.6	0.0	18.2	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	30 secs	-	-	-	-	4.4	0.0	16.7	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	60 secs	-	-	-	-	4.3	0.0	16.6	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	90 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	120 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	180 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	240 secs	-	-	-	-	4.3	0.0	16.5	0.0	0.0	0.0
WS110	1	50	3		---	0.50 to 3.50	300 secs	-	-	-	-	4.3	0.0	16.4	0.0	0.0	1.0

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

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)
WS110	1	50	3		3.46	0.50 to 3.50	360 secs	-	-	-	0.69	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:31:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS110	1	50	4	3.50	---	0.50 to 3.50	26/04/2017 11:32:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	15 secs	-	-	-	-	3.0	0.0	19.8	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	30 secs	-	-	-	-	2.9	0.0	19.1	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	60 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	90 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	120 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	180 secs	-	-	-	-	2.9	0.0	19.0	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	240 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		---	0.50 to 3.50	300 secs	-	-	-	-	2.9	0.0	18.9	0.0	0.0	0.0
WS110	1	50	4		3.47	0.50 to 3.50	360 secs	-	-	-	0.67	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 10:57:00	1028	1026	$-5.0_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	3		---	1.60 to 5.60	510 secs	-	-	$-0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	3	5.60	---	1.60 to 5.60	21/04/2017 11:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	3		---	1.60 to 5.60	15 secs	-	-	-	-	0.8	0.0	20.3	0.0	2.0	0.0
WS112	1	50	3		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.1	0.0	3.0	0.0
WS112	1	50	3		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	240 secs	-	-	-	-	1.0	0.0	20.0	0.0	3.0	1.0
WS112	1	50	3		---	1.60 to 5.60	300 secs	-	-	-	-	1.0	0.0	19.9	0.0	3.0	1.0

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

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)
WS112	1	50	3		5.58	1.60 to 5.60	360 secs	-	-	-	0.97	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:05:00	1011	1012	$2.6_{(I)}$	-	-	-	-	-	-	-
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	$0.3_{(SS)}$	-	-	-	-	-	-	-
WS112	1	50	4	5.60	---	1.60 to 5.60	26/04/2017 12:06:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS112	1	50	4		---	1.60 to 5.60	15 secs	-	-	-	-	1.0	0.0	20.5	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	30 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	60 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	90 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	120 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	180 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	240 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		---	1.60 to 5.60	300 secs	-	-	-	-	0.9	0.0	20.2	0.0	2.0	0.0
WS112	1	50	4		5.58	1.60 to 5.60	360 secs	-	-	-	0.93	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:01:00	1024	1024	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	3	3.50	---	1.50 to 3.50	21/04/2017 13:02:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	3		---	1.50 to 3.50	15 secs	-	-	-	-	0.4	0.0	20.8	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	30 secs	-	-	-	-	0.3	0.0	20.7	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	60 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	90 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	120 secs	-	-	-	-	0.3	0.0	20.6	0.0	1.0	0.0
WS113	1	50	3		---	1.50 to 3.50	180 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	240 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0
WS113	1	50	3		---	1.50 to 3.50	300 secs	-	-	-	-	0.3	0.0	20.6	0.0	2.0	0.0

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

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)
WS113	1	50	3		3.53	1.50 to 3.50	360 secs	-	-	-	1.82	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:57:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS113	1	50	4	3.50	---	1.50 to 3.50	26/04/2017 07:58:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS113	1	50	4		---	1.50 to 3.50	15 secs	-	-	-	-	0.6	0.0	20.9	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	30 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	60 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	90 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	120 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	180 secs	-	-	-	-	0.5	0.0	20.7	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	240 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		---	1.50 to 3.50	300 secs	-	-	-	-	0.5	0.0	20.8	0.0	1.0	0.0
WS113	1	50	4		3.53	1.50 to 3.50	360 secs	-	-	-	1.77	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:15:00	1025	1025	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	3	3.00	---	1.00 to 3.00	21/04/2017 08:16:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	15 secs	-	-	-	-	2.5	0.0	19.4	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	30 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	60 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	90 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	120 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	180 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	240 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0
WS114	1	50	3		---	1.00 to 3.00	300 secs	-	-	-	-	2.4	0.0	18.0	0.0	0.0	0.0

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

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)
WS114	1	50	3		2.82	1.00 to 3.00	360 secs	-	-	-	1.56	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:40:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS114	1	50	4	3.00	---	1.00 to 3.00	26/04/2017 08:41:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	15 secs	-	-	-	-	2.9	0.0	19.2	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	30 secs	-	-	-	-	2.7	0.0	17.7	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	60 secs	-	-	-	-	2.7	0.0	17.5	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	90 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	120 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	180 secs	-	-	-	-	2.8	0.0	15.8	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	240 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		---	1.00 to 3.00	300 secs	-	-	-	-	2.8	0.0	17.4	0.0	0.0	0.0
WS114	1	50	4		2.83	1.00 to 3.00	360 secs	-	-	-	1.62	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:02:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	3	3.70	---	0.90 to 3.70	21/04/2017 08:03:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	15 secs	-	-	-	-	2.1	0.0	18.8	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	30 secs	-	-	-	-	2.0	0.0	16.7	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	60 secs	-	-	-	-	2.0	0.0	16.6	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	90 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	120 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	180 secs	-	-	-	-	2.0	0.0	16.5	0.0	1.0	0.0
WS115	1	50	3		---	0.90 to 3.70	240 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0
WS115	1	50	3		---	0.90 to 3.70	300 secs	-	-	-	-	2.0	0.0	16.5	0.0	0.0	0.0

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

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)
WS115	1	50	3		3.60	0.90 to 3.70	360 secs	-	-	-	1.45	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:27:00	1010	1010	$0.0_{(I)}$	-	-	-	-	-	-	-
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS115	1	50	4	3.70	---	0.90 to 3.70	26/04/2017 08:28:00	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	15 secs	-	-	-	-	2.2	0.0	18.5	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	30 secs	-	-	-	-	2.1	0.0	16.3	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	60 secs	-	-	-	-	2.1	0.0	16.0	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	90 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	120 secs	-	-	-	-	2.1	0.0	15.9	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	180 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	240 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		---	0.90 to 3.70	300 secs	-	-	-	-	2.2	0.0	15.8	0.0	0.0	0.0
WS115	1	50	4		3.58	0.90 to 3.70	360 secs	-	-	-	1.50	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:33:00	1025	1025	$0.1_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	$0.0_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	3	5.00	---	0.80 to 4.20	21/04/2017 13:34:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	3		---	0.80 to 4.20	15 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	30 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	60 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	90 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	120 secs	-	-	-	-	2.1	0.0	18.2	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	180 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	240 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0
WS116	1	50	3		---	0.80 to 4.20	300 secs	-	-	-	-	2.1	0.0	18.1	0.0	1.0	0.0

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

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)
WS116	1	50	3		4.84	0.80 to 4.20	360 secs	-	-	-	1.05	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:16:00	1012	1012	$0.0_{(I)}$	-	-	-	-	-	-	-
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	$0.1_{(SS)}$	-	-	-	-	-	-	-
WS116	1	50	4	5.00	---	0.80 to 4.20	26/04/2017 11:17:00	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	15 secs	-	-	-	-	2.5	0.0	19.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	30 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	60 secs	-	-	-	-	2.4	0.0	18.3	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	90 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	120 secs	-	-	-	-	2.4	0.0	18.2	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	180 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	240 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	0.0
WS116	1	50	4		---	0.80 to 4.20	300 secs	-	-	-	-	2.4	0.0	18.1	0.0	0.0	1.0
WS116	1	50	4		4.81	0.80 to 4.20	360 secs	-	-	-	1.06	-	-	-	-	-	-
WSA	#REF!	#REF!	1	NDA	1.88	No Installation	23/09/2015	1005	1005	$0.0_{(I)}$	1.61	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	3.2	0.0	19.3	0.0	1.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	3.3	0.0	18.3	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	3.4	0.0	18.2	0.0	0.0	0.0
WSA	#REF!	#REF!	1	NDA	9.53	No Installation	23/09/2015 15:03:00	1005	1005	$0.0_{(I)}$	2.13	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0

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

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)
WSA	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.2	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.2	0.0	20.6	0.0	0.0	0.0
WSA	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.2	0.0	20.7	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	1.89	No Installation	01/10/2015 10:16:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	1.5	0.0	20.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	1.6	0.0	19.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	1.7	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	1.8	0.0	19.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	1.9	0.0	19.5	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	2.3	0.0	19.2	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	2.9	0.0	18.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	3.1	0.0	18.6	0.0	0.0	0.0
WSA	#REF!	#REF!	2	NDA	9.02	No Installation	01/10/2015 10:22:00	1026	1026	$0.2_{(I)}$	1.63	0.1	0.0	20.9	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSA	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0

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

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)
WSB	#REF!	#REF!	1	NDA	1.66	No Installation	23/09/2015	1005	1005	$0.1_{(I)}$	0.89	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.6	0.0	20.4	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	30 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	60 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	90 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	120 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	180 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	240 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	300 secs	-	-	-	-	0.4	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	1	NDA	3.29	No Installation	23/09/2015 00:06:00	1005	1005	$0.2_{(I)}$	2.19	0.1	0.0	20.9	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	375 secs	-	-	$0.0_{(SS)}$	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	390 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	420 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	450 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	480 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	540 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	600 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	1		---	No Installation	660 secs	-	-	-	-	0.1	0.0	20.7	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	1.66	No Installation	01/10/2015 11:27:00	1026	1026	$0.2_{(I)}$	1.14	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.3	0.0	20.6	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0

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

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)
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.5	0.0	20.3	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.3	0.0	20.5	0.0	0.0	0.0
WSB	#REF!	#REF!	2	NDA	3.30	No Installation	01/10/2015 11:35:00	1026	1026	$0.2_{(I)}$	2.23	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	15 secs	-	-	$0.1_{(SS)}$	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	30 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	60 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	90 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	120 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0
WSB	#REF!	#REF!	2		---	No Installation	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	0.0	0.0

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

APPENDIX H
LABORATORY CERTIFICATES FOR SOIL ANALYSIS (2017)

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT
SUPPLEMENT TO TEST REPORT 17/02568/1

Envirolab Job Number: 17/02568
Issue Number: 2 **Date:** 15 May, 2017

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Darren Bench/Michael Lawson
Project Name: Willen Road, Newport Pagnell
Project Ref: 313114
Order No: N/A
Date Samples Received: 28/03/17
Date Instructions Received: 11/04/17
Date Analysis Completed: 10/05/17

Prepared by: **Approved by:**

[redacted]

Laboratory Manager Director

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/1	17/02568/2	17/02568/3	17/02568/4	17/02568/5	17/02568/6	17/02568/7	17/02568/8	Units	Method ref
Client Sample No										
Client Sample ID	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120		
Depth to Top	0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20		
Depth To Bottom			1.50	0.60						
Date Sampled	28-Mar-17	28-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	21-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5A	5A	6AE	5A	5A	5A	5AE	5AEB		
% Stones >10mm$_A^{\#}$	9.6	7.7	13.1	<0.1	17.2	16.7	8.4	8.2	% w/w	A-T-044
pH$_D^{M\#}$	7.94	8.09	7.52	6.76	7.09	8.25	8.03	7.82	pH	A-T-031s
Total Organic Carbon$_D^{M\#}$	1.51	0.90	2.10	1.23	0.12	0.15	1.06	0.96	% w/w	A-T-032s
Arsenic$_D^{M\#}$	5	11	14	9	14	24	9	8	mg/kg	A-T-024s
Boron (water soluble)$_D^{M\#}$	1.4	1.0	1.7	<1.0	<1.0	<1.0	1.0	1.3	mg/kg	A-T-027s
Cadmium$_D^{M\#}$	0.6	0.8	1.0	0.6	0.9	0.8	0.5	0.8	mg/kg	A-T-024s
Copper$_D^{M\#}$	16	8	10	6	9	<1	14	11	mg/kg	A-T-024s
Chromium$_D^{M\#}$	20	33	31	19	25	12	15	28	mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Lead$_D^{M\#}$	52	18	33	23	12	8	147	21	mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	0.25	0.22	mg/kg	A-T-024s
Nickel$_D^{M\#}$	14	24	26	15	30	17	16	25	mg/kg	A-T-024s
Selenium$_D$	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-024s
Zinc$_D^{M\#}$	67	52	128	36	46	37	79	53	mg/kg	A-T-024s
Leachate Prep BS EN 12457-1 (2:1) (per 250ml prepared leachate)$_A$	-	*	-	*	-	-	*	*		A-T-001
Arsenic (leachable)$_A^{\#}$	-	<1	-	<1	-	-	5	4	µg/l	A-T-025w
Cadmium (leachable)$_A^{\#}$	-	<1	-	<1	-	-	<1	<1	µg/l	A-T-025w
Copper (leachable)$_A^{\#}$	-	4	-	2	-	-	4	2	µg/l	A-T-025w
Chromium (leachable)$_A^{\#}$	-	<1	-	<1	-	-	<1	<1	µg/l	A-T-025w
Chromium (hexavalent) (leachable)$_A$	-	<0.05	-	<0.05	-	-	<0.05	<0.05	mg/l	A-T-040w
Lead (leachable)$_A^{\#}$	-	<1	-	<1	-	-	6	1	µg/l	A-T-025w
Mercury (leachable)$_A^{\#}$	-	<0.1	-	0.1	-	-	<0.1	<0.1	µg/l	A-T-025w
Nickel (leachable)$_A^{\#}$	-	2	-	1	-	-	5	3	µg/l	A-T-025w
Selenium (leachable)$_A^{\#}$	-	<1	-	<1	-	-	2	<1	µg/l	A-T-025w
Zinc (leachable)$_A^{\#}$	-	7	-	5	-	-	15	9	µg/l	A-T-025w

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/1	17/02568/2	17/02568/3	17/02568/4	17/02568/5	17/02568/6	17/02568/7	17/02568/8	Units	Method ref
Client Sample No										
Client Sample ID	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120		
Depth to Top	0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20		
Depth To Bottom			1.50	0.60						
Date Sampled	28-Mar-17	28-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	21-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5A	5A	6AE	5A	5A	5A	5AE	5AEB		
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{A}^{\#}$	NAD	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD		A-T-045
Asbestos Matrix (microscope)$_{A}$	-	-	-	Loose Fibres	-	-	-	-		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		
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_{D}$	-	-	-	<0.001	-	-	-	-	% w/w	A-T-054

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/1	17/02568/2	17/02568/3	17/02568/4	17/02568/5	17/02568/6	17/02568/7	17/02568/8	Units	Method ref
Client Sample No										
Client Sample ID	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120		
Depth to Top	0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20		
Depth To Bottom			1.50	0.60						
Date Sampled	28-Mar-17	28-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	21-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5A	5A	6AE	5A	5A	5A	5AE	5AEB		
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	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	0.04	<0.02	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	0.10	<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$_A^{M\#}$	0.06	<0.05	0.05	<0.05	<0.05	<0.05	0.06	<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$_A^{M\#}$	0.07	<0.06	<0.06	<0.06	<0.06	<0.06	0.11	<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$_A^{M\#}$	0.11	<0.08	0.09	<0.08	<0.08	<0.08	0.22	0.09	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.03	<0.03	0.04	<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$_A^{M\#}$	0.04	<0.03	0.04	<0.03	<0.03	<0.03	0.16	0.06	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.09	<0.07	0.09	<0.07	<0.07	<0.07	0.18	<0.07	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	0.46	<0.08	0.37	<0.08	<0.08	<0.08	0.87	0.24	mg/kg	A-T-019s

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/1	17/02568/2	17/02568/3	17/02568/4	17/02568/5	17/02568/6	17/02568/7	17/02568/8	Units	Method ref
Client Sample No										
Client Sample ID	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120		
Depth to Top	0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20		
Depth To Bottom			1.50	0.60						
Date Sampled	28-Mar-17	28-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	30-Mar-17	28-Mar-17	21-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5A	5A	6AE	5A	5A	5A	5AE	5AEB		
TPH CWG										
Ali >C5-C6$_A^\#$	<0.01	<0.01	<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	0.9	<0.1	mg/kg	A-T-023s
Ali >C16-C21$_A^\#$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.5	<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	2.3	<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	0.4	0.4	mg/kg	A-T-023s
Aro >C12-C16$_A^\#$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.7	2.8	mg/kg	A-T-023s
Aro >C16-C21$_A^\#$	0.3	<0.1	0.3	<0.1	<0.1	<0.1	3.3	6.2	mg/kg	A-T-023s
Aro >C21-C35$_A^\#$	2.3	<0.1	0.6	0.4	<0.1	<0.1	2.8	3.8	mg/kg	A-T-023s
Total Aromatics$_A$	2.7	<0.1	0.8	0.4	<0.1	<0.1	8.1	13.2	mg/kg	A-T-023s
TPH (Ali & Aro)$_A$	2.7	<0.1	0.8	0.4	<0.1	<0.1	10.5	13.2	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: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/9	17/02568/10	17/02568/11	17/02568/12	17/02568/13	17/02568/14	17/02568/15	17/02568/33	Units	Method ref
Client Sample No										
Client Sample ID	TP122	TP128	TP131	TP133	TP136	WS110	WS112	WS113		
Depth to Top	1.20	0.60	2.50	1.20	0.20	2.20	1.10	0.20		
Depth To Bottom	1.30							1.00		
Date Sampled	30-Mar-17	31-Mar-17	20-Mar-17	20-Mar-17	28-Mar-17	24-Mar-17	22-Mar-17	24-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil		
Sample Matrix Code	5A	5A	6AE	5A	6AE	5A	6AE	5A		
% Stones >10mm$_A^{\#}$	8.6	2.4	12.7	1.7	4.9	9.6	14.1	-	% w/w	A-T-044
pH$_D^{M\#}$	8.04	7.89	7.67	7.72	6.91	7.60	7.80	-	pH	A-T-031s
Total Organic Carbon$_D^{M\#}$	0.88	0.30	1.17	1.54	1.80	1.01	0.82	-	% w/w	A-T-032s
Arsenic$_D^{M\#}$	14	16	10	14	10	12	10	-	mg/kg	A-T-024s
Boron (water soluble)$_D^{M\#}$	1.0	<1.0	1.0	<1.0	<1.0	1.2	<1.0	-	mg/kg	A-T-027s
Cadmium$_D^{M\#}$	0.9	1.1	0.7	1.3	0.8	0.6	0.8	-	mg/kg	A-T-024s
Copper$_D^{M\#}$	12	11	12	8	12	6	9	-	mg/kg	A-T-024s
Chromium$_D^{M\#}$	22	24	18	23	20	22	24	-	mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1	<1	-	mg/kg	A-T-040s
Lead$_D^{M\#}$	16	13	21	14	30	20	13	-	mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17	0.30	<0.17	<0.17	0.32	<0.17	-	mg/kg	A-T-024s
Nickel$_D^{M\#}$	25	32	19	30	18	16	25	-	mg/kg	A-T-024s
Selenium$_D$	<1	<1	<1	<1	<1	<1	<1	-	mg/kg	A-T-024s
Zinc$_D^{M\#}$	66	52	52	65	53	45	53	-	mg/kg	A-T-024s
Leachate Prep BS EN 12457-1 (2:1) (per 250ml prepared leachate)$_A$	*	-	-	-	-	-	*	-		A-T-001
Arsenic (leachable)$_A^{\#}$	2	-	-	-	-	-	1	-	µg/l	A-T-025w
Cadmium (leachable)$_A^{\#}$	<1	-	-	-	-	-	<1	-	µg/l	A-T-025w
Copper (leachable)$_A^{\#}$	1	-	-	-	-	-	3	-	µg/l	A-T-025w
Chromium (leachable)$_A^{\#}$	<1	-	-	-	-	-	<1	-	µg/l	A-T-025w
Chromium (hexavalent) (leachable)$_A$	<0.05	-	-	-	-	-	<0.05	-	mg/l	A-T-040w
Lead (leachable)$_A^{\#}$	1	-	-	-	-	-	<1	-	µg/l	A-T-025w
Mercury (leachable)$_A^{\#}$	<0.1	-	-	-	-	-	<0.1	-	µg/l	A-T-025w
Nickel (leachable)$_A^{\#}$	1	-	-	-	-	-	3	-	µg/l	A-T-025w
Selenium (leachable)$_A^{\#}$	<1	-	-	-	-	-	<1	-	µg/l	A-T-025w
Zinc (leachable)$_A^{\#}$	11	-	-	-	-	-	10	-	µg/l	A-T-025w

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/9	17/02568/10	17/02568/11	17/02568/12	17/02568/13	17/02568/14	17/02568/15	17/02568/33	Units	Method ref
Client Sample No										
Client Sample ID	TP122	TP128	TP131	TP133	TP136	WS110	WS112	WS113		
Depth to Top	1.20	0.60	2.50	1.20	0.20	2.20	1.10	0.20		
Depth To Bottom	1.30							1.00		
Date Sampled	30-Mar-17	31-Mar-17	20-Mar-17	20-Mar-17	28-Mar-17	24-Mar-17	22-Mar-17	24-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil		
Sample Matrix Code	5A	5A	6AE	5A	6AE	5A	6AE	5A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	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: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/9	17/02568/10	17/02568/11	17/02568/12	17/02568/13	17/02568/14	17/02568/15	17/02568/33	Units	Method ref
Client Sample No										
Client Sample ID	TP122	TP128	TP131	TP133	TP136	WS110	WS112	WS113		
Depth to Top	1.20	0.60	2.50	1.20	0.20	2.20	1.10	0.20		
Depth To Bottom	1.30							1.00		
Date Sampled	30-Mar-17	31-Mar-17	20-Mar-17	20-Mar-17	28-Mar-17	24-Mar-17	22-Mar-17	24-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil		
Sample Matrix Code	5A	5A	6AE	5A	6AE	5A	6AE	5A		
PAH 16										
Acenaphthene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<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	-	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	-	mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<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	-	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<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	-	mg/kg	A-T-019s

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/9	17/02568/10	17/02568/11	17/02568/12	17/02568/13	17/02568/14	17/02568/15	17/02568/33	Units	Method ref
Client Sample No										
Client Sample ID	TP122	TP128	TP131	TP133	TP136	WS110	WS112	WS113		
Depth to Top	1.20	0.60	2.50	1.20	0.20	2.20	1.10	0.20		
Depth To Bottom	1.30							1.00		
Date Sampled	30-Mar-17	31-Mar-17	20-Mar-17	20-Mar-17	28-Mar-17	24-Mar-17	22-Mar-17	24-Mar-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil		
Sample Matrix Code	5A	5A	6AE	5A	6AE	5A	6AE	5A		
TPH CWG										
Ali >C5-C6$_A^\#$	<0.01	<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	-	mg/kg	A-T-022s
Ali >C8-C10$_A^\#$	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<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	-	mg/kg	A-T-023s
Ali >C12-C16$_A^\#$	<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	-	mg/kg	A-T-023s
Ali >C21-C35$_A^\#$	<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	-	mg/kg	A-T-023s
Aro >C5-C7$_A^\#$	<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	-	mg/kg	A-T-022s
Aro >C8-C9$_A^\#$	<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	-	mg/kg	A-T-022s
Aro >C10-C12$_A^\#$	<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	0.9	<0.1	-	mg/kg	A-T-023s
Aro >C16-C21$_A^\#$	<0.1	<0.1	1.8	<0.1	<0.1	2.2	0.7	-	mg/kg	A-T-023s
Aro >C21-C35$_A^\#$	<0.1	<0.1	11.5	<0.1	<0.1	4.3	2.4	-	mg/kg	A-T-023s
Total Aromatics$_A$	<0.1	<0.1	13.4	<0.1	<0.1	7.4	3.1	-	mg/kg	A-T-023s
TPH (Ali & Aro)$_A$	<0.1	<0.1	13.4	<0.1	<0.1	7.4	3.1	-	mg/kg	A-T-023s
BTEX - Benzene$_A^\#$	<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	-	mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A^\#$	<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	-	mg/kg	A-T-022s
BTEX - o Xylene$_A^\#$	<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	-	mg/kg	A-T-022s

Envirolab Job Number: 17/02568

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02568/34								Units	Method ref
Client Sample No										
Client Sample ID	WS113									
Depth to Top	0.20									
Depth To Bottom	1.20									
Date Sampled	24-Mar-17									
Sample Type	Solid - Fragment / Tile									
Sample Matrix Code	8									
Bulk Fibre ID (inc. matrix) ^										
Bulk Fibre Identification$_A^{\#}$	NAD									A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test?$_D$	N/A									Gravimetry

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. 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.

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 (2017)

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/03210
Issue Number: 1 **Date:** 23 May, 2017

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Michael Lawson
Project Name: Willen Rd, Newport Pagnell
Project Ref: 313114
Order No: N/A
Date Samples Received: 08/05/17
Date Instructions Received: 10/05/17
Date Analysis Completed: 23/05/17

Prepared by: **Approved by:**

[redacted]

Administrative Assistant Client Service Manager

Envirolab Job Number: 17/03210

Client Project Name: Willen Rd, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/03210/1	17/03210/2	17/03210/3	17/03210/4	17/03210/5	17/03210/6	17/03210/7	17/03210/8	Units	Method ref
Client Sample No										
Client Sample ID	CP104	WS104	WS103	CP106	CP103	WS108B	WS110B	CP102		
Depth to Top	1.83	1.57	2.05	2.01	1.83	1.04	1.2	1.17		
Depth To Bottom										
Date Sampled	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code										
pH (w)$_A^\#$	7.83	7.32	7.69	7.62	8.01	7.69	6.71	7.52	pH	A-T-031w
Hardness Total$_A^\#$	296	560	316	497	526	438	1280	674	mg/l Ca CO3	A-T-049w
Chloride (w)$_A^\#$	27	32	34	40	674	90	133	47	mg/l	A-T-026w
DOC (w)$_A^\#$	2.2	5.2	3.7	5.0	3.5	4.8	31.4	8.4	mg/l	A-T-032w
Arsenic (dissolved)$_A^\#$	1	<1	<1	<1	<1	1	8	1	µg/l	A-T-025w
Boron (dissolved)$_A^\#$	609	74	690	291	56	61	109	1050	µg/l	A-T-025w
Cadmium (dissolved)$_A^\#$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	µg/l	A-T-025w
Calcium (dissolved)$_A^\#$	101	207	106	180	190	168	455	230	mg/l	A-T-049w
Copper (dissolved)$_A^\#$	3	4	2	3	3	5	<1	2	µg/l	A-T-025w
Chromium (dissolved)$_A^\#$	4	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-025w
Chromium (hexavalent) (w)$_A^\#$	<0.01	<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	<1	µg/l	A-T-025w
Mercury (dissolved)$_A^\#$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	µg/l	A-T-025w
Nickel (dissolved)$_A^\#$	3	4	2	3	3	2	9	4	µg/l	A-T-025w
Selenium (dissolved)$_A^\#$	4	<1	<1	<1	<1	3	<1	<1	µg/l	A-T-025w
Zinc (dissolved)$_A^\#$	67	25	49	24	7	7	22	14	µg/l	A-T-025w

Envirolab Job Number: 17/03210

Client Project Name: Willen Rd, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/03210/1	17/03210/2	17/03210/3	17/03210/4	17/03210/5	17/03210/6	17/03210/7	17/03210/8	Units	Method ref
Client Sample No										
Client Sample ID	CP104	WS104	WS103	CP106	CP103	WS108B	WS110B	CP102		
Depth to Top	1.83	1.57	2.05	2.01	1.83	1.04	1.2	1.17		
Depth To Bottom										
Date Sampled	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code										
PAH 16MS (w)										
Acenaphthene (w)$_A^{\#}$	<0.01	<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	<0.01	µg/l	A-T-019w
Anthracene (w)$_A^{\#}$	<0.01	<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	<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	<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	<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	<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	<0.01	µg/l	A-T-019w
Chrysene (w)$_A^{\#}$	<0.01	<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	<0.01	µg/l	A-T-019w
Fluoranthene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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	<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	<0.01	µg/l	A-T-019w
Naphthalene (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	µg/l	A-T-019w
Phenanthrene (w)$_A^{\#}$	<0.01	<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	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
PAH (total 16) (w)$_A^{\#}$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01	µg/l	A-T-019w

Envirolab Job Number: 17/03210

Client Project Name: Willen Rd, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/03210/1	17/03210/2	17/03210/3	17/03210/4	17/03210/5	17/03210/6	17/03210/7	17/03210/8	Units	Method ref
Client Sample No										
Client Sample ID	CP104	WS104	WS103	CP106	CP103	WS108B	WS110B	CP102		
Depth to Top	1.83	1.57	2.05	2.01	1.83	1.04	1.2	1.17		
Depth To Bottom										
Date Sampled	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17	03-May-17		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code										
TPH CWG										
Ali >C5-C6 $(w)_A^{\#}$	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-022w
Ali >C6-C8 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Ali >C8-C10 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	4	<1	µg/l	A-T-022w
Ali >C10-C12 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Ali >C12-C16 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Ali >C16-C21 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Ali >C21-C35 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Total Aliphatics $(w)_A$	<5	<5	<5	<5	<5	<5	6	<5	µg/l	A-T-022+23w
Aro >C5-C7 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C7-C8 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	5	<1	µg/l	A-T-022w
Aro >C8-C9 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C9-C10 $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C10-C12 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Aro >C12-C16 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Aro >C16-C21 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Aro >C21-C35 $(w)_A^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-023w
Total Aromatics $(w)_A$	<5	<5	<5	<5	<5	<5	5	<5	µg/l	A-T-022+23w
TPH (Ali & Aro) $(w)_A$	<5	<5	<5	<5	<5	<5	11	<5	µg/l	A-T-022+23w
BTEX - Benzene $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - Toluene $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	5	<1	µg/l	A-T-022w
BTEX - Ethyl Benzene $(w)_A^{\#}$	<1	<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	<1	µg/l	A-T-022w
BTEX - o Xylene $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
MTBE $(w)_A^{\#}$	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w

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Soil chemical analysis:
All results are reported as dry weight (<40°C).
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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.

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

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] or by the USEPA[14], 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 v1.071, 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 2.51 model with the Johnson and Ettinger model for soil and groundwater volatilisation. 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 and to outputs from the RBCA model 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], the 2015 LQM/CIEH report[7] or the USEPA IRIS database[14]. 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 C_8–C_9 (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 C_5–C_8 were not modelled, as this range comprises benzene and toluene, which are modelled separately. The aromatic C_8–C_9 hydrocarbon fraction comprises ethylbenzene, xylene and styrene. As ethylbenzene and xylene are being modelled separately, the physical, chemical and toxicological data for aromatic C_8–C_9 have been taken from styrene.

For the GrAC, the HCV used in the modelling were derived using the toxicological data for the SAC amended as follows:

- An adult weighing 70kg and breathing 15.7m^3 air per day in accordance with the revised exposure parameters used in the SP1010 final project report for the Category 4 Screening Levels (C4SL) (Table 3.2[3]) and USEPA data[12]
- Background inhalation (mean daily intake(MDI)) for an adult (Age Class 17).

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 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

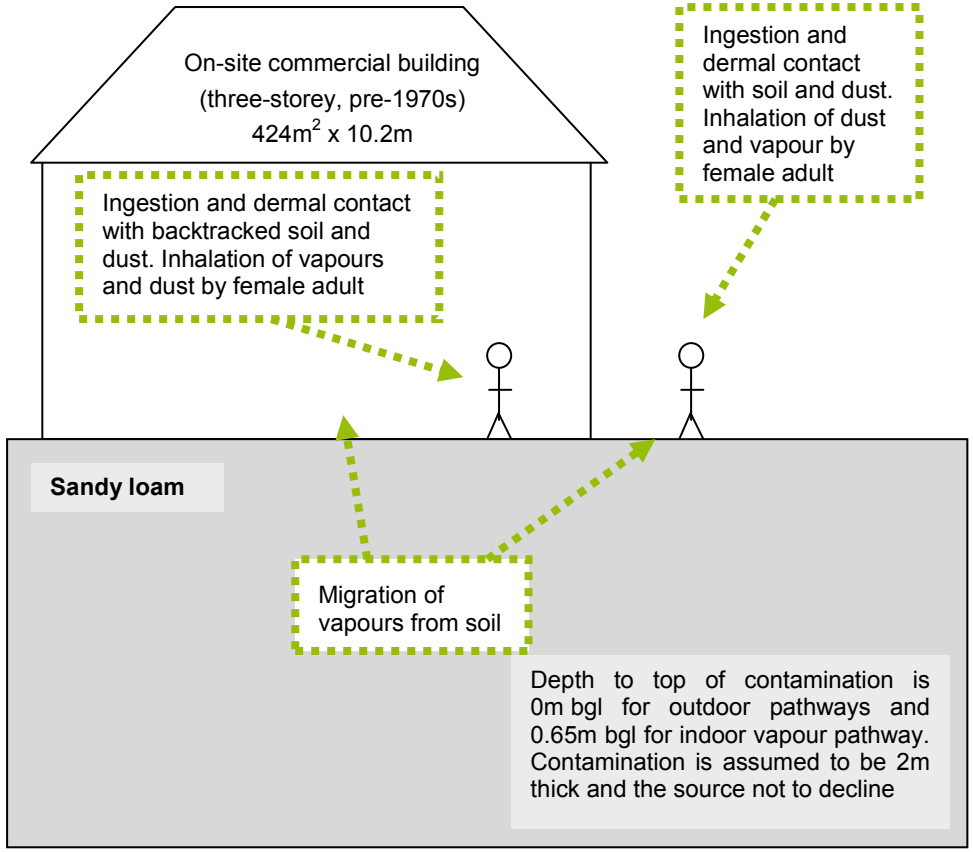

Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

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

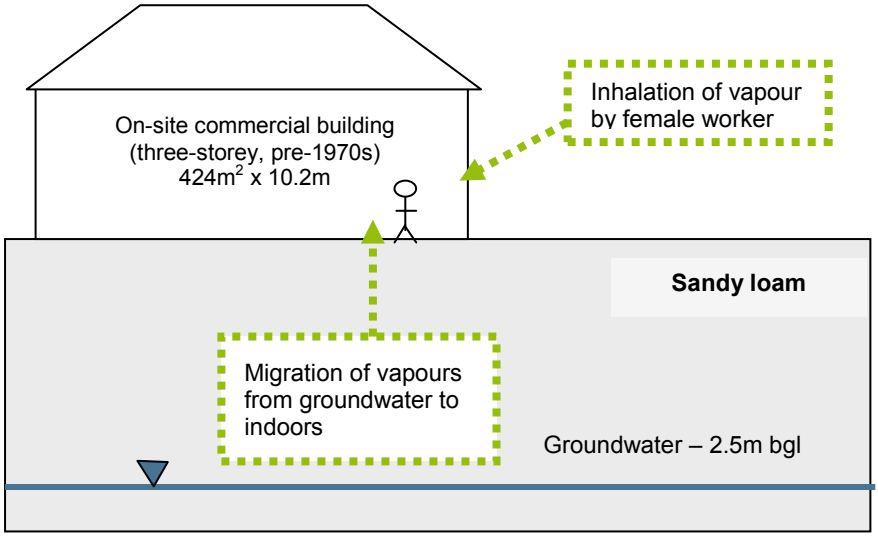

Table 3: Commercial – RBCA inputs

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} or kg/L	1.21	
Vertical hydraulic conductivity	cm s^{-1}	3.56E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[5] equivalent to 307 cm/day
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] Building air exchange rate equivalent to 2.8E-04 s^{-1}
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] Equivalent to 44 g/cm/s^2

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (µg/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)	-	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR
Chromium (III) - trivalent	(c)	-	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	-	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR	9.62E+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+01	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+05	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 (free)		-	6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR
Volatile Organic Compounds														
Benzene	(a)	1.36E+05	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+05	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+05	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+05	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		1.73E+05	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+05	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		1.73E+05	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+07	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		3.73E+03	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		3.43E+04	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+06	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		1.60E+05	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		1.63E+05	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		5.47E+03	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		5.71E+03	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		3.82E+02	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		5.59E+04	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)	-	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
Semi-Volatile Organic Compounds														
Acenaphthene		4.11E+03	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		7.95E+03	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		-	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		-	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		-	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		-	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		-	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		-	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		-	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		-	2.29E+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		-	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		-	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		-	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		-	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)	-	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+04	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 (µg/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		3.59E+04	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		5.37E+03	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		4.27E+02	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		3.39E+01	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		7.59E-01	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)		2.90E+05	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 >EC_9-EC_{10}		6.46E+04	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		2.45E+04	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		5.75E+03	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 cellls 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, PAHs napthalene, acenaphthene and acenaphthylene, 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.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 5
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	GrAC for Groundwater (µg/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	-	2,300	2,300	2,300
Elemental Mercury (Hg^0)	56	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg^{2+})	-	1,120	1,120	1,120
Methyl Mercury (Hg^{4+})	100000	290 (73)	310 (142)	320
Nickel	-	980	980	980
Selenium	-	12,000	12,000	12,000
Zinc	-	740,000	740,000	740,000
Cyanide (free)	-	650	650	650
Volatile Organic Compounds				
Benzene	136190	27	50	98
Toluene	590000	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	180000	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	200000	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	173000	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	200000	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	173000	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	48000000	67,000 (20,400)	101,000 (33,100)	165,000 (62,700)
Trichloroethene	3730	1	3	6
Tetrachloroethene	34310	20	40	90
1,1,1-Trichloroethane	1300000	700	1,300	3,000
1,1,1,2 Tetrachloroethane	160000	110	250	560
1,1,2,2-Tetrachloroethane	162840	270	550	1,130
Carbon Tetrachloride	5470	2.9	6.3	14.2
1,2-Dichloroethane	5710	0.67	0.97	1.65
Vinyl Chloride	382	0.06	0.08	0.12
1,2,4-Trimethylbenzene	55900	330	640	1,040
1,3,5-Trimethylbenzene	-	NR	NR	NR
Semi-Volatile Organic Compounds				
Acenaphthene	4110	110,000	110,000	110,000
Acenaphthylene	7950	110,000	110,000	110,000
Anthracene	-	520,000	540,000	540,000
Benzo(a)anthracene	-	170	170	180
Benzo(b)fluoranthene	-	44	45	45
Benzo(g,h,i)perylene	-	3,900	3,900	4,000
Benzo(k)fluoranthene	-	1,200	1,200	1,200
Chrysene	-	350	350	350
Dibenzo(a,h)anthracene	-	3.5	3.6	3.6
Fluoranthene	-	23,000	23,000	23,000
Fluorene	-	63,000 (31)	68,000	71,000
Indeno(1,2,3-cd)pyrene	-	500	510	510
Phenanthrene	-	22,000	22,000	23,000
Pyrene	-	54,000	54,000	54,000
Benzo(a)pyrene	-	77	77	77
Naphthalene	19000	1,800 (76)	3,900 (183)	7,800 (432)
Phenol	-	440*	690*	1,300*
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons EC_5-EC_6	35900	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-EC_8	5370	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	427	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	34	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	0.759	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)	290000	14,000 (626)	18,000 (1,440)	20,000 (3,350)
Aromatic hydrocarbons >EC_9-EC_{10}	64600	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	24500	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	5750	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 and GrAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, 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.

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 CONTROLLED WATERS

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

Protection of the water environment

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.

The term 'controlled waters' refers to 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 and surface water protection as well as 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 within "The Environment Agency's approach to groundwater protection", version 1.0 (March 2017)[(1)] and the associated guidance "Land contamination groundwater compliance points: quantitative risk assessments (March 2017)[(1a)] that have replaced the previous guidance document "Groundwater Principles and Practice (GP3)". When assessing risks to groundwater, the following need to be considered:

- 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 to avoid pollution, deterioration in the status of groundwater bodies and to prevent sustained, upward trends in pollutant concentrations in groundwater.*
- Where pollutants have already entered groundwater, the priority is to take all necessary and reasonable measures to:
    - ***minimise*** *further entry of "contaminants" where there is a defined source*
    - ***limit the pollution*** *of groundwater or any effect on the status of the groundwater body from the future expansion of the 'plume', if necessary, by actively reducing its extent.*

Within the context of groundwater risk assessments on sites affected by land contamination, "reasonable" means feasible without involving disproportionate costs. What costs are "disproportionate" depends on site-specific circumstances, which may include:

- Considerations of technical feasibility such as identified by the remedial options appraisal, this may be due to the distribution or nature of the contamination and the available remedial methods to treat the identified contamination;
- Sustainability considerations.

DEFINITIONS AND SUBSTANCE CLASSIFICATIONS

Risks to surface waters:

When assessing risks to surface waters, the following list of definitions should be understood:

Priority substances (PS) are harmful substances originally identified under the Water Framework Directive (WFD) 2000/60/EC as substances 'presenting a significant risk to or via the aquatic environment' at a European level. Member States are required to incorporate the identified **PS** into their country-wide monitoring programmes. There are currently 33 **PS** defined within the Priority Substances Directive (2013/39/EU; Annex 1), with a further 12 additional substances due to come into force from 22 December 2018. Directive 2013/39/EU has been transposed into domestic legislation for England and Wales by The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Under the umbrella of **PS**, there is a sub-set of substances identified as being "hazardous", and these are referred to as **Priority hazardous substances (PHS).** The list of **PHS** is defined at EU level within the Priority Substances Directive (2013/39/EU). The WFD defines hazardous substances 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.' There are currently 15 **PHS**, with a further 6 additional substances due to come into force from 22 December 2018.

There is also another group of substances defined at EU level and which are referred to as **other pollutants (OP)** in Directive 2013/39/EU**.** These are additional substances which although not **priority substances**, have EQS which are identical to those laid down in the legislation which applied prior to 13 January 2009 (Directive 2008/105/EU). The **OP** are listed along with the **priority substance (PS)** within the Priority Substances Directive (2013/39/EU),and their associated EQS are also listed therein. There are 6 **OP** defined within the Priority Substances Directive (2013/39/EU).

In addition to the EU level substances, there are also a group of pollutants defined at a Member State level, referred to as **Specific pollutants (SP)**. These substances are pollutants which are released in significant quantities into water bodies in each of the individual European Member States. Under the WFD, Member States are required to set their own EQS for these substances. An indicative list of **SP** is given in Annex VIII of the WFD. Many of the substances categorised as **SP** in the UK were formerly List 2 substances under the old Groundwater Directive (80/68/EEC). The **SP** are defined within Part 2 (Table 1) of The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Risks to groundwater:

When assessing risks to groundwater, the following definitions should be understood:

Under the requirements of the Groundwater Daughter Directive (2006/118/EU), the UK has published a list of substances it considers to be **hazardous substances** with respect to groundwater. In their advisory capacity to the government, this list has been derived by the UK Joint Agencies Groundwater Directive Advisory Group (JAGDAG), of which the Environment Agency is a member. The JAGDAG list of **hazardous substances** was published in January 2017 and the Environment Agency will use the updated list of hazardous substances from this date for all new activities that may lead to the discharge of hazardous substances to groundwater. The list is extensive and can be found in full at:

https://www.wfduk.org/sites/default/files/Media/170116%20Substance%20Determinationsfinal.pdf

Selecting the appropriate assessment criteria

When assessing the risks to controlled waters, various assessment criteria apply, depending on the nature of the assessment and the conceptual site model.

Where a surface water body is involved, then Environmental Quality Standards (EQS) are the relevant assessment criteria as they are designed to be protective of surface water ecology.

Where a public water supply or a Principal aquifer is involved, then the standards defined in The Water Supply (Water Quality) Regulations[2] are the primary source of assessment criteria. The Private Water Supplies Regulations[3] may also be applicable in some cases. For instances where there are no UK assessment criteria, then the World Health Organisation (WHO) drinking water guidelines[4] may be used.

This appendix presents the generic assessment criteria (GAC) that RSK considers suitable for assessing risks to controlled waters for our most commonly encountered determinants. A full list of EQS for England and Wales are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

The RSK GAC for controlled waters are presented in **Table 1** and **Table 2**. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The appropriate target concentrations should be selected with consideration to:

- the site conceptual model (i.e. the receptor at potential risk);
- whether the substance is already present in groundwater at the site;
- whether or not the substance is classified as a priority hazardous substance under the Priority Substances Directive (2013/39/EC) (see above), or as a hazardous substance according to the current list of JAGDAG determinations[5]; and
- background concentrations in the aquifer (if applicable).

It is important to remember that the WFD and Environment Agency guidance[1 & 1a] support a sustainable, risk-based approach be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is inevitably required.

Target concentrations shaded in green are statutory values	Target concentrations shaded in orange are non-statutory values

Note: Units µg/l throughout (unless otherwise stated)

Table 1: Target concentrations for controlled waters (excluding TPH CWG fractions)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Metals & other inorganics						
Hazardous substance	Specific pollutant	Arsenic	-	10[2]	50[6a]	25[6a]
Non-hazardous pollutant	Priority substance	Cadmium	0.1[7]	5[2]	≤0.08, 0.08, 0.09, 0.15, 0.25 [6b]	0.2[6a]
(Not determined)	-	Chromium (total)	-	50[2]	Sum values for chromium III and VI	
(None	Specific pollutant	Chromium (III)	-	Use value for total chromium	4.7[6a]	-
Hazardous substance	Specific pollutant	Chromium (VI)			3.4[6a]	0.6[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	Specific pollutant	Copper	-	2,000[2]	1 bioavailable[6a]	3.76 dissolved, where DOC ≤1mg/l[6a]
						3.76µg/l + (2.677µg/l x ((DOC/2) – 0.5µg/l)) dissolved, where DOC >1mg/l[6a]
Hazardous substance	Priority substance	Lead	-	10[2]	1.2 bioavailable[6a]	1.3[6a]
Hazardous substance	**Priority hazardous substance**	Mercury	0.01[7]	1[2]	0.07[6c]	0.07[6c]
Non-hazardous pollutant	Priority substance	Nickel	-	20[2]	4.0 bioavailable[6a]	8.6[6a]
Non-hazardous pollutant	-	Selenium	-	10[2]	-	-
Non-hazardous pollutant	Specific pollutant	Zinc	-	3,000[8]	10.9 bioavailable[6a]	6.8 dissolved [6a]
None	Specific pollutant	Iron	-	200[2]	1000[6a]*1	1000[6a])*1
None	Specific pollutant	Manganese	-	50[2] (0.05mg/l)	123 bioavailable[6a] (0.123mg/l)	-
(Not determined)	-	Aluminium	-	200[2]	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	**Priority hazardous substance**	Tributyltin compounds (Tributyltin-cation)	0.001[7]	-	0.0002[6a]	0.0002[6a]
(Not determined)	-	Sodium	-	200,000[2] (200 mg/l)	-	-
Non-hazardous pollutant	Specific pollutant	Cyanide (Hydrogen cyanide)	-	50[2] (0.05 mg/l)	1[6a] (0.001 mg/l)	1[6a] (0.001 mg/l)
Non-hazardous pollutant	-	Total ammonia[$] (ammonium (as NH_4^+) plus ammonia (NH_3)	-	500[2] (0.5 mg/l)	300[6f] (0.3 mg/l)	-
Non-hazardous pollutant	Specific pollutant	Ammonia un-ionised (NH_3)	-	-	-	21[6a] (0.021 mg/l)
Non-hazardous pollutant	Specific pollutant	Chlorine	-	-	2[6a] (0.002 mg/l)	10[6d] (0.01 mg/l)
(Not determined)	-	Chloride	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Sulphate	-	250,000[2] (250 mg/l)	-	-
(Not determined)	-	Nitrate (as NO_3)	-	50,000[2] (50 mg/l)	-	-
(Not determined)	-	Nitrite (as NO_2)	-	500[2] (0.5 mg/l)	10[9] (0.01 mg/l)	-
Volatile organic compounds (VOC)						

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Other pollutant	Tetrachloroethene (tetrachloroethylene)	0.1[7]	10[2]	10[6a]	10[6a]
Hazardous substance	Other pollutant	Trichloroethene (trichloroethylene)	0.1[7]	10[2]	10[6a]	10[6a]
None	Specific pollutant	Tetrachloroethane	-	-	140[6a]	-
Hazardous substance	Other pollutant	Carbon tetrachloride (tetrachloromethane)	0.1[7]	3.0[2]	12[6a]	12[6a]
Non-hazardous pollutant	Priority substance	1,2-Dichloroethane	1.0[7]	3.0[2]	10[6a]	10[6a]
Hazardous substance	**-**	Vinyl chloride (chloroethene)	-	0.5[2]	-	-
Non-hazardous pollutant	Priority substance	Dichloromethane	-	20[4]	20[6a]	20[6a]
Non-hazardous pollutant	Priority substance	Trichlorobenzenes	0.01[7]	-	0.4[6a]	0.4[(6a)]
(Not determined)	-	Trihalomethanes	-	100[2a]	-	-
Hazardous substance	Priority substance	Trichloromethane (Chloroform)	0.1[7]	(see "Trihalomethanes"above)	2.5[6a]	2.5[6a]
Non-hazardous pollutant	**Priority hazardous substance**	Di(2-ethylhexyl) phthalate (bis(2-ethylhexyl) phthalate, DEHP)	-	8[4]	1.3[6a]	1.3[6a]

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
None	Specific pollutant	Benzyl butyl phthalate	-	-	7.5[6a]	0.75[6e]
Hazardous substance	**Priority hazardous substance**	Hexachlorobutadiene	0.005[7]	0.6[4]	0.6[6c]	0.6[6c]
Semi-volatile organic compounds (SVOC)						
(Not determined)	-	Acenaphthylene (C12-C16)	-	-	5.8[10]	
Hazardous substance	**Priority hazardous substance**	Anthracene (C16-C35)	-	-	0.1[6a]	0.1[6a]
Non-hazardous pollutant	Priority substance	Naphthalene (C10-C12)	-	-	2[6a]	2[6a]
Hazardous substance	Priority substance	Fluoranthene (C16-C35)	-	-	0.0063[6a]	0.0063[6a]
Hazardous substance(s)	**Priority hazardous substance(s)**	Benzo(a)pyrene (C16-C35)	-	0.01[2]	0.00017[6a]	0.00017[6a]
		Benzo(b)fluoranthene (C16-C35)	-	0.1[2] sum of the concentration of the four specified compounds	No EQS for these substances. B(a)P should be used as the indicator compound instead.	
		Benzo(k)fluoranthene (C16-C35)	-			

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
		Benzo(g,h,i)perylene (C16-C35)	-			
		Indeno(1,2,3-cd) pyrene (C16-C35)	-			
Non-hazardous pollutant	Specific pollutant	Phenol		-	7.7[6a]	7.7[6a]
Hazardous substance	Specific pollutant	2,4-Dichlorophenol	0.1[7]	-	4.2[6a]	0.42[6a]
Hazardous substance	Priority substance	Pentachloro-phenol (PCP)	0.1[7]	9[4]	0.4[6a]	0.4[6a]
Petroleum hydrocarbons						
Hazardous substance	-	Total petroleum hydrocarbons	-	See Table 2 for individual (non-statutory) TPH CWG fractions with respect to drinking water receptors	See individual risk driving compounds (i.e. BTEX and PAH) for specific EQS	
Hazardous substance	Priority substance	Benzene	1[7]	1[2]	10[6a]	8[6a]
Hazardous substance	Specific pollutant	Toluene	4[7]	700[4]	74[6a]	74[6a]
Hazardous substance	-	Ethylbenzene	-	300[4]	-	-
(Not determined)	-	Xylenes	3[7]	500[4]	30[11]	-

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
Groundwater receptors[5]	Surface water receptors[6]				Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	-	Methyl tertiary butyl ether (MTBE)	-	15[12]	-	
Pesticides, fungicides, insecticides and herbicides						
Hazardous substance(s)	Other pollutant (Cyclodiene pesticides)	Aldrin	0.003[7]	0.03[2]	0.01[6a]	0.005[6a]
		Dieldrin	0.003[7]	0.03[2]		
		Endrin	0.003[7]	0.1[2b]		
		Isodrin*2	0.003[7]	0.1[2b]		
Hazardous substance	Other pollutant	DDT (total)	0.002[7]	1[4]	0.025[6a]	0.025[6a]
(Not determined) – assume to be Hazardous Substance	-	Total pesticides	-	0.5[2]	-	-
(Not determined) - assume to be Hazardous Substance	-	Other individual pesticides	-	0.1[2]		

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Carbendazim	-	-	0.15[6a]	-
Hazardous substance	Specific pollutant	Chlorothalonil	-	-	0.035[6a]	-
Hazardous substance	Specific pollutant (until 22/12/18, after which it becomes a Priority substance)	Cypermethrin	-	-	0.0001[6a] From 22/12/18: 8.0E-5[6a]	0.0001[6a] From 22/12/18: 8.0E-6[6a]
Hazardous substance	Specific pollutant	Dimethoate	0.01[7]	-	0.48[6a]	0.48[6a]
(Not determined)	Specific pollutant	Glyphosate	-	-	196[6a]	196[6a]
Hazardous substance	Specific pollutant	Linuron		-	0.5[6a]	0.5[6a]
Non-hazardous pollutant	Specific pollutant	Mecoprop	0.04[7]	-	18[6a]	18[6a]
Non-hazardous pollutant	Specific pollutant	Methiocarb	-	-	0.01[6a]	-
Non-hazardous pollutant	Specific pollutant	Pendimethalin	-	20[4]	0.3[6a]	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Permethrin	0.001[7]	-	0.001[6a]	0.0002[6a]
Hazardous substance	Priority substance	Alachlor	-	20[4]	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Atrazine	0.03[7]	100[4]	0.6[6a]	0.6[6a]
Hazardous substance	Priority substance	Diuron	-	-	0.2[6a]	0.2[6a]
Hazardous substance	**Priority hazardous substance**	Endosulphan	0.005[7]	-	0.005[6a]	0.0005[6a]
Non-hazardous pollutant	Priority substance	Isoproturon	-	9[4]	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Simazine	0.03[7]	2[4]	1[6a]	1 [6a]
Hazardous substance	**Priority hazardous substance**	Trifluralin	0.01[7]	20[4]	0.03[6a]	0.03[6a]
(Not determined)	From 22/12/18: Priority substance	Dichlorovos	-	-	From 22/12/18: 6.0E-4[6a]	From 22/12/18: 6.0E-5[6a]
Hazardous substance	From 22/12/18: Priority substance	Heptachlor and heptachlor epoxide	-	0.03[2]	From 22/12/18: 2.0E-7[6a]	From 22/12/18: 1.0E-08[6a]
Miscellaneous						

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors[5]	Surface water receptors[6]		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
None	Specific pollutant	Triclosan (antibacterial agent)	-	-	0.1[6a]	0.1[6a]
Hazardous substance	**From 22/12/18: Priority hazardous substance**	Perfluoro-octane sulfonic acid (and its derivatives) (PFOS)	-	-	From 22/12/18: 6.5E-4[6a]	From 22/12/18: 1.3E-4[6a]
Hazardous substance	**From 22/12/18: Priority hazardous substance**	Hexabromo cyclododecane (HBCDD)	-	-	From 22/12/18: 0.0016[6a]	From 22/12/18: 0.0016[6a]

Notes:

'-' A target concentration is not available.

$Please note that total ammonia (NH_4^+ and NH_3) is equivalent to ammoniacal nitrogen in laboratory reports

*1 Please note that although iron is listed in the 2015 Direction as 1.000 µg/l, the EQS remains at 1mg/l in Scotland and it is assumed this is an error and should read either 1,000 or 1000µg/l.

*2 Please note that although Isodrin is not listed in name within the group of "Cyclodiene pesticides" in Table 1 of Schedule 3 Part 3 of the 2015 Direction[6], the CAS number for Isodrin (465-73-6) **is** listed and therefore it is assumed that it has been missed off the named list of substances.

*3 Total petroleum hydrocarbons is used for consistency, but is an analytical method-defined measurement for a mixture of hydrocarbons subject to environmental analysis[11].

"Bioavailable" in relation to copper, zinc, nickel and manganese (but not lead) is the generic EQSbioavailable[6a] 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.

For zinc, if there is an exceedance of the EQSbioavailable in an initial GQRA, Tier 2 required that the EQS for zinc should also have the ambient background concentration of zinc added as well

Table 2: World Health Organization (WHO) guide values for TPH CWG fractions in drinking water[13] (as referenced in CL:AIRE, 2017[11])

TPH CWG fraction	WHO guide value for drinking water[13] (µg/l)
Aliphatic fractions:	
Aliphatic EC5-EC6	15,000
Aliphatic >EC6-EC8	15,000
Aliphatic >EC8-EC10	300
Aliphatic >EC10-EC12	300
Aliphatic >EC12-EC16	300
Aliphatic >EC16-EC21	-
Aliphatic >EC21-EC35	-
Aromatic fractions:	
Aromatic EC5-EC6	10 (benzene)
Aromatic >EC6-EC8	700 (toluene)
Aromatic >EC8-EC10	300 (ethyl benzene) 500 (xylenes)
Aromatic >EC10-EC12	90
Aromatic >EC12-EC16	90
Aromatic >EC16-EC21	90
Aromatic >EC21-EC35	90
Reference: World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva[13].	

References

1. Environment Agency (2017), 'The Environment Agency's approach to groundwater protection', version 1.0, March 2017 (formerly contained within GP3) [accessed 29 March 2017]. https://www.gov.uk/government/collections/groundwater-protection

1a. Environment Agency (2017), 'Land contamination groundwater compliance points: quantitative risk assessments', March 2017 (formerly contained within GP3) [accessed 29 March 2017]. https://www.gov.uk/government/collections/groundwater-protection

2. The Water Supply (Water Quality) Regulations 2016 (SI 2016/619)
    - 2a. Sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane
    - 2b. Standard applies to individual pesticides except aldrin, dieldrin, heptachlor and heptachlor epoxide, for which a separate standard is defined.
3. The Private Water Supplies (England) Regulations 2016. SI 2016 / 618
4. WHO (2011), *Guidelines for drinking-water quality*, 4th edn
5. JAGDAG hazard substance determinations: This list contains substances that are determined to be hazardous substances or non-hazardous pollutants for the purposes of the groundwater directive 2006/118/EC. The absence of an assessment or substance from the list means an assessment has not been done yet and is presented as 'Not yet determined'; if a substance has been assessed but does not fall into either category it is presented as 'None'. For further details on how substances are assessed, see the Joint Agencies Groundwater Directive Advisory Group (JAGDAG) 'Methodology for the determination of hazardous substances in groundwater for the purposes of the groundwater directive 2006/118/EC' which is available from the JAGDAG website. The methodology is a UK –wide framework that sets criteria for how to assess whether a substance is a hazardous substances in groundwater. The list of substances can be found at:

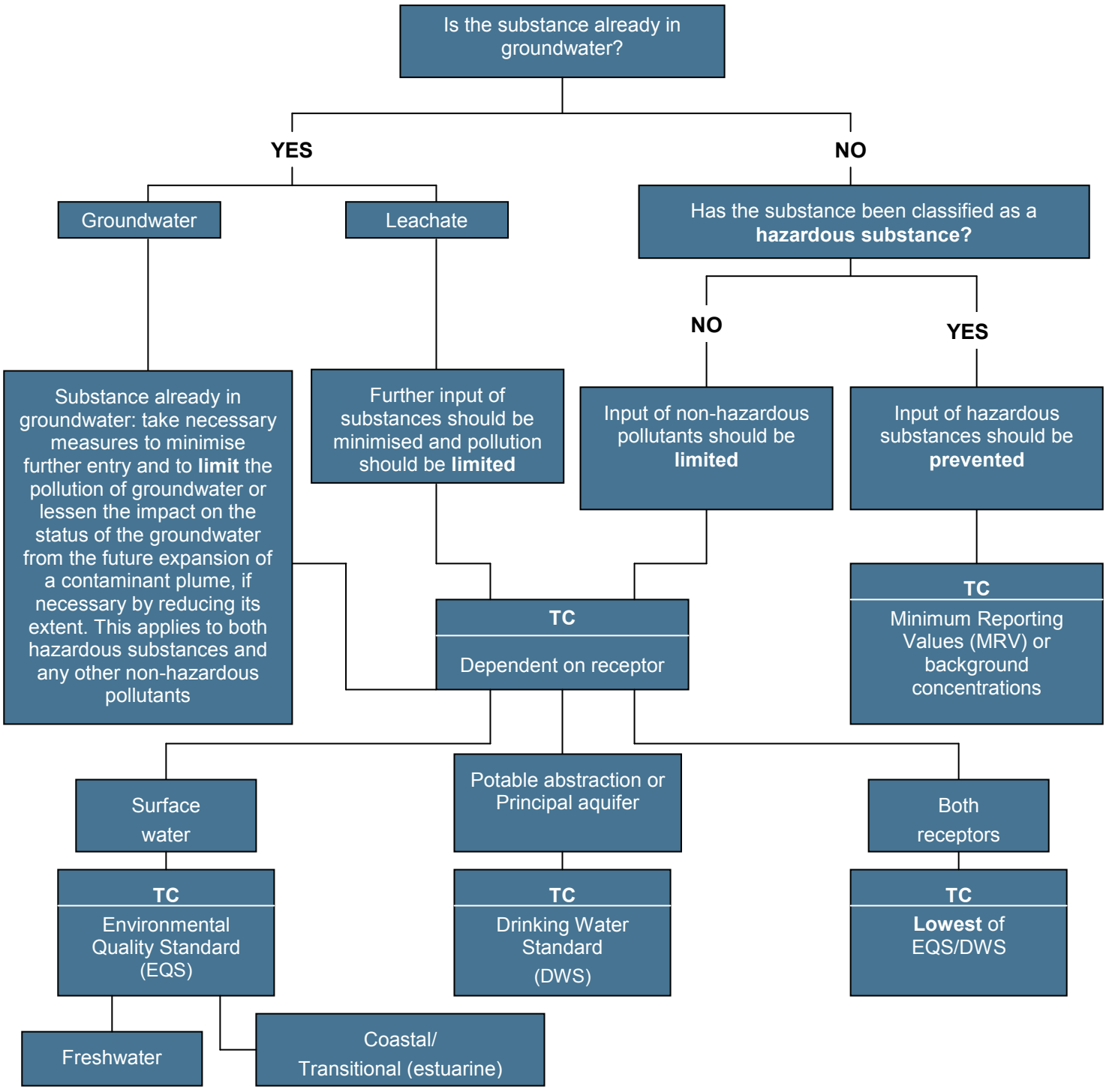
   https://www.wfduk.org/sites/default/files/Media/170116%20Substance%20Determinationsfinal.pdf

6. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
    - 6a. The EQS for these substances are based on a "long term mean" or an "annual average (AA)" EQS.
    - 6b. For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/l, Class 2: 40 to < 50 mg CaCO3/l, Class 3: 50 to < 100 mg CaCO3/l, Class 4: 100 to < 200 mg CaCO3/l and Class 5: ≥ 200 mg CaCO3/l).
    - 6c. The EQS for Mercury and hexachlorobutadiene are based on a "maximum acceptable concentration (MAC)" EQS in absence of an "annual average (AA)" EQS.
    - 6d. The EQS for chlorine in saltwater is based on the 95th percentile concentration of total residual oxidant, which refers to the sum of all oxidising agents existing in water, expressed as available chlorine.
    - 6e. The recommended saltwater standard is derived using a safety factor of 100. Where the standard is failed, it is recommended that supporting evidence of ecological damage should be obtained before committing to expensive action.
    - 6f. EQS for total ammonia is as per Schedule 3, Part 1, Table 7 of of the above directions. EQS applies to river types 1, 2 and 4 and 6 (namely upland and low alkalinity). The EQS for a lowland and high alkalinity rivers (types 3, 5 and 7) is 600µg/l (0.6mg/l).

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

7. Minimum reporting values listed at https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values (updated 13 January 2017; accessed 29 March 2017). Note target concentration for xylenes is 3 μg/l each for o-xylene and m/p xylene as it may not be possible to separate m- and p-xylene; 135 tcb, 124 tcb, 123 tcb each to 0.01 μg/l)
8. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001
9. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)
10. WRc plc (2002), R&D Technical Report P45.
11. CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. V1.1.
12. 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
13. World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva. [accessed 29 March 2017] http://www.who.int/water_sanitation_health/dwq/chemicals/petroleumproducts_2add_june2008.pdf

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 L
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	• 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	• Phenols	2	0.4
2f	• 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 M
COMPARISON OF SOIL LABORATORY DATA TO HUMAN HEALTH GAC (2015 & 2017)

313114 - Newport Pagnell - Human Health Risk Assessment Soil Results Summary Table and Direct Comparison

Sample Identity		Industrial/Commercial Screening Value (1% SOM)	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120	TP122	TP128	TP131	TP133	TP136	WS110	WS112	WS113	WS113
Depth		**GACs**	**0.60**	**0.40**	**1.40**	**0.50**	**0.40**	**2.60**	**1.00**	**1.20**	**1.20**	**0.60**	**2.50**	**1.20**	**0.20**	**2.20**	**1.10**	**0.20**	**0.20**
Date											**2017**								
Determinants	**Units**																		
Visual Fibre Screen			NAD	NAD	NAD	Chrysotile	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos in soil % composition	%					<0.001													
pH	pH		7.94	8.09	7.52	6.76	7.09	8.25	8.03	7.82	8.04	7.89	7.67	7.72	6.91	7.6	7.8		
Sulphate BRE	mg/l		Results presented with geotechnical lab analysis																
Phenols - Total by HPLC	mg/kg	440																	
Total Organic Carbon	% w/w		1.51	0.9	2.1	1.23	0.12	0.15	1.06	0.96	0.88	0.3	1.17	1.54	1.8	1.01	0.82		
Metals																			
Arsenic	mg/kg	640	5	11	14	9	14	24	9	8	14	16	10	14	10	12	10		
Boron (water soluble)	mg/kg		1.4	1	1.7	<1.0	<1.0	<1.0	1	1.3	1	<1.0	1	<1.0	<1.0	1.2	<1.0		
Cadmium	mg/kg	410	0.6	0.8	1	0.6	0.9	0.8	0.5	0.8	0.9	1.1	0.7	1.3	0.8	0.6	0.8		
Copper	mg/kg	68000	16	8	10	6	9	<1	14	11	12	11	12	8	12	6	9		
Chromium	mg/kg	8600	20	33	31	19	25	12	15	28	22	24	18	23	20	22	24		
Chromium (hexavalent)	mg/kg	49	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Lead	mg/kg	2300	52	18	33	23	12	8	147	21	16	13	21	14	30	20	13		
Mercury	mg/kg	1120	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	0.25	0.22	<0.17	<0.17	0.3	<0.17	<0.17	0.32	<0.17		
Nickel	mg/kg	980	14	24	26	15	30	17	16	25	25	32	19	30	18	16	25		
Selenium	mg/kg	12000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Zinc	mg/kg	740000	67	52	128	36	46	37	79	53	66	52	52	65	53	45	53		
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)																			
Ali >C5-C6	mg/kg	3200	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Ali >C6-C8	mg/kg	7800	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Ali >C8-C10	mg/kg	2000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01		
Ali >C10-C12	mg/kg	9700	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ali >C12-C16	mg/kg	59000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ali >C16-C21	mg/kg	Assess as sum below	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ali >C21-C35	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ali >C16-C35	mg/kg	1000000	0.2	0.2	0.2	0.2	0.2	0.2	1.6	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
Total Aliphatics	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aro >C5-C7	mg/kg	27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Aro >C7-C8	mg/kg	56000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Aro >C8-C9	mg/kg	14000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Aro >C9-C10	mg/kg	3500	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Aro >C10-C12	mg/kg	16000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Aro >C12-C16	mg/kg	36000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.7	2.8	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1		
Aro >C16-C21	mg/kg	28000	0.3	<0.1	0.3	<0.1	<0.1	<0.1	3.3	6.2	<0.1	<0.1	1.8	<0.1	<0.1	2.2	0.7		
Aro >C21-C35	mg/kg	28000	2.3	<0.1	0.6	0.4	<0.1	<0.1	2.8	3.8	<0.1	<0.1	11.5	<0.1	<0.1	4.3	2.4		
Total Aromatics	mg/kg		2.7	<0.1	0.8	0.4	<0.1	<0.1	8.1	13.2	<0.1	<0.1	13.4	<0.1	<0.1	7.4	3.1		
TPH (Ali & Aro)	mg/kg		2.7	<0.1	0.8	0.4	<0.1	<0.1	10.5	13.2	<0.1	<0.1	13.4	<0.1	<0.1	7.4	3.1		
BTEX - Benzene	mg/kg	27	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
BTEX - Toluene	mg/kg	56000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
BTEX - Ethyl Benzene	mg/kg	6000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
BTEX - m & p Xylene	mg/kg	5900	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
BTEX - o Xylene	mg/kg	6600	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
MTBE	mg/kg	67000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
PAHs (Polycyclic Aromatic Hydrocarbons)																			
Acenapthene	mg/kg	110000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Acenapthylene	mg/kg	110000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Anthracene	mg/kg	520000	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		
Benzo(a)anthracene	mg/kg	170	0.05	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		
Benzo(a)pyrene	mg/kg	77	<0.04	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		
Benzo(b)fluoranthene	mg/kg	44	0.06	<0.05	0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Benzo(ghi)perylene	mg/kg	3900	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Benzo(k)fluoranthene	mg/kg	1200	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		
Chrysene	mg/kg	350	0.07	<0.06	<0.06	<0.06	<0.06	<0.06	0.11	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06		
Dibenzo(ah)anthracene	mg/kg	3.5	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		
Fluoranthene	mg/kg	23000	0.11	<0.08	0.09	<0.08	<0.08	<0.08	0.22	0.09	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		
Fluorene	mg/kg	63000	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Indeno(123-cd)pyrene	mg/kg	500	0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		
Napthalene	mg/kg	1800	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		
Phenanthrene	mg/kg	22000	0.04	<0.03	0.04	<0.03	<0.03	<0.03	0.16	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		
Pyrene	mg/kg	54000	0.09	<0.07	0.09	<0.07	<0.07	<0.07	0.18	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		
Total PAH	mg/kg		0.46	<0.08	0.37	<0.08	<0.08	<0.08	0.87	0.24	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08		

= Exceedence of GAC for an industrial/commercial end-use

All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and LQM/CIEH S4ULs

313114 - Newport Pagnell - Human Health Risk Assessment Soil Results Summary Table and Direct Comparison

Sample Identity		Industrial/Commercial Screening Value (1% SOM)	WS01	WS02	WS04	WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07
Depth		**GACs**	**3.50**	**1.80**	**0.50**	**0.40**	**0.50**	**4.30**	**0.20**	**0.60**	**0.50**	**0.50**	**0.20**
Date			**2015**										
Determinants	**Units**												
Visual Fibre Screen				NAD	NAD	NAD	NAD		NAD	NAD	NAD		NAD
Asbestos in soil % composition	%												
pH	pH		8.23	8.4	7.89	9.36	8.28	8.55	7.48	7.93	8.33	8.74	7.88
Sulphate BRE	mg/l		94	63		327	73	33				145	
Phenols - Total by HPLC	mg/kg	440		<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2		<0.2
Total Organic Carbon	% w/w			1.32	0.4	1.75	2.43		2.67	0.48	1.69		3.04
Metals													
Arsenic	mg/kg	640		10	12	12	11		12	14	25		11
Boron (water soluble)	mg/kg												
Cadmium	mg/kg	410		<0.5	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5		<0.5
Copper	mg/kg	68000		16	8	14	22		12	10	16		15
Chromium	mg/kg	8600		29	21	19	27		21	30	21		26
Chromium (hexavalent)	mg/kg	49		<1	<1	<1	<1		<1	<1	<1		<1
Lead	mg/kg	2300		20	10	15	67		38	13	20		35
Mercury	mg/kg	1120		0.2	<0.17	0.21	0.18		<0.17	<0.17	0.2		<0.17
Nickel	mg/kg	980		27	23	20	26		17	30	23		20
Selenium	mg/kg	12000		<1	<1	<1	1		<1	<1	<1		<1
Zinc	mg/kg	740000		58	37	55	62		48	44	65		57
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)													
Ali >C5-C6	mg/kg	3200		<0.03	<0.03	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03
Ali >C6-C8	mg/kg	7800		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Ali >C8-C10	mg/kg	2000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Ali >C10-C12	mg/kg	9700		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C12-C16	mg/kg	59000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C16-C21	mg/kg	Assess as sum below		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C21-C35	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Ali >C16-C35	mg/kg	1000000		0.2	0.2	0.2	0.2		0.2	0.2	0.2		0.2
Total Aliphatics	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C5-C7	mg/kg	27		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C7-C8	mg/kg	56000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C8-C9	mg/kg	14000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C9-C10	mg/kg	3500		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Aro >C10-C12	mg/kg	16000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C12-C16	mg/kg	36000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C16-C21	mg/kg	28000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Aro >C21-C35	mg/kg	28000		<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
Total Aromatics	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
TPH (Ali & Aro)	mg/kg			<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1		<0.1
BTEX - Benzene	mg/kg	27		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - Toluene	mg/kg	56000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - Ethyl Benzene	mg/kg	6000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - m & p Xylene	mg/kg	5900		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
BTEX - o Xylene	mg/kg	6600		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
MTBE	mg/kg	67000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
PAHs (Polycyclic Aromatic Hydrocarbons)													
Acenapthene	mg/kg	110000		<0.01	<0.01	0.02	<0.01		<0.01	<0.01	<0.01		<0.01
Acenapthylene	mg/kg	110000		<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Anthracene	mg/kg	520000		<0.02	<0.02	0.05	<0.02		<0.02	<0.02	0.03		<0.02
Benzo(a)anthracene	mg/kg	170		0.06	<0.04	0.15	<0.04		<0.04	<0.04	0.13		0.11
Benzo(a)pyrene	mg/kg	77		0.05	<0.04	0.12	<0.04		0.1	<0.04	0.13		0.14
Benzo(b)fluoranthene	mg/kg	44		<0.05	<0.05	0.22	<0.05		0.12	<0.05	0.22		0.15
Benzo(ghi)perylene	mg/kg	3900		<0.05	<0.05	0.1	<0.05		<0.05	<0.05	0.08		0.08
Benzo(k)fluoranthene	mg/kg	1200		<0.07	<0.07	0.12	<0.07		0.07	<0.07	0.13		0.1
Chrysene	mg/kg	350		0.1	<0.06	0.22	<0.06		0.1	0.06	0.22		0.18
Dibenzo(ah)anthracene	mg/kg	3.5		<0.04	<0.04	<0.04	<0.04		<0.04	<0.04	<0.04		<0.04
Fluoranthene	mg/kg	23000		0.19	<0.08	0.5	<0.08		0.1	0.08	0.42		0.32
Fluorene	mg/kg	63000		<0.01	<0.01	0.01	<0.01		<0.01	<0.01	<0.01		<0.01
Indeno(123-cd)pyrene	mg/kg	500		<0.03	<0.03	0.09	<0.03		<0.03	<0.03	0.08		0.05
Napthalene	mg/kg	1800		<0.03	<0.03	<0.03	<0.03		<0.03	<0.03	<0.03		<0.03
Phenanthrene	mg/kg	22000		0.06	<0.03	0.2	<0.03		<0.03	<0.03	0.12		0.05
Pyrene	mg/kg	54000		0.15	<0.07	0.33	<0.07		0.09	0.08	0.32		0.26
Total PAH	mg/kg			0.6	<0.08	2.1	<0.08		0.6	0.24	1.86		1.44
= Exceedence of GAC for an industrial/commercial end-use													
All GACs calculated by RSK or taken from EIC/AGS/CLAIRE Generic Assessment Criteria; and L													

313114 - Willen Road, Newport Pagnell - Tier 1 Groundwater Risk Assessment - Soil Leachate Results

Sample Identity		Tier 2 Target Concentration (LTC2)		TP108	TP110	TP115	TP120	TP122	WS112
Depth				0.40	0.50	1.00	1.20	1.20	1.10
Determinand	Units	Freshwater EQS	UK DWS						
Metals									
Arsenic (leachable)	ug/l	50	10	<1	<1	5	4	2	1
Cadmium (leachable)	ug/l	0.25	5	<1	<1	<1	<1	<1	<1
Copper (leachable)	ug/l	36.57	2000	4	2	4	2	1	3
Chromium (leachable)	ug/l	8.1	50	<1	<1	<1	<1	<1	<1
Hexavalent Chromium (leachable)	mg/l	0.0034	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead (leachable)	ug/l	9.62	10	<1	<1	6	1	1	<1
Mercury (leachable)	ug/l	0.07	1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Nickel (leachable)	ug/l	19.91	20	2	1	5	3	1	3
Selenium (leachable)	ug/l		10	<1	<1	2	<1	<1	<1
Zinc (leachable)	ug/l	35.22	3000	7	5	15	9	11	10
= exceedance of Tier 2 Target Concentration									
^ hardness dependent									
* bioavailable									

APPENDIX N
COMPARISON OF WATER LABORATORY DATA TO CONTROLLED WATERS GAC

313114 - Willen Road - Controlled Waters Risk Assessment Groundwater Results Summary Table and Direct Comparison

Sample Identity		Tier 2 Target Concentration (LTC2)					CP104	WS104	WS103	CP106	CP103	WS108B	WS110B	CP102
Depth							1.83	1.57	2.05	2.01	1.83	1.04	1.2	1.17
		Environmental Quality Standard or Best Equivalent												
Strata		Freshwater EQS	UK/EC DWS	WHO DWS	Dutch Intervention Value	US Regional Screening Levels (RSLs) - Tapwater	GW	GW	GW	GW	GW	GW	GW	GW
Determinants	**Units**													
pH	pH	6 to 9	6.5-9.5				7.83	7.32	7.69	7.62	8.01	7.69	6.71	7.52
Hardness	mg/l Ca CO3						296	560	316	497	526	438	1280	674
DOC	mg/l						2.2	5.2	3.7	5	3.5	4.8	31.4	8.4
Chloride	mg/l		250				27	32	34	40	674	90	133	47
Metals														
Arsenic (dissolved)	µg/l	50	10				1	<1	<1	<1	<1	1	8	1
Boron (dissolved)	µg/l	2000	1000				609	74	690	291	56	61	109	1050
Cadmium (dissolved)	µg/l	0.25	5				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Calcium	mg/l						101	207	106	180	190	168	455	230
Copper (dissolved)	µg/l	36.57	2000				3	4	2	3	3	5	<1	2
Chromium (dissolved) (III + VI)	µg/l	8.1	50				4	<1	<1	<1	<1	<1	<1	<1
Chromium (dissolved) (VI)	mg/l	0.0034	0.05				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (dissolved)	µg/l	9.62	10				<1	<1	<1	<1	<1	<1	<1	<1
Mercury (dissolved)	µg/l	0.07	1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (dissolved)	µg/l	19.91	20				3	4	2	3	3	2	9	4
Selenium (dissolved)	µg/l		10				4	<1	<1	<1	<1	3	<1	<1
Zinc (dissolved)	µg/l	35.22	3000				67	25	49	24	7	7	22	14
Total Petroleum Hydrocarbons Criteria Working Group (TPHCWG)														
BTEX - Benzene	µg/l	10	1				<1	<1	<1	<1	<1	<1	<1	<1
BTEX - Ethyl Benzene	µg/l			300			<1	<1	<1	<1	<1	<1	<1	<1
BTEX - Toluene	µg/l	74		700			<1	<1	<1	<1	<1	<1	5	<1
BTEX - m & p Xylene	µg/l						<1	<1	<1	<1	<1	<1	<1	<1
BTEX - o Xylene	µg/l						<1	<1	<1	<1	<1	<1	<1	<1
Sum of xylenes	µg/l	30		500			<2	<2	<2	<2	<2	<2	<2	<2
MTBE	µg/l		15		9200		<1	<1	<1	<1	<1	<1	<1	<1
Ali >C5-C6	µg/l			15000			<3	<3	<3	<3	<3	<3	<3	<3
Ali >C6-C8	µg/l			15000			<1	<1	<1	<1	<1	<1	<1	<1
Ali >C8-C10	µg/l			300			<1	<1	<1	<1	<1	<1	4	<1
Ali >C10-C12	µg/l			300			<5	<5	<5	<5	<5	<5	<5	<5
Ali >C12-C16	µg/l			300			<5	<5	<5	<5	<5	<5	<5	<5
Ali >C16-C21	µg/l						<5	<5	<5	<5	<5	<5	<5	<5
Ali >C21-C35	µg/l						<5	<5	<5	<5	<5	<5	<5	<5
Total Aliphatics	µg/l						<5	<5	<5	<5	<5	<5	6	<5
Aro >C5-C7	µg/l			10			<1	<1	<1	<1	<1	<1	<1	<1
Aro >C7-C8	µg/l			700			<1	<1	<1	<1	<1	<1	5	<1
Aro >C8-C9	µg/l			300			<1	<1	<1	<1	<1	<1	<1	<1
Aro >C9-C10	µg/l						<1	<1	<1	<1	<1	<1	<1	<1
Aro >C10-C12	µg/l			90			<5	<5	<5	<5	<5	<5	<5	<5
Aro >C12-C16	µg/l			90			<5	<5	<5	<5	<5	<5	<5	<5
Aro >C16-C21	µg/l			90			<5	<5	<5	<5	<5	<5	<5	<5
Aro >C21-C35	µg/l			90			<5	<5	<5	<5	<5	<5	<5	<5
Total Aromatics	µg/l						<5	<5	<5	<5	<5	<5	5	<5
TPH (Ali & Aro)	µg/l						<5	<5	<5	<5	<5	<5	11	<5
PAHs (Polycyclic Aromatic Hydrocarbons)														
Acenapthene	µg/l					2200	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenapthylene	µg/l	5.8					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	µg/l	0.1					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	µg/l				0.5		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	µg/l	0.00017	0.01				<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	<0.01
Benzo(ghi)perylene	µg/l		Sum				<0.01	<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	<0.01
Chrysene	µg/l				0.2		<0.01	<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	<0.01
Fluoranthene	µg/l	0.0063				1500	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	µg/l					240	<0.01	<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	<0.01
Naphthalene	µg/l	2					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.12	<0.01
Phenanthrene	µg/l				5		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	µg/l					1100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<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	<0.01	<0.01	<0.01	<0.01

= exceedance of Tier 2 target concentrations
= exceedance of most conservative site wide GAC but no exceedance of sample specific GAC

* = Total PAH EQS (0.1) assessed via comparsion 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 O
CERTIFICATES OF GEOTECHNICAL ANALYSIS

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
CP102	1	D	1.20	36					Orange grey slightly sandy slightly gravelly CLAY
CP102	2	D	2.00	30					Grey brown slightly sandy slightly gravelly CLAY
CP102	3	D	3.00	28					Orange grey slightly sandy slightly gravelly CLAY
CP102	4	D	4.00	17					Dark grey slightly gravelly CLAY
CP102	6	D	6.00	18					Grey slightly sandy CLAY
CP102	7	U	6.50	18	39	15	24	100	Grey slightly silty CLAY
CP102	8	U	7.50	18	43	14	29	100	Dark grey CLAY
CP104	1	D	1.20	24					Grey brown slightly sandy slightly gravelly CLAY

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
CP104	2	D	2.00	16					Light brown slightly sandy slightly gravelly CLAY
CP104	3	D	3.00	7.6					Light brown sandy GRAVEL
CP104	4	D	4.00	21	42	16	26	96	Dark grey slightly gravelly CLAY
CP104	5	D	5.00	19					Grey slightly sandy slightly gravelly CLAY
CP104	7	D	7.00	15					Stiff grey slightly sandy CLAY
CP104	8	D	8.00	26	70	22	48	100	Dark grey slightly gravelly CLAY
CP104	9	D	9.00	25					Grey slightly sandy CLAY
CP105	1	D	1.20	20					Brown grey slightly sandy gravelly CLAY (Wet)

STRUCTURAL SOILS LTD

Contract:

Willen Road

Contract Ref:

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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
CP105	2	D	2.00	16					Grey brown slightly sandy slightly gravelly CLAY (Wet)
CP105	4	D	4.00	22					Grey slightly sandy slightly gravelly CLAY
CP105	5	D	5.00	18	40	14	26	99	Dark grey slightly gravelly CLAY
CP105	7	D	7.00	20					Grey slightly sandy CLAY
CP105	8	D	8.00	26	64	23	41	100	Dark grey CLAY
CP107	1	D	1.20	17	39	17	22	77	Brown slightly sandy slightly gravelly CLAY
CP107	2	D	2.00	18					Grey brown slightly sandy slightly gravelly CLAY
CP107	3	D	3.00	20					Grey slightly sandy slightly gravelly CLAY

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Contract:

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Contract Ref:

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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
CP107	4	D	4.00	21					Grey slightly sandy slightly gravelly CLAY
CP107	5	D	5.00	18					Grey slightly sandy slightly gravelly CLAY
CP107	6	U	6.50	21					Grey silty slightly gravelly CLAY
CP107	7	D	7.00	19					Grey slightly sandy slightly gravelly CLAY
CP107	8	D	8.00	16	40	16	24	90	Dark grey slightly sandy slightly gravelly CLAY
CP107	9	D	9.00	14					Dark grey slightly sandy slightly gravelly CLAY
CP107	11	D	11.00	17					Grey slightly sandy slightly gravelly CLAY
TP104	4	D	3.60	28	64	27	37	99	Dark grey slightly sandy slightly gravelly CLAY

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
TP105	2	D	0.50	15	50	18	32	63	Brown slightly sandy slightly gravelly CLAY
TP119	3	B	2.80	40	50	19	31	90	Light brown slightly sandy slightly gravelly CLAY
TP127	1	B	0.70	17	27	15	12	67	Brown sandy slightly gravelly CLAY
TP127	2	B	1.50	22	54	18	36	86	Light brown sandy slightly gravelly CLAY
TP128	1	B	1.00	44	49	19	30	61	Brown sandy slightly gravelly CLAY
TP129	1	B	0.20	12	43	17	26	68	Dark brown sandy slightly gravelly CLAY
TP129	2	B	1.00	30	48	20	28	59	Brown slightly sandy slightly gravelly CLAY
WS101	1	D	1.50	12					Orange brown slightly sandy slightly gravelly CLAY

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
WS101	2	D	3.00	14					Light brown sandy slightly gravelly CLAY
WS101	3	D	4.00	10					Grey slightly sandy CLAY
WS103	1	B	1.20	8.8					Brown sandy GRAVEL
WS103	2	D	2.50	10					Orange grey slightly sandy gravelly CLAY
WS103	3	D	3.50	18					Grey slightly sandy CLAY
WS103	4	D	4.00	19					Grey slightly sandy CLAY
WS103	5	D	5.50	32	68	21	47	100	Dark grey CLAY
WS104	1	D	3.00	6.1					Light brown slightly clayey sandy GRAVEL

STRUCTURAL SOILS LTD

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Willen Road

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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
WS104	2	D	3.70	21	50	16	34	100	Dark grey slightly sandy CLAY
WS108	1	D	2.00	6.4					Orange sandy gravelly CLAY
WS108	2	D	3.00	13					Light brown gravelly SAND
WS108	3	D	4.00	14	30	14	16	90	Dark grey slightly gravelly CLAY
WS108	4	D	4.80	13	31	13	18	92	Dark grey slightly gravelly CLAY
WS108	5	D	6.00	14					Grey slightly sandy CLAY
WS110	3	D	2.00	29	47	17	30	89	Brown slightly sandy slightly gravelly CLAY
WS110	4	D	3.00	29					Brown slightly sandy slightly gravelly CLAY

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
WS110	5	D	5.00	16	63	25	38	97	Dark grey gravelly CLAY
WS110	6	D	6.00	18					Grey slightly sandy CLAY
WS112	7	D	0.90	15	35	13	22	61	Brown sandy slightly gravelly CLAY
WS112	1	D	1.10	12	36	14	22	59	Brown slightly sandy slightly gravelly CLAY
WS112	2	D	2.00	24					Brown slightly sandy slightly gravelly CLAY
WS112	3	D	3.00	31					Orange slightly sandy CLAY
WS112	8	D	4.00	20					Light brown SAND
WS112	4	D	4.60	23	49	15	34	92	Brown sandy slightly gravelly CLAY

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
WS112	5	D	5.00	12					Grey slightly sandy slightly gravelly CLAY
WS112	6	D	6.00	17	37	14	23	95	Dark grey brown slightly gravelly CLAY
WS113	3	D	2.50	17	34	13	21	62	Brown sandy slightly gravelly CLAY
WS113	5	D	4.50	11	32	13	19	76	Dark grey brown slightly sandy slightly gravelly CLAY
WS114	1	D	1.10	20	48	19	29	74	Brown slightly sandy slightly gravelly CLAY
WS114	2	D	2.00	13					Orange slightly sandy slightly gravelly CLAY
WS114	3	D	3.00	15					Light brown slightly clayey slightly gravelly SAND
WS114	4	D	4.00	11					Light brown slightly sandy slightly gravelly CLAY

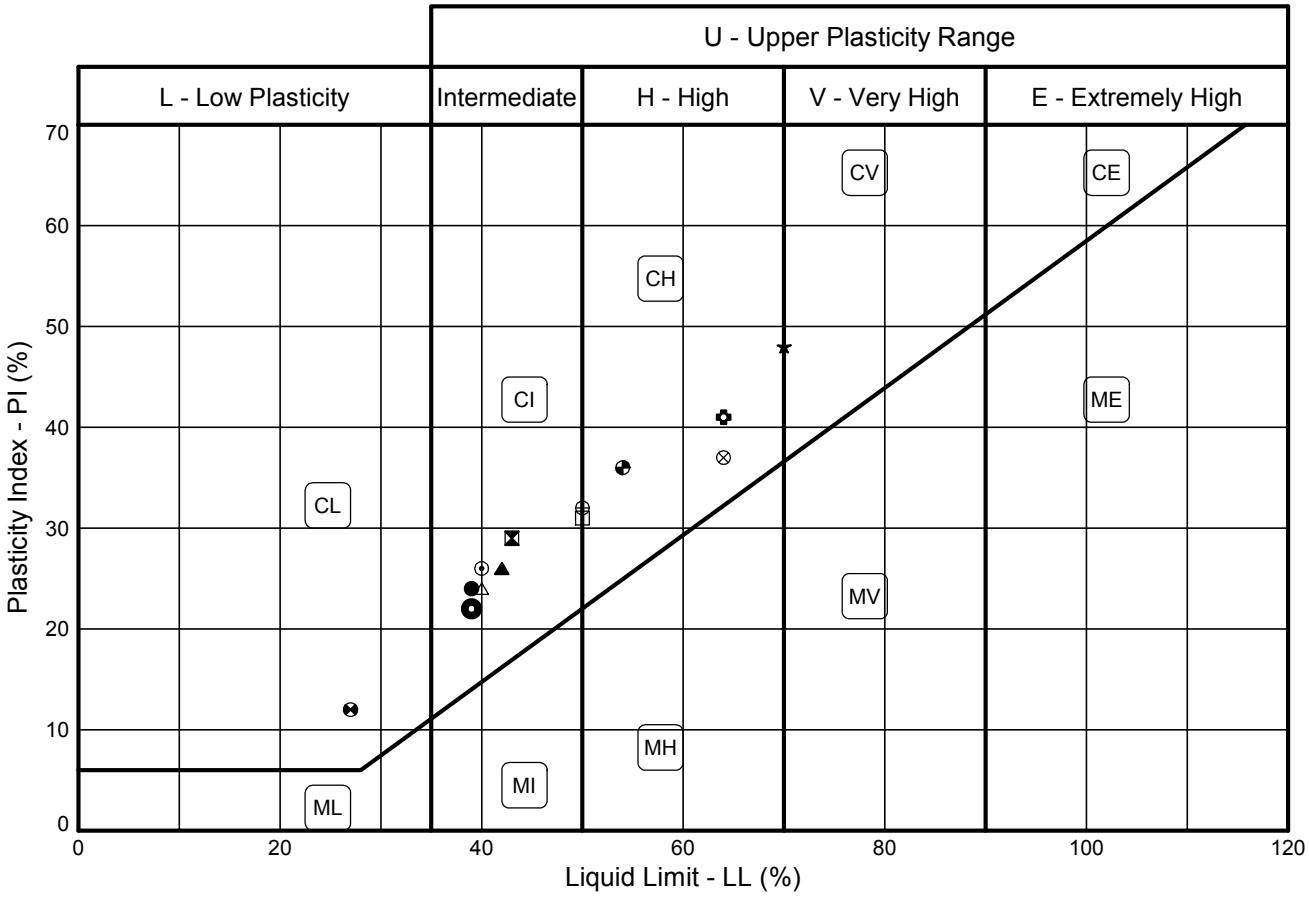
SUMMARY OF SOIL CLASSIFICATION TESTS

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
WS115	1	D	1.20	12					Brown slightly sandy slightly gravelly CLAY
WS115	2	D	2.50	11					Orange slightly slightly clayey sandy GRAVEL
WS115	3	D	3.50	24	32	15	17	86	Light brown slightly sandy slightly gravelly CLAY
WS115	4	D	3.80	9.2					Grey brown slightly sandy slightly gravelly CLAY
WS116	1	D	1.20	24					Orange grey slightly sandy slightly gravelly CLAY
WS116	2	D	2.50	31	61	22	39	89	Dark grey slightly sandy slightly gravelly CLAY
WS116	3	D	3.50	15					Light brown gravelly SAND
WS116	4	D	4.50	22	38	14	24	77	Grey slightly sandy slightly gravelly CLAY

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
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)			%	%	%	%	%	
●	CP102	7U	6.50	3.2/4.4/5.3/5.4	4.2.3	18	39	15	24	100	C
⊠	CP102	8U	7.50	3.2/4.4/5.3/5.4	4.2.3	18	43	14	29	100	C
▲	CP104	4D	4.00	3.2/4.4/5.3/5.4	4.2.4	21	42	16	26	96	C
★	CP104	8D	8.00	3.2/4.4/5.3/5.4	4.2.3	26	70	22	48	100	C
⊙	CP105	5D	5.00	3.2/4.4/5.3/5.4	4.2.4	18	40	14	26	99	C
✿	CP105	8D	8.00	3.2/4.4/5.3/5.4	4.2.3	26	64	23	41	100	C
◉	CP107	1D	1.20	3.2/4.4/5.3/5.4	4.2.4	17	39	17	22	77	C
△	CP107	8D	8.00	3.2/4.4/5.3/5.4	4.2.4	16	40	16	24	90	C
⊗	TP104	4D	3.60	3.2/4.4/5.3/5.4	4.2.4	28	64	27	37	99	C
⊕	TP105	2D	0.50	3.2/4.4/5.3/5.4	4.2.4	15	50	18	32	63	C
□	TP119	3B	2.80	3.2/4.4/5.3/5.4	4.2.3	40	50	19	31	90	C
◓	TP127	1B	0.70	3.2/4.3/5.3/5.4	4.2.3	17	27	15	12	67	C
◔	TP127	2B	1.50	3.2/4.4/5.3/5.4	4.2.4	22	54	18	36	86	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: [redacted] MARK ATHORNE

Date: 22/05/17

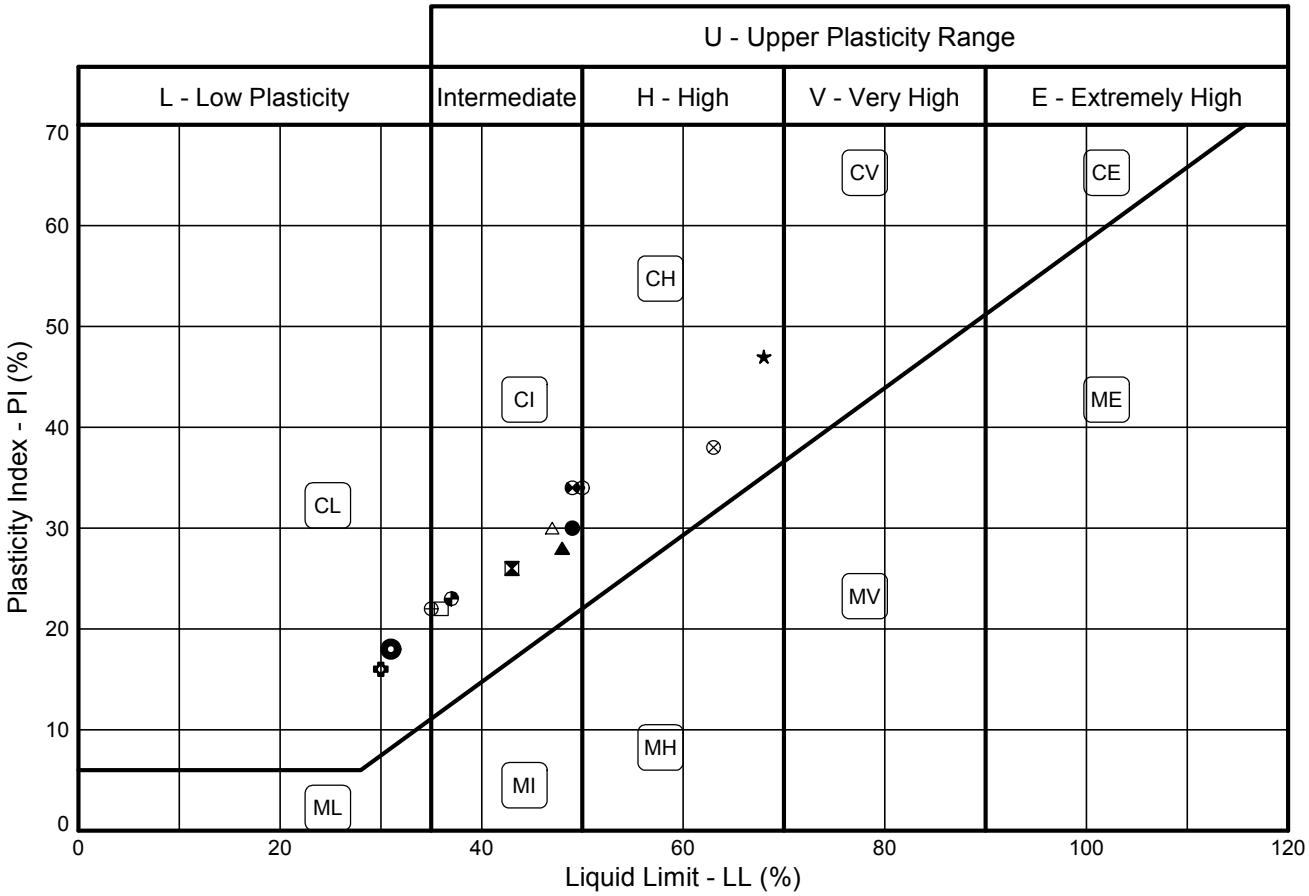
Con: **Willen Road**

Contract Ref: **782551**

AGS

PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
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)			%	%	%	%	%	
●	TP128	1B	1.00	3.2/4.3/5.3/5.4	4.2.4	44	49	19	30	61	C
⊠	TP129	1B	0.20	3.2/4.4/5.3/5.4	4.2.4	12	43	17	26	68	C
▲	TP129	2B	1.00	3.2/4.4/5.3/5.4	4.2.4	30	48	20	28	59	C
★	WS103	5D	5.50	3.2/4.4/5.3/5.4	4.2.3	32	68	21	47	100	C
⊙	WS104	2D	3.70	3.2/4.4/5.3/5.4	4.2.3	21	50	16	34	100	C
✿	WS108	3D	4.00	3.2/4.4/5.3/5.4	4.2.4	14	30	14	16	90	C
◉	WS108	4D	4.80	3.2/4.4/5.3/5.4	4.2.4	13	31	13	18	92	C
△	WS110	3D	2.00	3.2/4.4/5.3/5.4	4.2.4	29	47	17	30	89	C
⊗	WS110	5D	5.00	3.2/4.4/5.3/5.4	4.2.4	16	63	25	38	97	C
⊕	WS112	7D	0.90	3.2/4.4/5.3/5.4	4.2.4	15	35	13	22	61	C
□	WS112	1D	1.10	3.2/4.4/5.3/5.4	4.2.4	12	36	14	22	59	C
⊛	WS112	4D	4.60	3.2/4.4/5.3/5.4	4.2.4	23	49	15	34	92	C
◕	WS112	6D	6.00	3.2/4.4/5.3/5.4	4.2.4	17	37	14	23	95	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: [redacted] MARK ATHORNE

Date: 22/05/17

Contract: **Willen Road**

Contract Ref: **782551**

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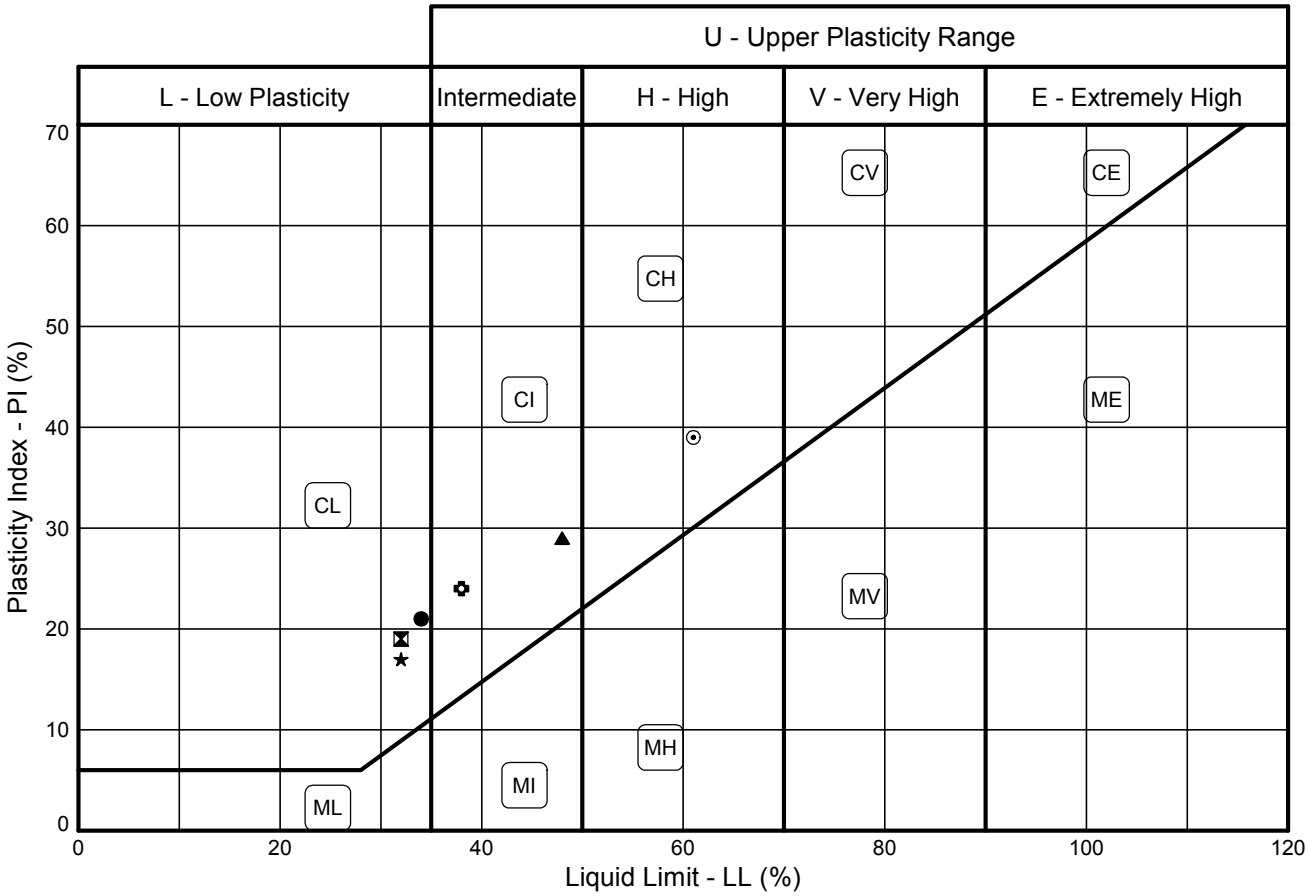
PLASTICITY CHART - PI Vs LL

In accordance with clause 42.3 of BS5930:1999
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)			%	%	%	%	%		
●	WS113	3D	2.50	3.2/4.4/5.3/5.4	4.2.4	17	34	13	21	62	C	
⊠	WS113	5D	4.50	3.2/4.4/5.3/5.4	4.2.4	11	32	13	19	76	C	
▲	WS114	1D	1.10	3.2/4.4/5.3/5.4	4.2.4	20	48	19	29	74	C	
★	WS115	3D	3.50	3.2/4.4/5.3/5.4	4.2.4	24	32	15	17	86	C	
⊙	WS116	2D	2.50	3.2/4.4/5.3/5.4	4.2.4	31	61	22	39	89	C	
✿	WS116	4D	4.50	3.2/4.4/5.3/5.4	4.2.4	22	38	14	24	77	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

mpiled By	Date
MARK ATHORNE	22/05/17

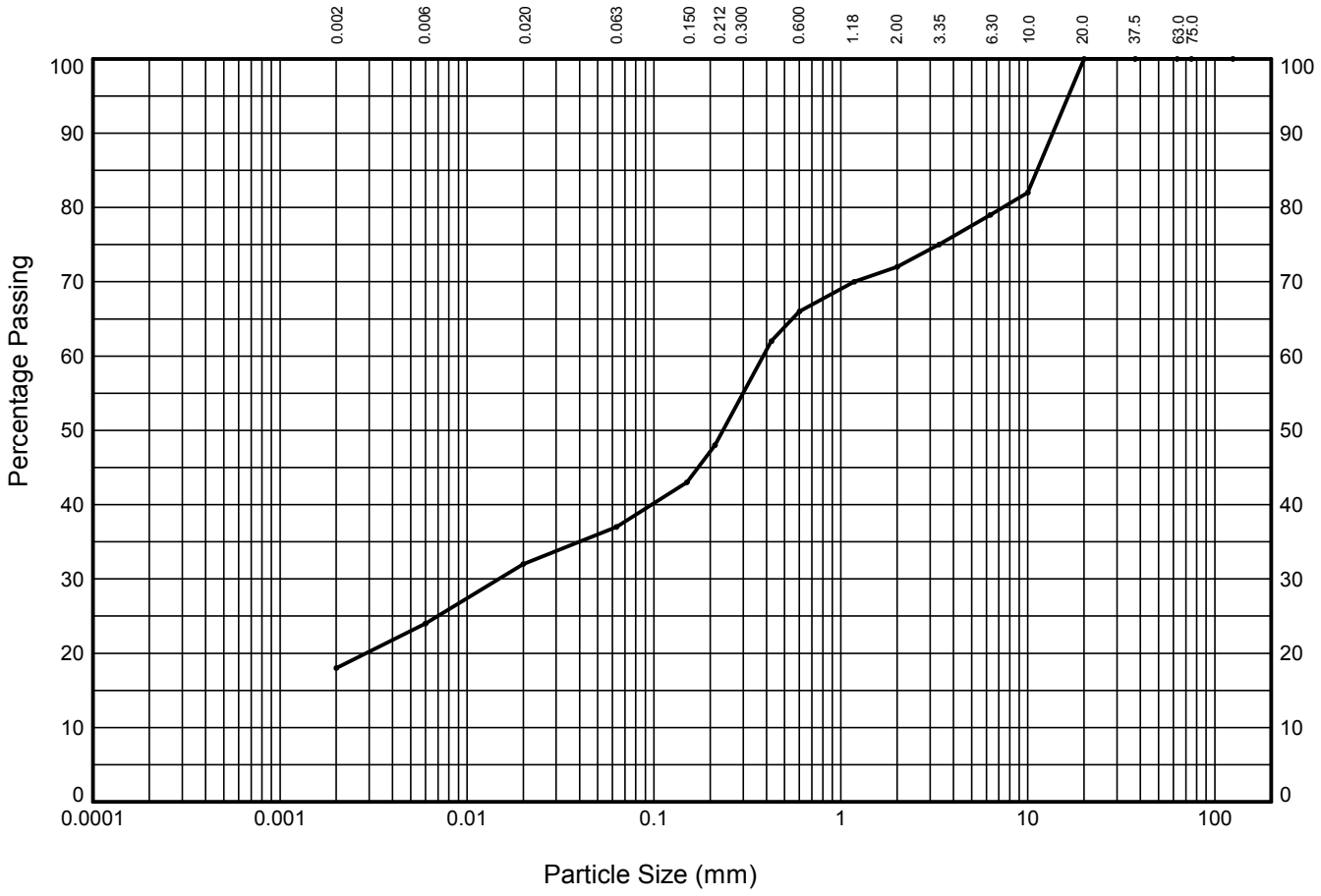
Contract	Contract Ref:
Willen Road	**782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP104** 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	**82**
6.30	**79**
3.35	**75**
2.00	**72**
1.18	**70**
0.600	**66**
0.425	**62**
0.212	**48**
0.150	**43**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**32**
0.006	**24**
0.002	**18**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**28**
SAND	**35**
SILT	**19**
CLAY	**18**

Soil Description:

Grey brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**
Con **Willen Road**	Contract Ref: **782551**	

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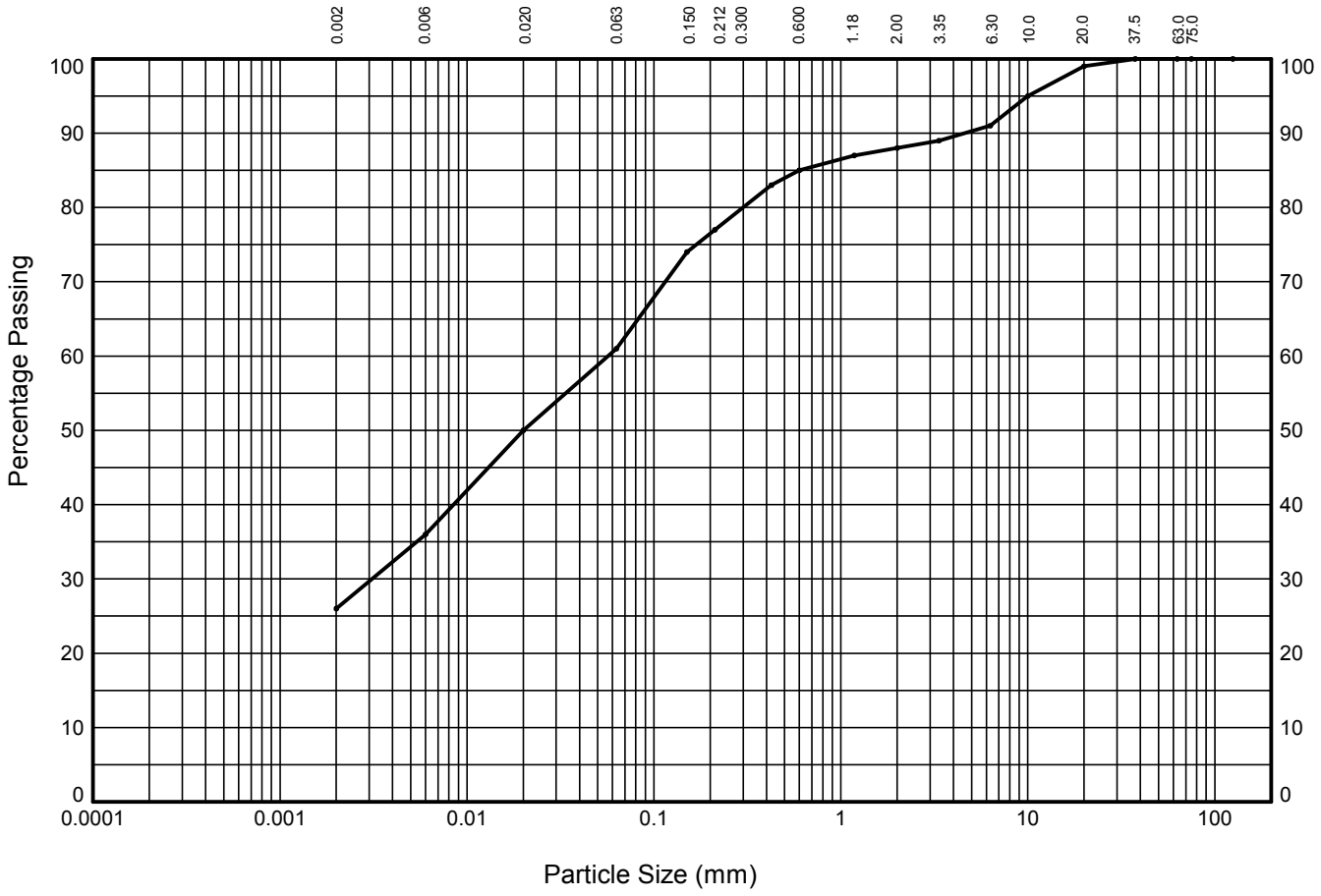
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



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	**99**
10.0	**95**
6.30	**91**
3.35	**89**
2.00	**88**
1.18	**87**
0.600	**85**
0.425	**83**
0.212	**77**
0.150	**74**
0.063	**61**

Particle Diameter (mm)	Percent Passing (%)
0.02	**50**
0.006	**36**
0.002	**26**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**12**
SAND	**27**
SILT	**35**
CLAY	**26**

Soil Description:

Light brown slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

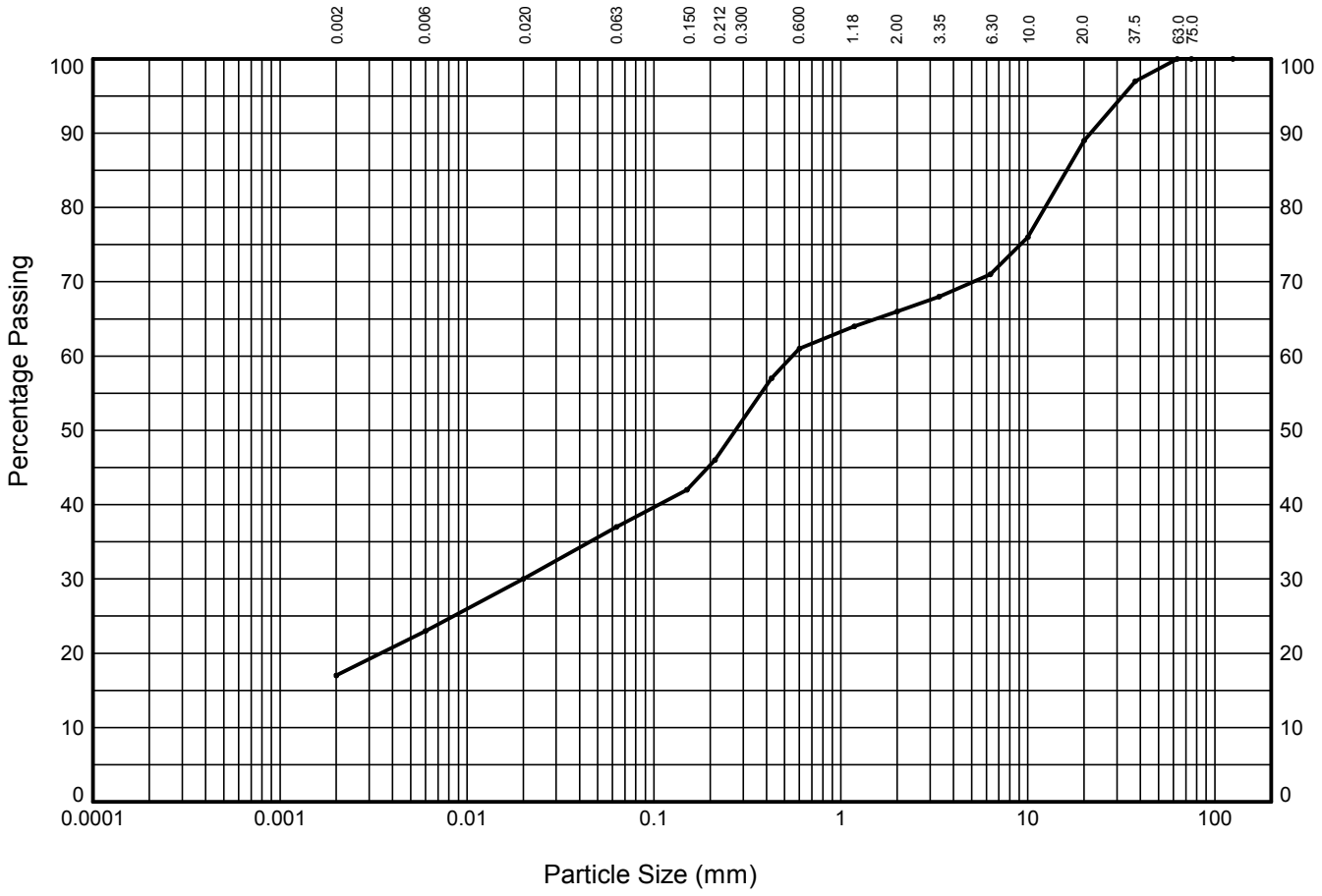
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP105** 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	**97**
20.0	**89**
10.0	**76**
6.30	**71**
3.35	**68**
2.00	**66**
1.18	**64**
0.600	**61**
0.425	**57**
0.212	**46**
0.150	**42**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**30**
0.006	**23**
0.002	**17**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**34**
SAND	**29**
SILT	**20**
CLAY	**17**

Soil Description:

Brown slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

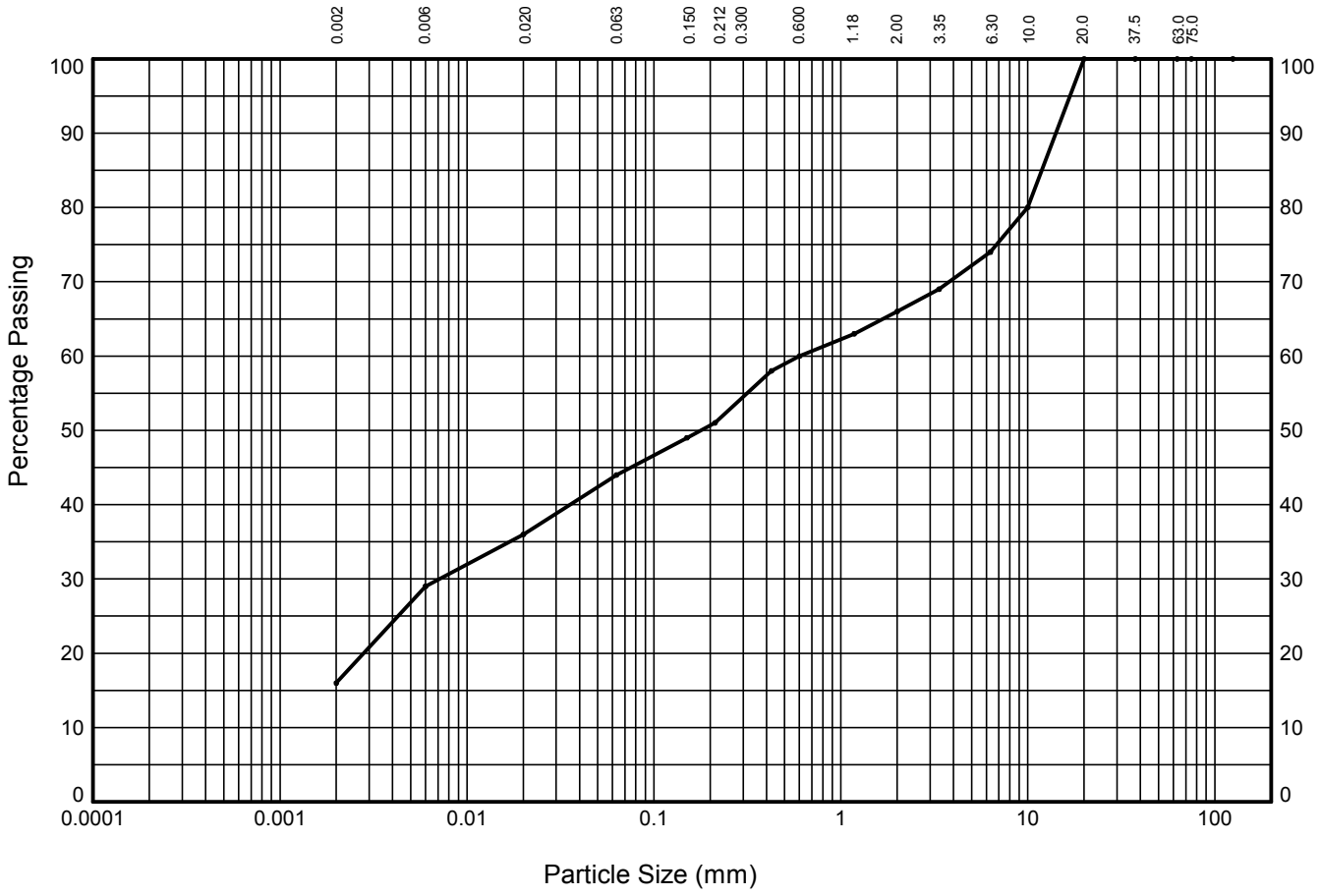
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



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	**80**
6.30	**74**
3.35	**69**
2.00	**66**
1.18	**63**
0.600	**60**
0.425	**58**
0.212	**51**
0.150	**49**
0.063	**44**

Particle Diameter (mm)	Percent Passing (%)
0.02	**36**
0.006	**29**
0.002	**16**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**34**
SAND	**22**
SILT	**28**
CLAY	**16**

Soil Description:

Light brown grey slightly sandy slightly gravelly chalky CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER** Date: **22/05/17**

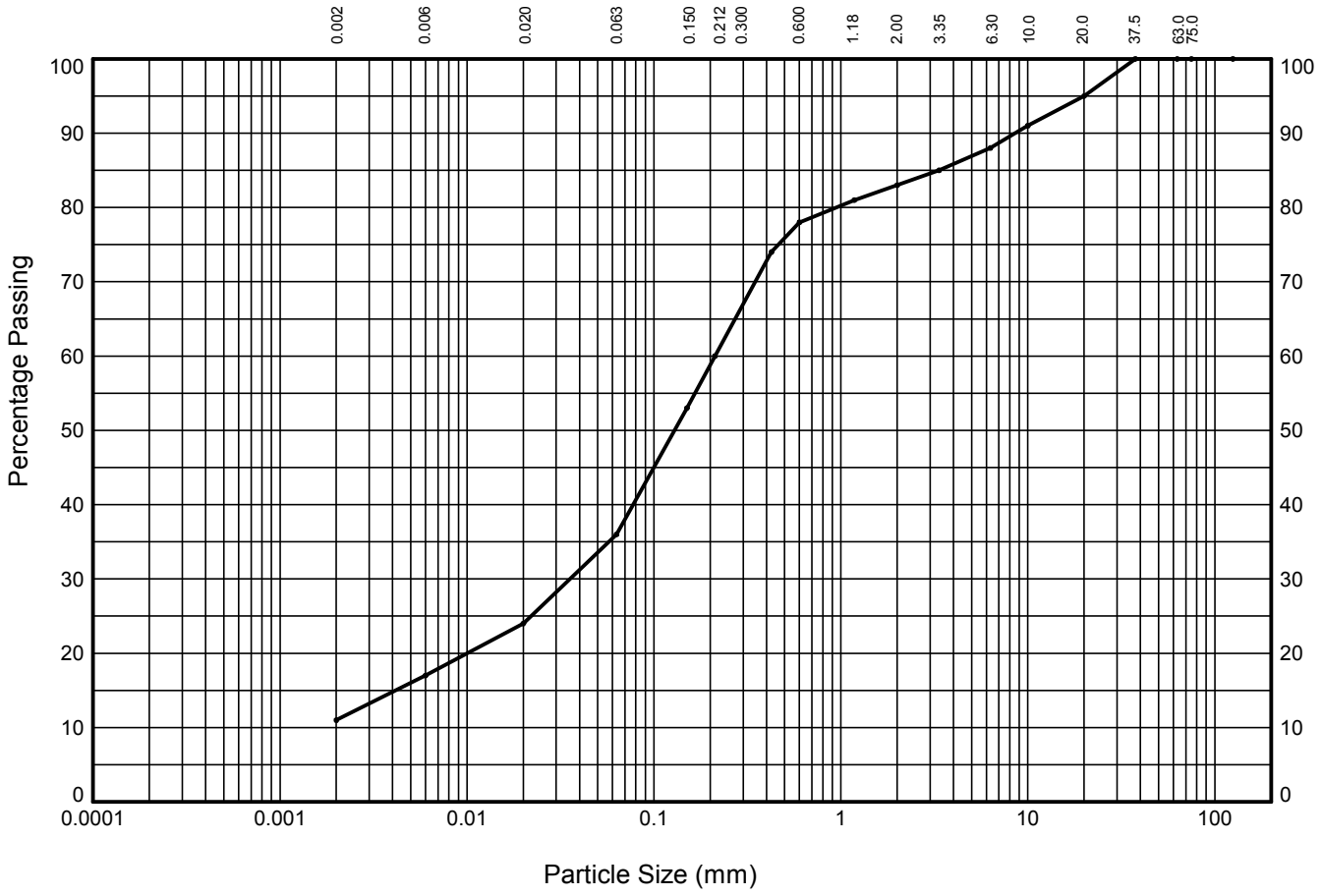
Contract: **Willen Road** Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP105** Sample Ref: **4** 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	**95**
10.0	**91**
6.30	**88**
3.35	**85**
2.00	**83**
1.18	**81**
0.600	**78**
0.425	**74**
0.212	**60**
0.150	**53**
0.063	**36**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**17**
0.002	**11**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**17**
SAND	**47**
SILT	**25**
CLAY	**11**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER** Date: **22/05/17**

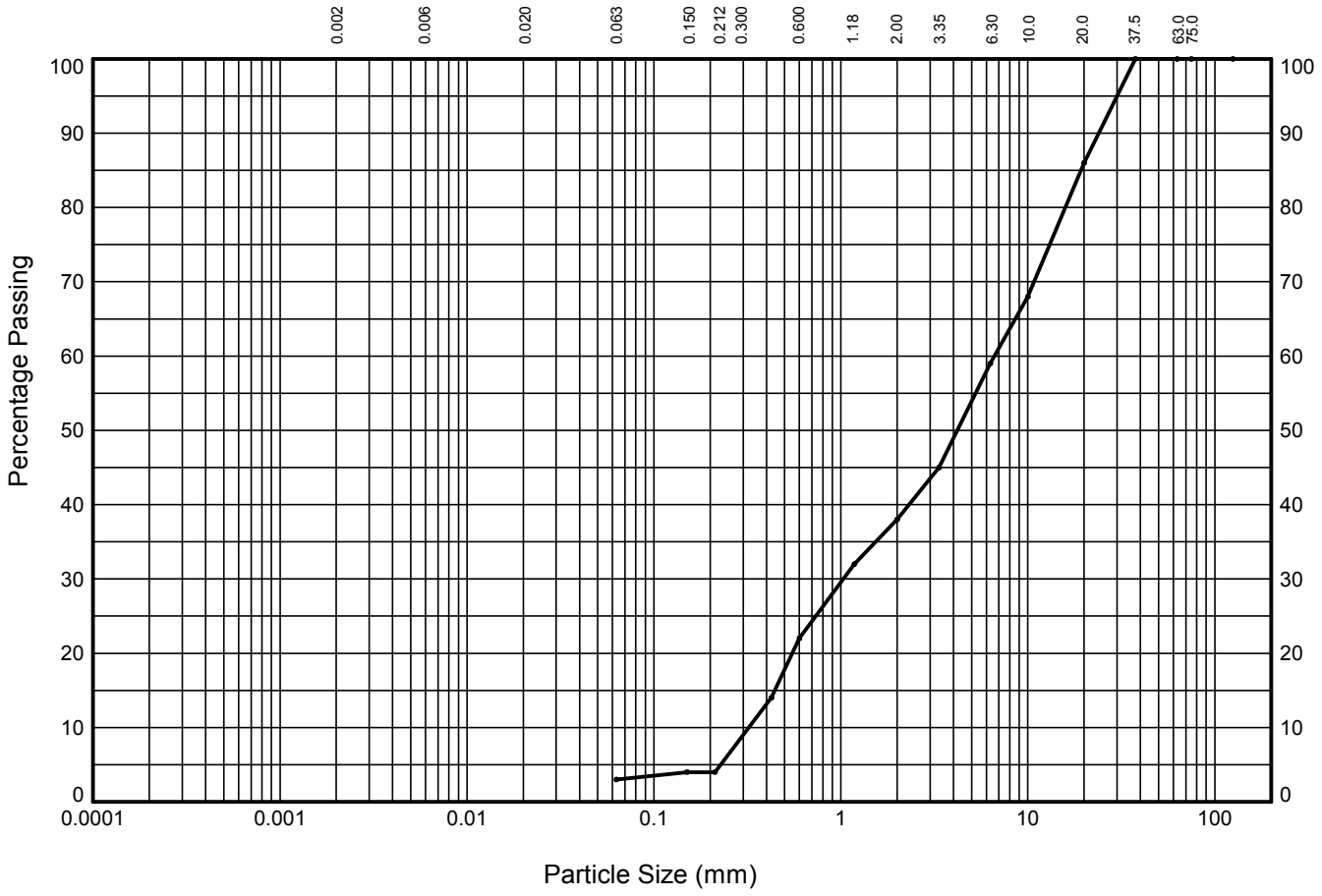
Contract: **Willen Road** Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP109** Sample Ref: **1** Sample Type: **B** Depth (m): **0.90**



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	**68**
6.30	**59**
3.35	**45**
2.00	**38**
1.18	**32**
0.600	**22**
0.425	**14**
0.212	**4**
0.150	**4**
0.063	**3**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**62**
SAND	**35**
SILT/CLAY	**3**

Soil Description:

Light brown slightly clayey very sandy GRAVEL

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**

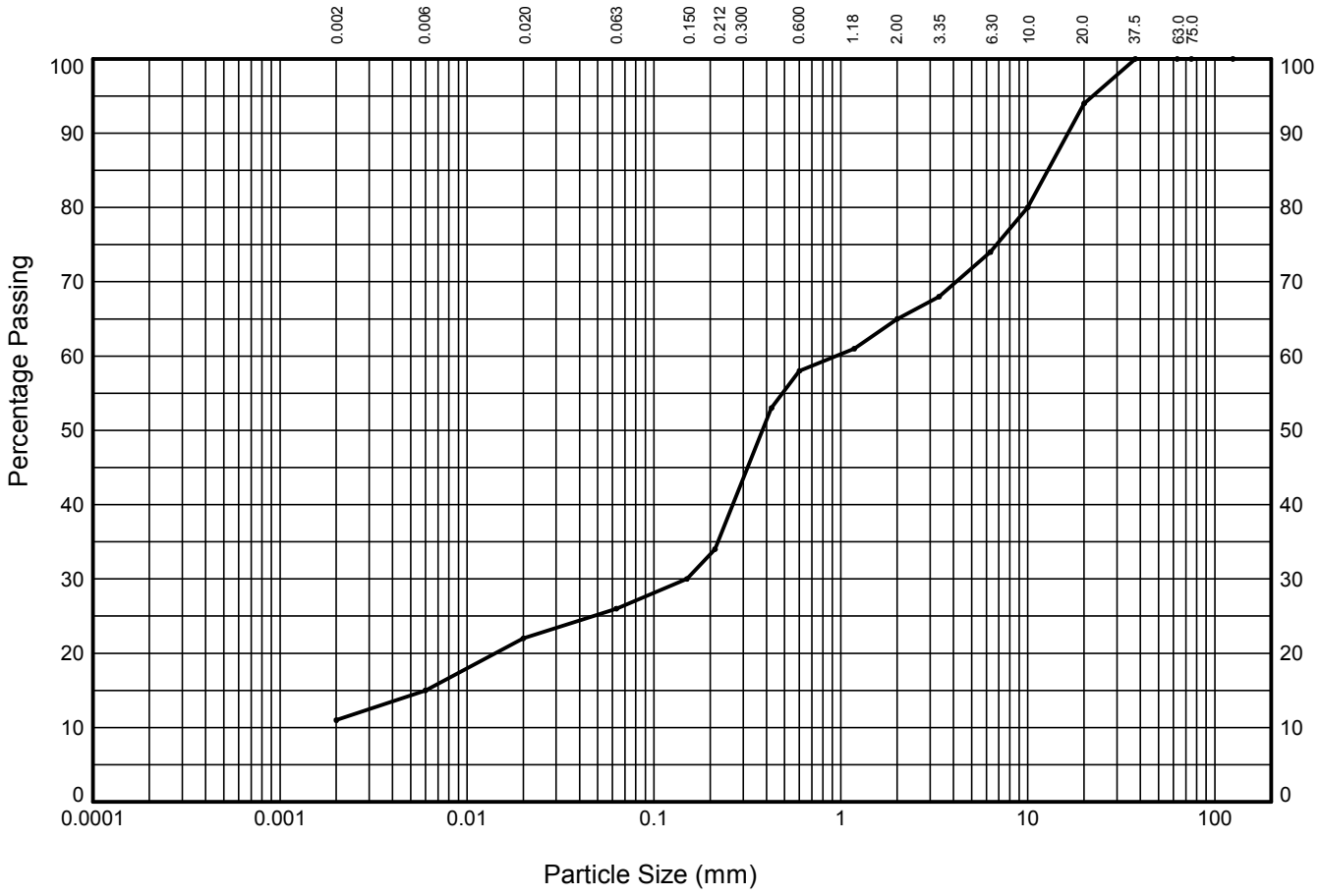
Contract	Contract Ref:
Willen Road	**782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP118** 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	**94**
10.0	**80**
6.30	**74**
3.35	**68**
2.00	**65**
1.18	**61**
0.600	**58**
0.425	**53**
0.212	**34**
0.150	**30**
0.063	**26**

Particle Diameter (mm)	Percent Passing (%)
0.02	**22**
0.006	**15**
0.002	**11**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**35**
SAND	**39**
SILT	**15**
CLAY	**11**

Soil Description:

Grey brown slightly sandy gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

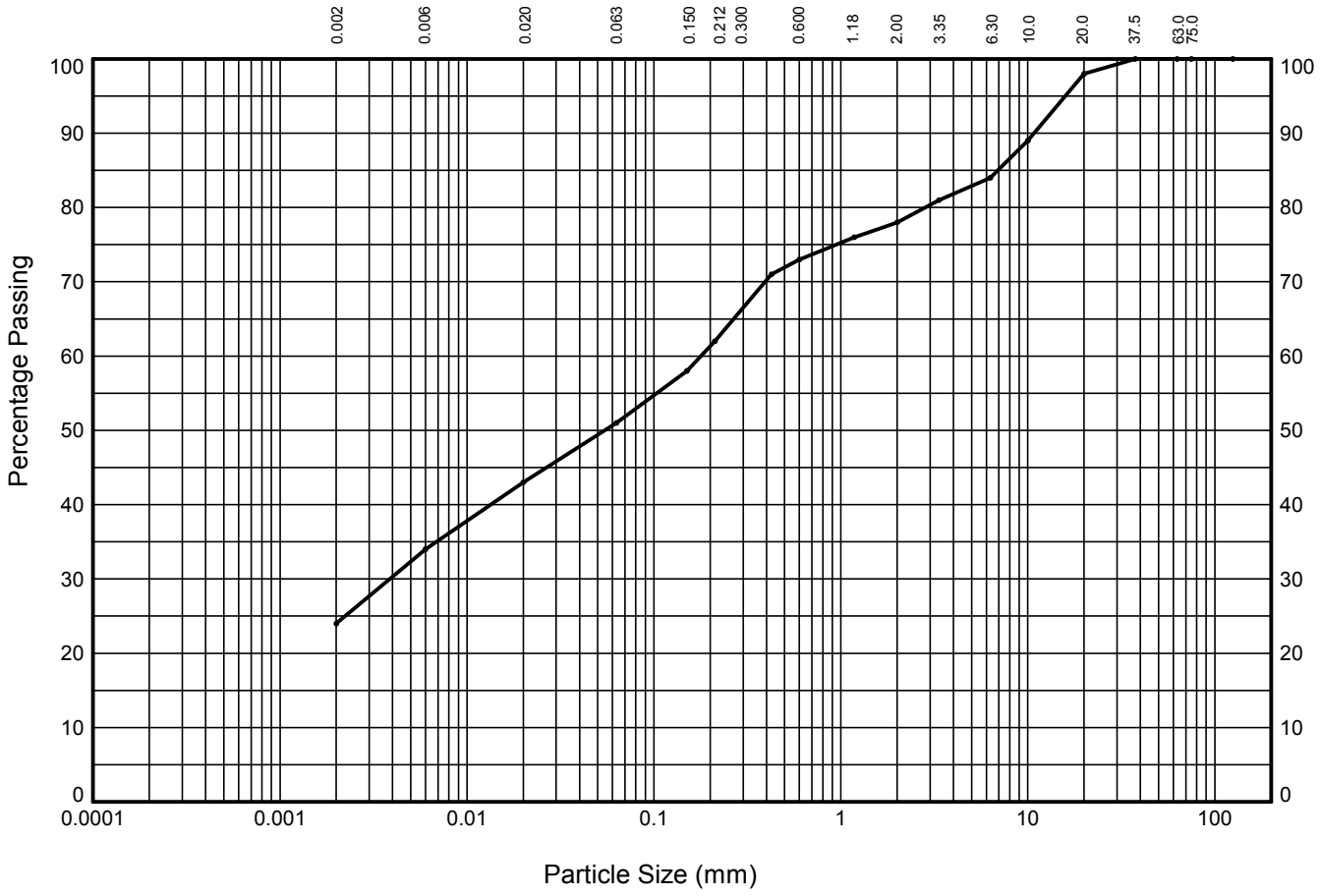
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



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	**89**
6.30	**84**
3.35	**81**
2.00	**78**
1.18	**76**
0.600	**73**
0.425	**71**
0.212	**62**
0.150	**58**
0.063	**51**

Particle Diameter (mm)	Percent Passing (%)
0.02	**43**
0.006	**34**
0.002	**24**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**22**
SAND	**27**
SILT	**27**
CLAY	**24**

Soil Description:

Dark grey slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

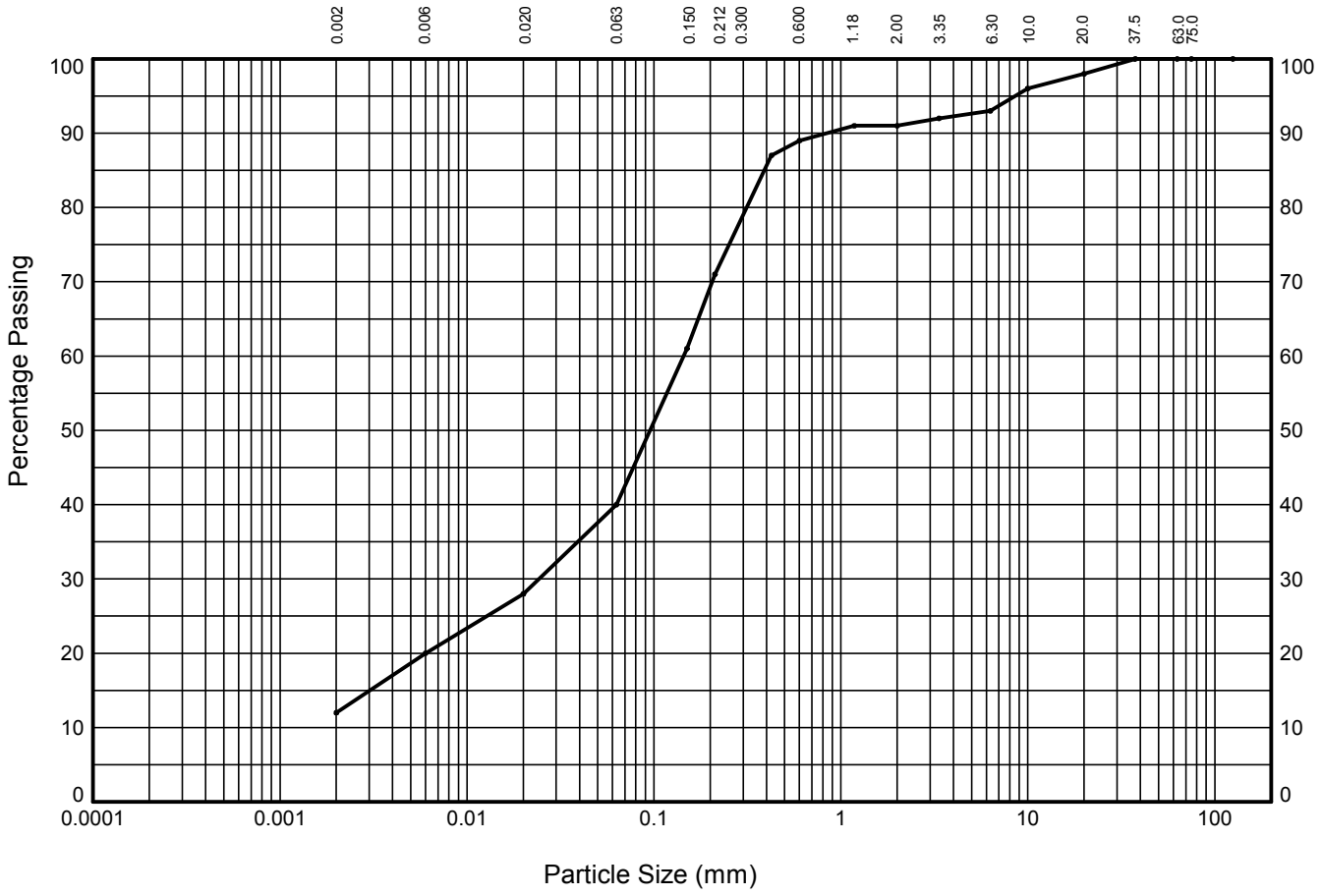
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP118** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



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	**98**
10.0	**96**
6.30	**93**
3.35	**92**
2.00	**91**
1.18	**91**
0.600	**89**
0.425	**87**
0.212	**71**
0.150	**61**
0.063	**40**

Particle Diameter (mm)	Percent Passing (%)
0.02	**28**
0.006	**20**
0.002	**12**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**9**
SAND	**51**
SILT	**28**
CLAY	**12**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER** Date: **22/05/17**

Contra: **Willen Road**

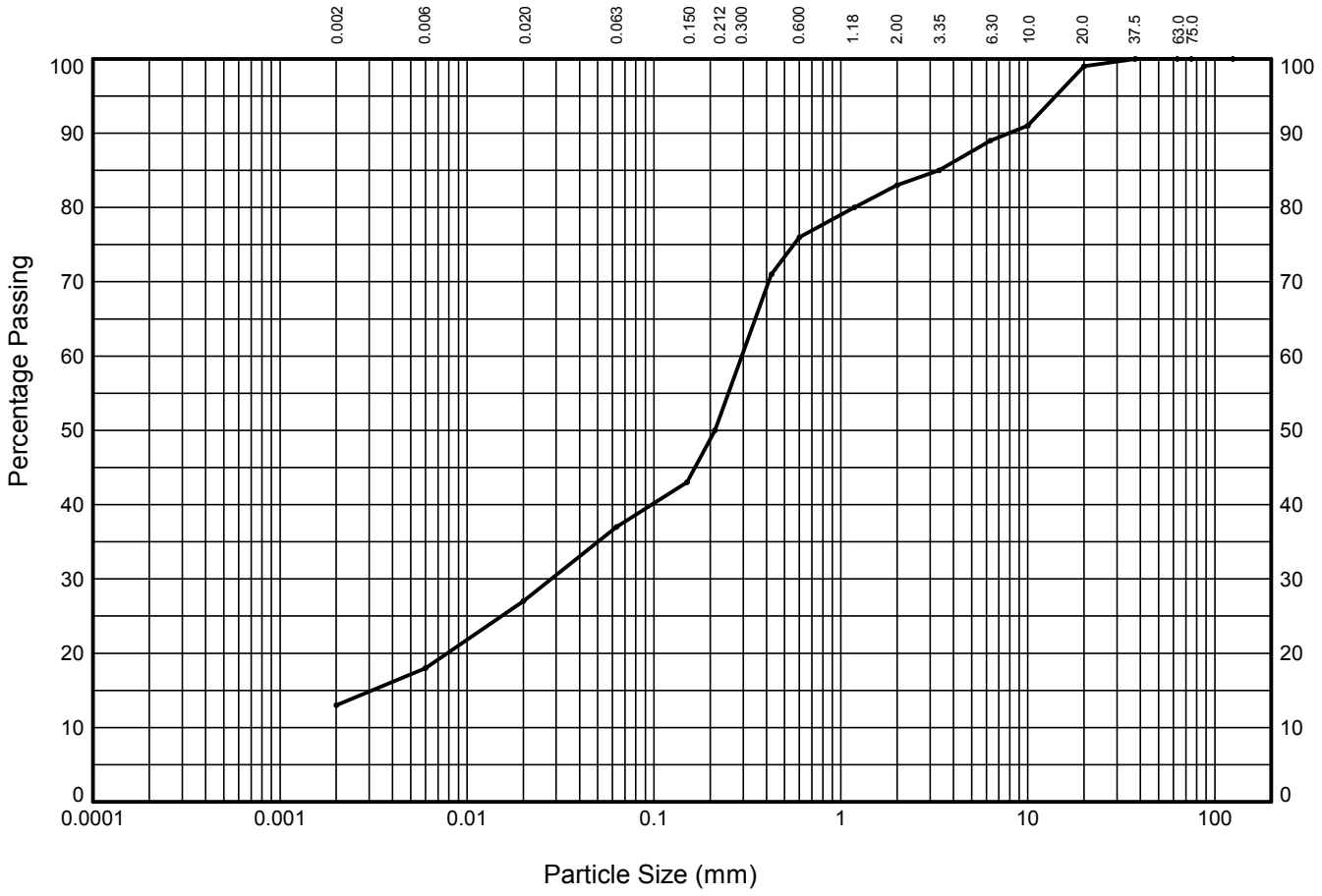
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



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	**99**
10.0	**91**
6.30	**89**
3.35	**85**
2.00	**83**
1.18	**80**
0.600	**76**
0.425	**71**
0.212	**50**
0.150	**43**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**27**
0.006	**18**
0.002	**13**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**17**
SAND	**46**
SILT	**24**
CLAY	**13**

Soil Description:

Dark brown/grey sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

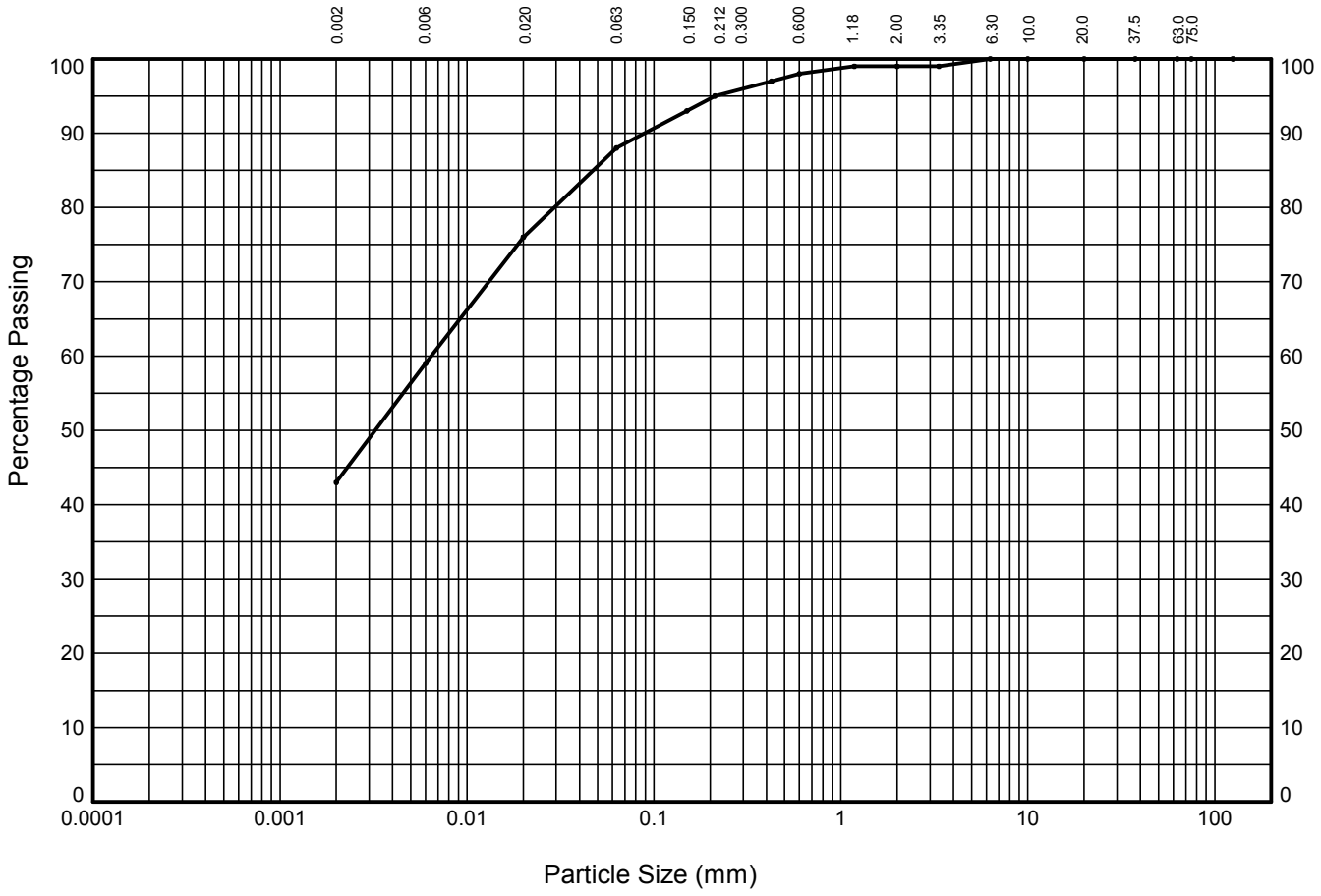
Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**
Cont	Contract Ref:	
Willen Road	**782551**	

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



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	**99**
2.00	**99**
1.18	**99**
0.600	**98**
0.425	**97**
0.212	**95**
0.150	**93**
0.063	**88**

Particle Diameter (mm)	Percent Passing (%)
0.02	**76**
0.006	**59**
0.002	**43**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**1**
SAND	**11**
SILT	**45**
CLAY	**43**

Soil Description:

Light brown slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER** Date: **22/05/17**

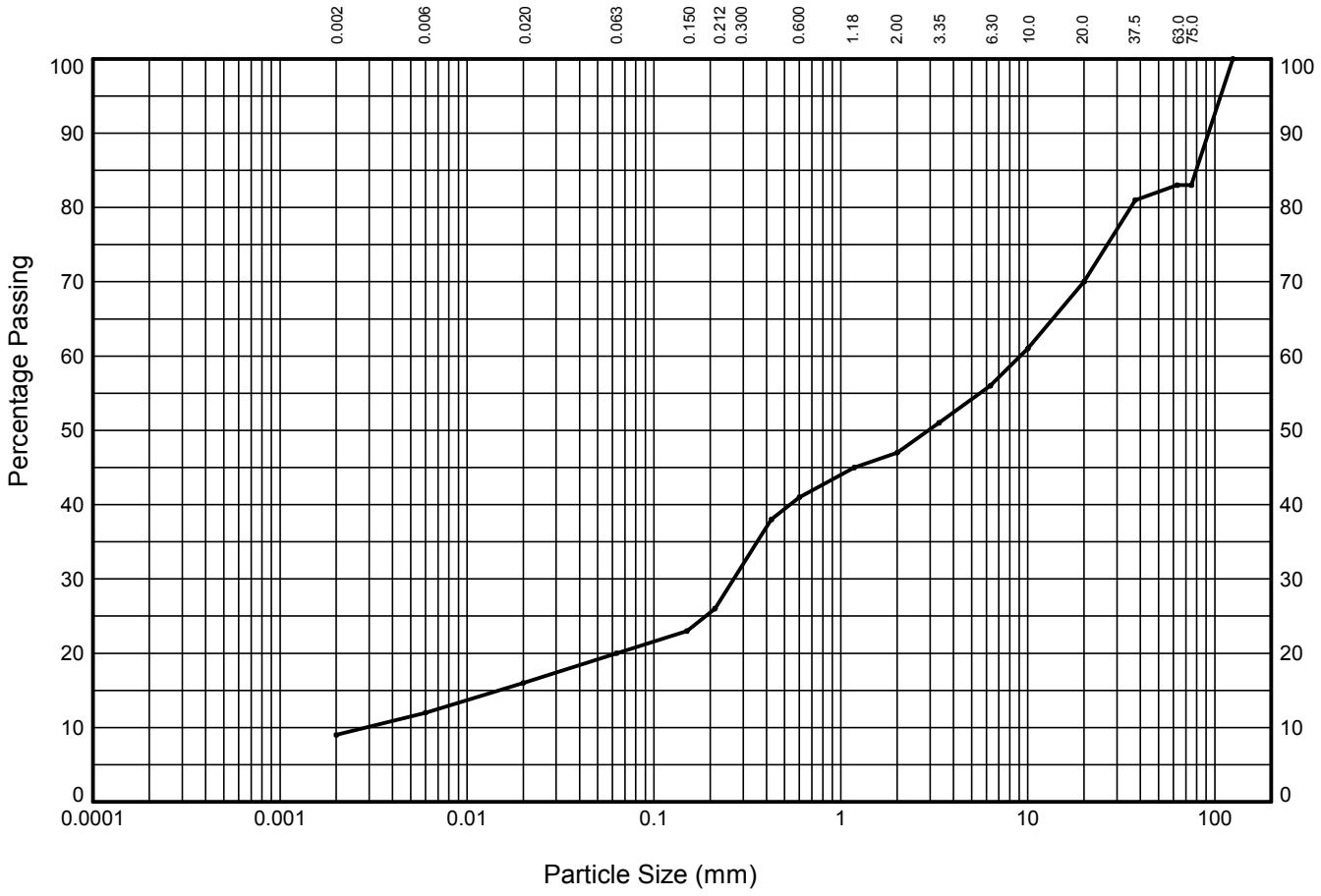
Contract: **Willen Road** Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP121** Sample Ref: **1** Sample Type: **B** Depth (m): **1.40**



CLAY	fine	medium	coarse	fine	medium	coarse	fine	medium	coarse	COBBLES
	SILT			SAND			GRAVEL			

Test Sieve (mm)	Percent Passing (%)
125.0	**100**
75.0	**83**
63.0	**83**
37.5	**81**
20.0	**70**
10.0	**61**
6.30	**56**
3.35	**51**
2.00	**47**
1.18	**45**
0.600	**41**
0.425	**38**
0.212	**26**
0.150	**23**
0.063	**20**

Particle Diameter (mm)	Percent Passing (%)
0.02	**16**
0.006	**12**
0.002	**9**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
COBBLES	**17**
GRAVEL	**36**
SAND	**27**
SILT	**11**
CLAY	**9**

Soil Description:

Brown grey slightly sandy gravelly CLAY with one cobble

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**

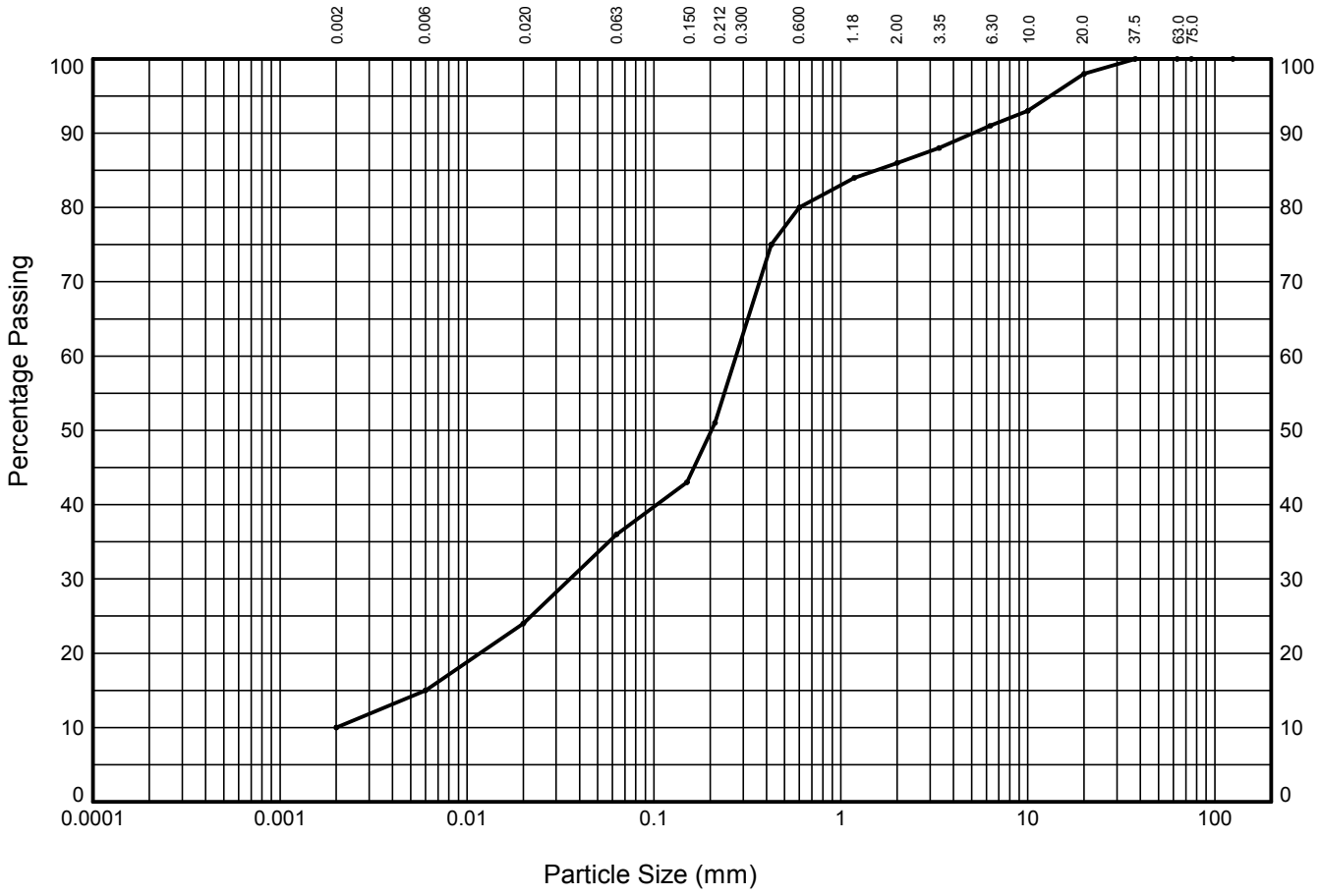
Contract	Contract Ref:
Willen Road	**782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



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	**98**
10.0	**93**
6.30	**91**
3.35	**88**
2.00	**86**
1.18	**84**
0.600	**80**
0.425	**75**
0.212	**51**
0.150	**43**
0.063	**36**

Particle Diameter (mm)	Percent Passing (%)
0.02	**24**
0.006	**15**
0.002	**10**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**14**
SAND	**50**
SILT	**26**
CLAY	**10**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]

Compiled By: **MAUREEN FISHER** Date: **22/05/17**

Contra: **Willen Road**

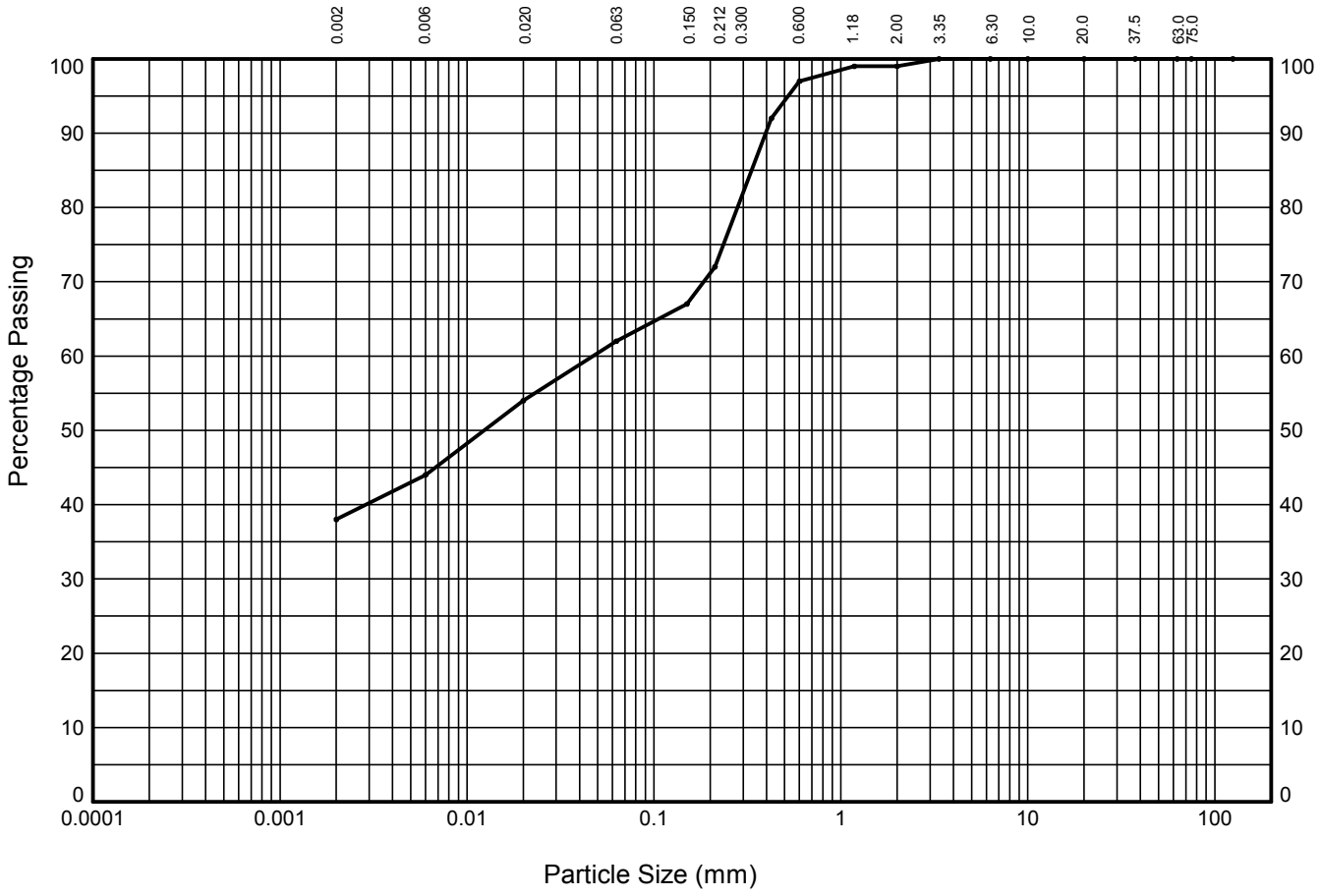
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP127** Sample Ref: **2** 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	**100**
6.30	**100**
3.35	**100**
2.00	**99**
1.18	**99**
0.600	**97**
0.425	**92**
0.212	**72**
0.150	**67**
0.063	**62**

Particle Diameter (mm)	Percent Passing (%)
0.02	**54**
0.006	**44**
0.002	**38**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**1**
SAND	**37**
SILT	**24**
CLAY	**38**

Soil Description:

Light brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

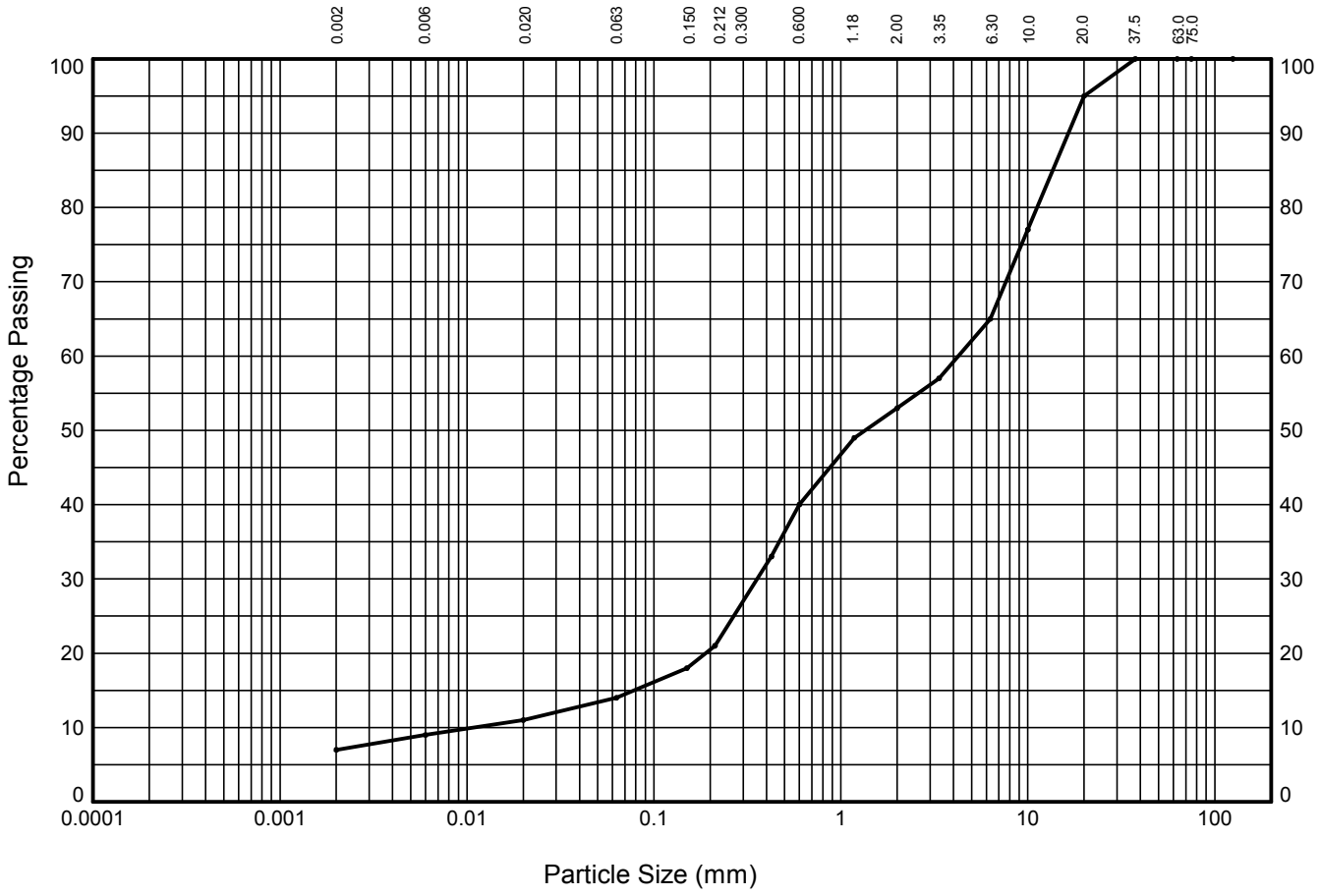
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP127** Sample Ref: **3** 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	**95**
10.0	**77**
6.30	**65**
3.35	**57**
2.00	**53**
1.18	**49**
0.600	**40**
0.425	**33**
0.212	**21**
0.150	**18**
0.063	**14**

Particle Diameter (mm)	Percent Passing (%)
0.02	**11**
0.006	**9**
0.002	**7**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**47**
SAND	**39**
SILT	**7**
CLAY	**7**

Soil Description:

Brown clayey SAND and GRAVEL

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

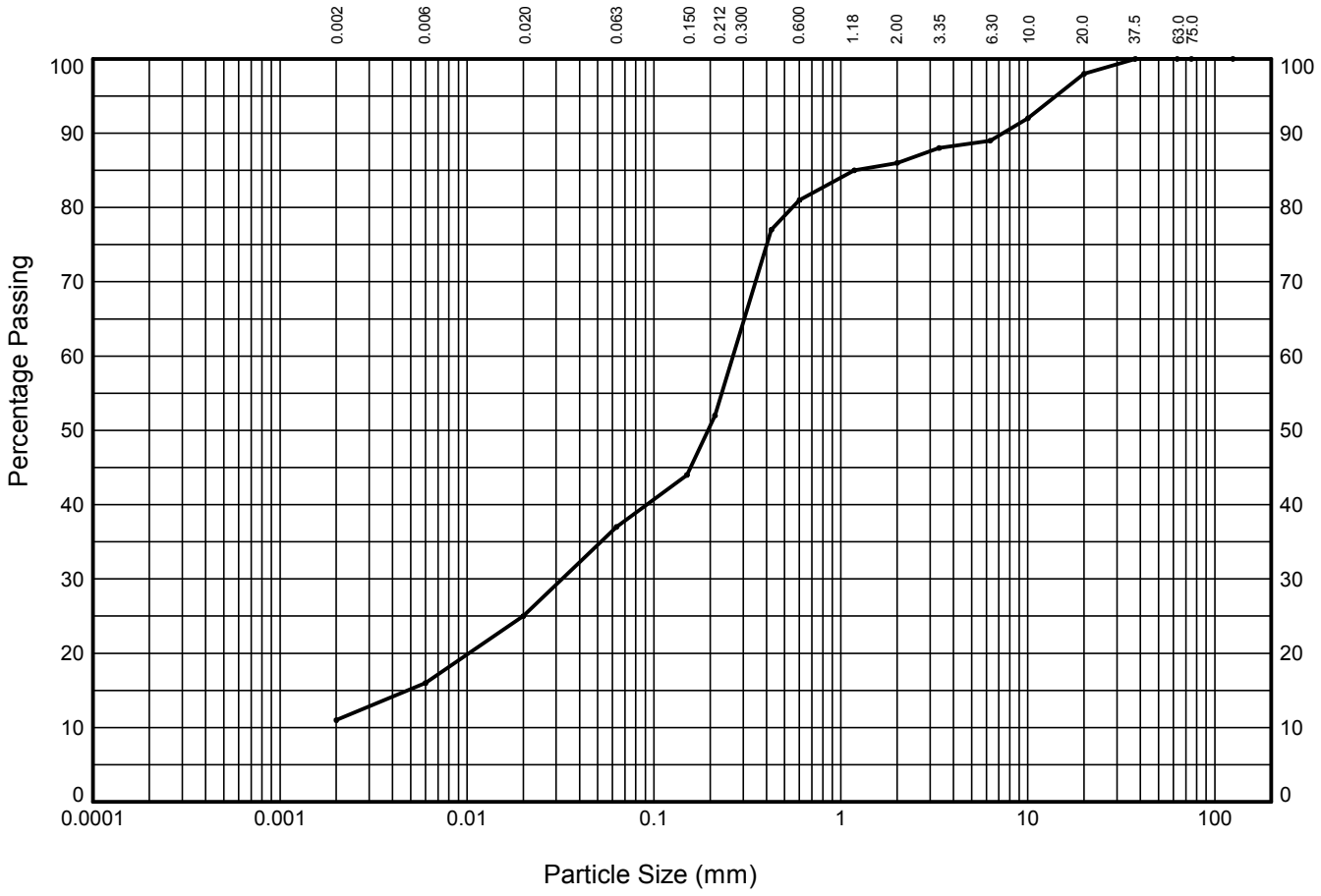
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP128** 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	**92**
6.30	**89**
3.35	**88**
2.00	**86**
1.18	**85**
0.600	**81**
0.425	**77**
0.212	**52**
0.150	**44**
0.063	**37**

Particle Diameter (mm)	Percent Passing (%)
0.02	**25**
0.006	**16**
0.002	**11**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**14**
SAND	**49**
SILT	**26**
CLAY	**11**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**

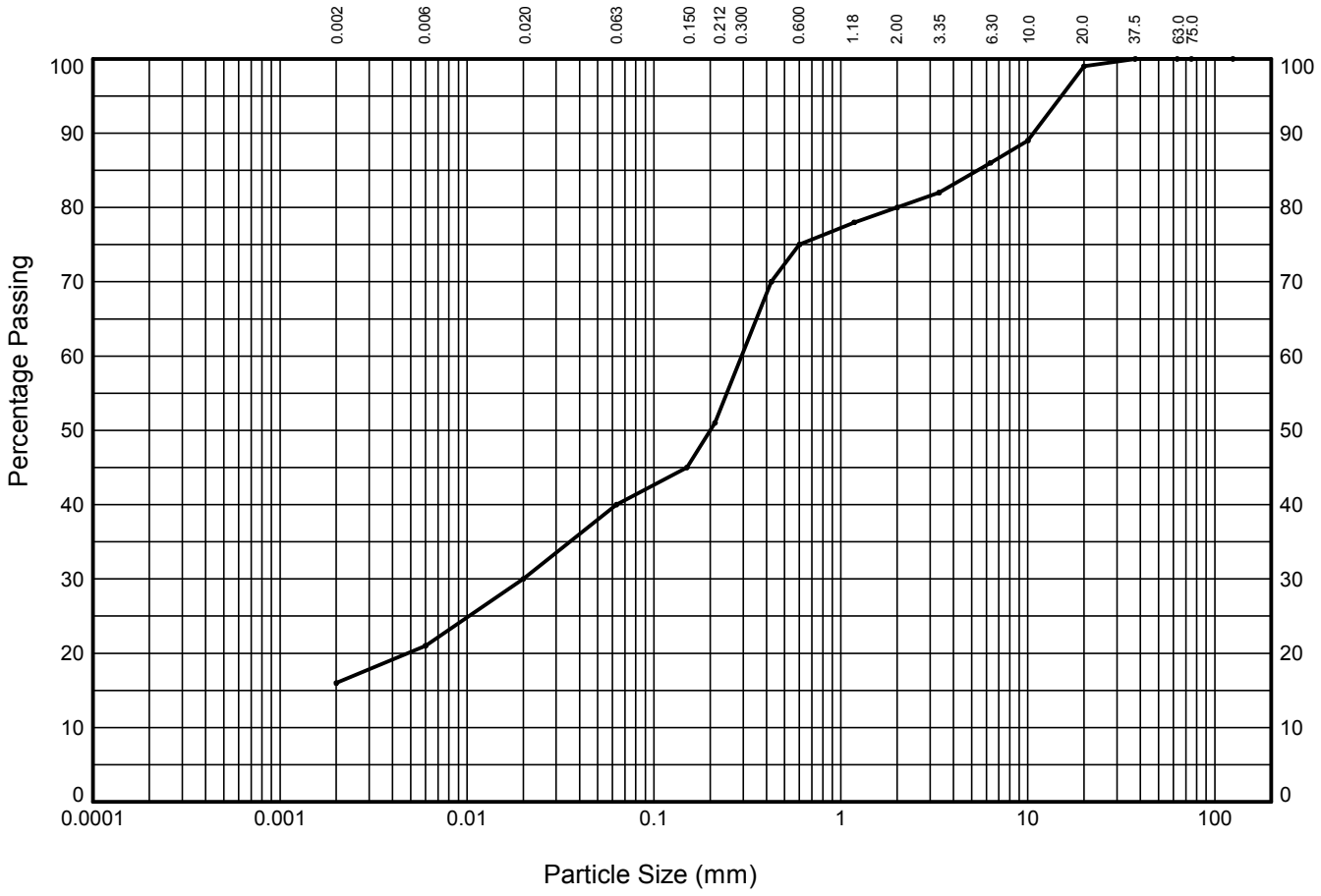
Contract	Contract Ref:
Willen Road	**782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



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	**89**
6.30	**86**
3.35	**82**
2.00	**80**
1.18	**78**
0.600	**75**
0.425	**70**
0.212	**51**
0.150	**45**
0.063	**40**

Particle Diameter (mm)	Percent Passing (%)
0.02	**30**
0.006	**21**
0.002	**16**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**20**
SAND	**40**
SILT	**24**
CLAY	**16**

Soil Description:

Dark brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

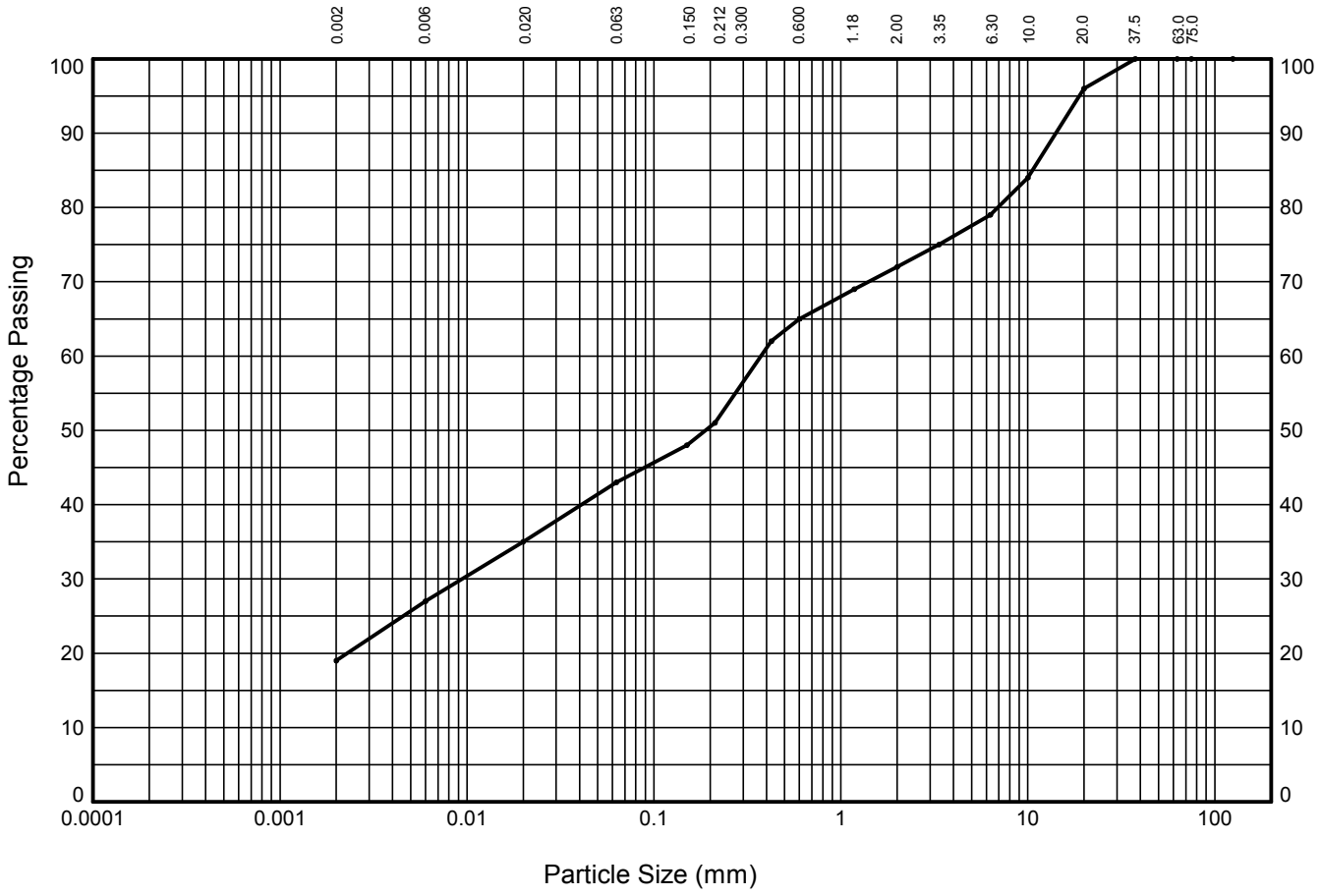
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP129** Sample Ref: **2** 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	**96**
10.0	**84**
6.30	**79**
3.35	**75**
2.00	**72**
1.18	**69**
0.600	**65**
0.425	**62**
0.212	**51**
0.150	**48**
0.063	**43**

Particle Diameter (mm)	Percent Passing (%)
0.02	**35**
0.006	**27**
0.002	**19**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**28**
SAND	**29**
SILT	**24**
CLAY	**19**

Soil Description:

Brown slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

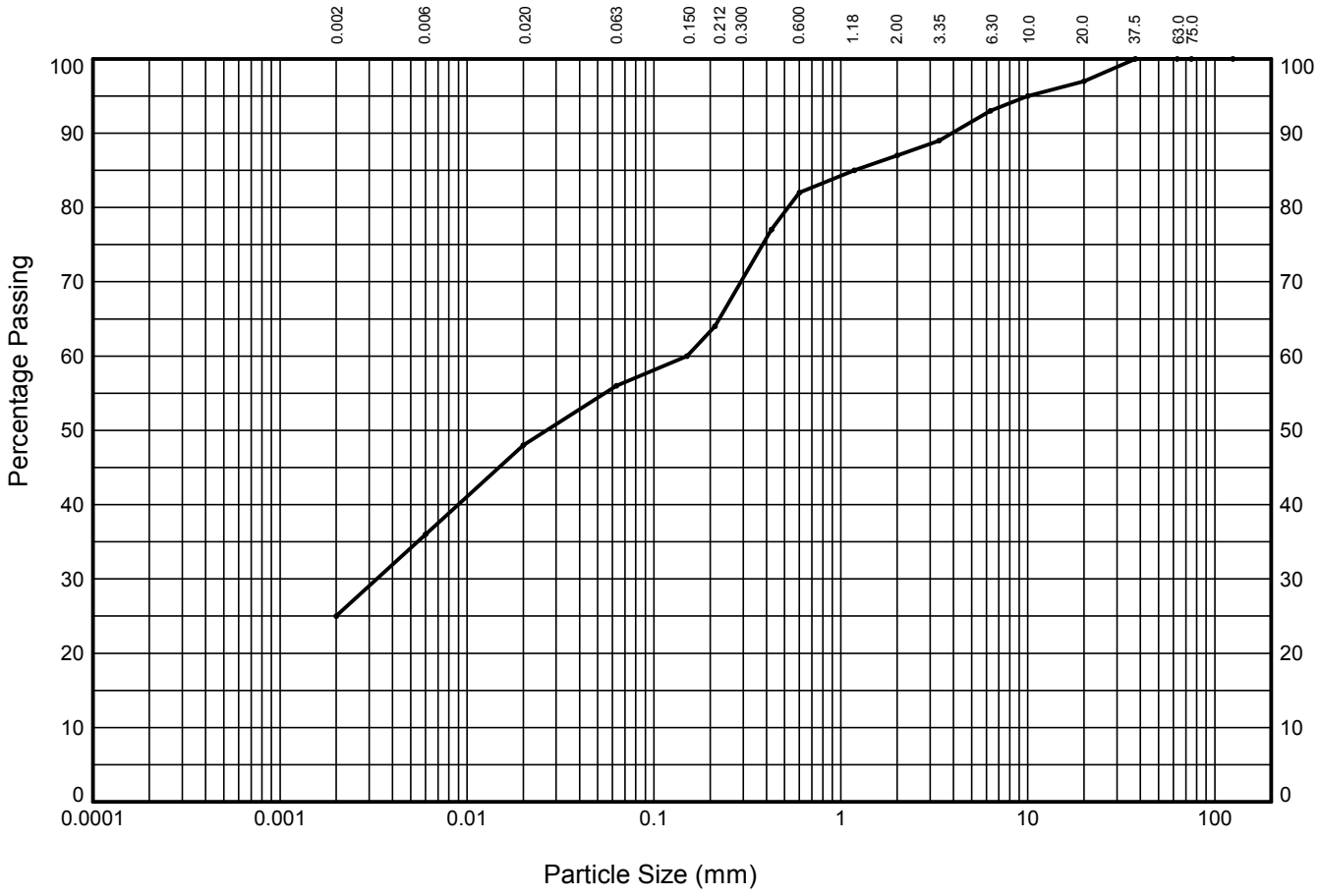
Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**
Contrac	Contract Ref:	
Willen Road	**782551**	

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP129** Sample Ref: **3** Sample Type: **B** Depth (m): **2.90**



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	**97**
10.0	**95**
6.30	**93**
3.35	**89**
2.00	**87**
1.18	**85**
0.600	**82**
0.425	**77**
0.212	**64**
0.150	**60**
0.063	**56**

Particle Diameter (mm)	Percent Passing (%)
0.02	**48**
0.006	**36**
0.002	**25**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**13**
SAND	**31**
SILT	**31**
CLAY	**25**

Soil Description:

Grey brown slightly sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

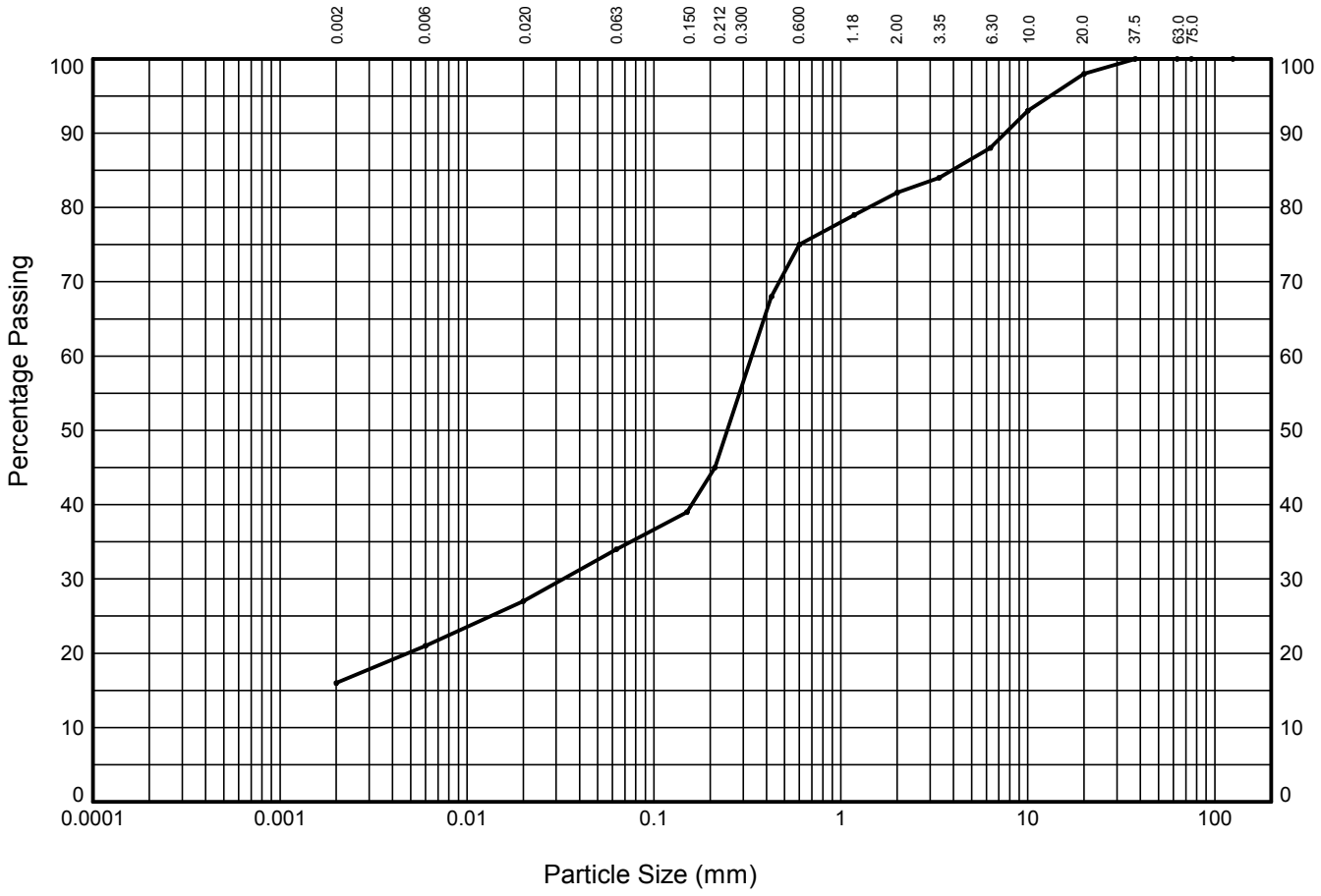
Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**
Contract: **Willen Road**	Contract Ref: **782551**	

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



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	**98**
10.0	**93**
6.30	**88**
3.35	**84**
2.00	**82**
1.18	**79**
0.600	**75**
0.425	**68**
0.212	**45**
0.150	**39**
0.063	**34**

Particle Diameter (mm)	Percent Passing (%)
0.02	**27**
0.006	**21**
0.002	**16**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**18**
SAND	**48**
SILT	**18**
CLAY	**16**

Soil Description:

Light brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

[redacted]

Compiled By: **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

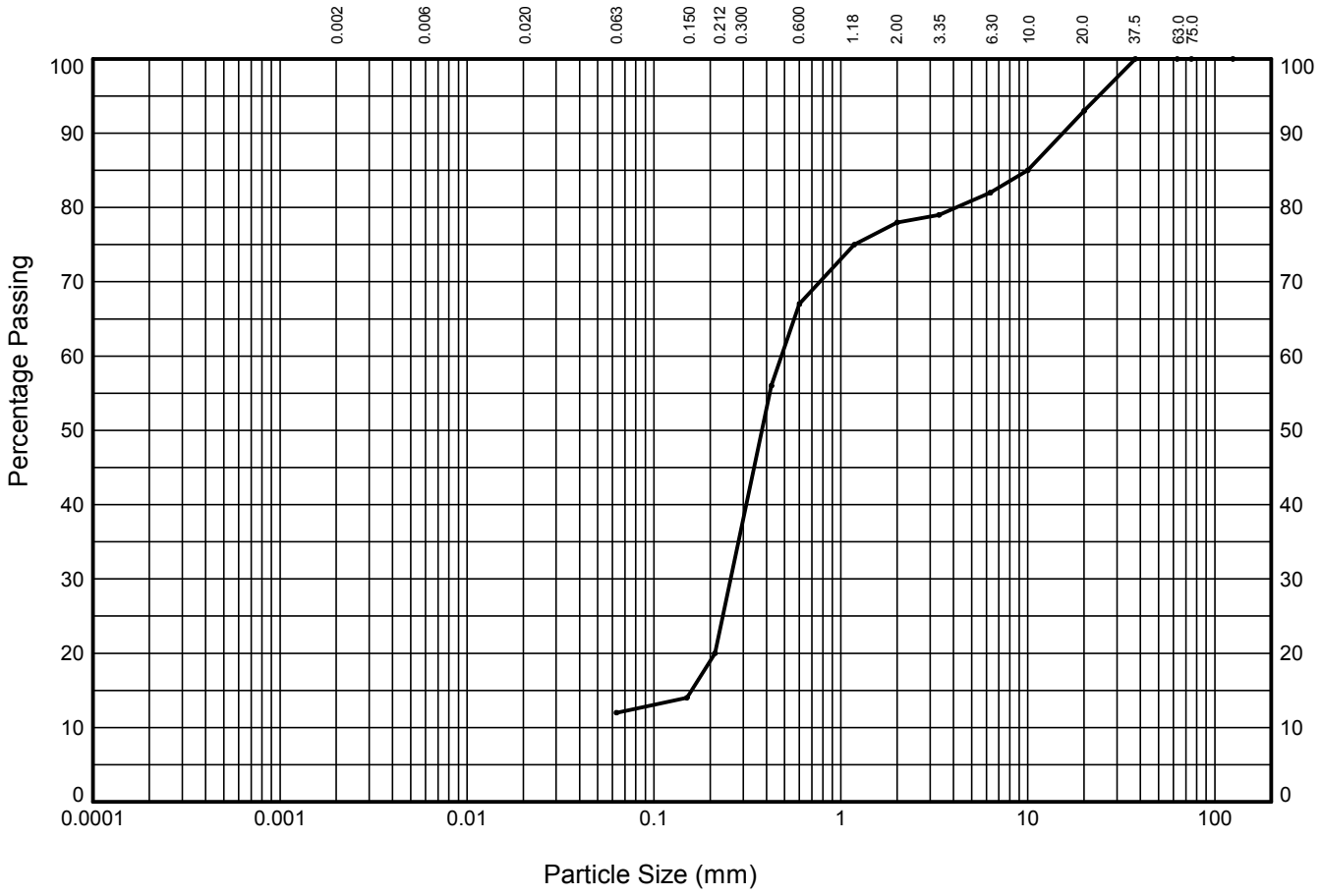
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP130** Sample Ref: **2** 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	**93**
10.0	**85**
6.30	**82**
3.35	**79**
2.00	**78**
1.18	**75**
0.600	**67**
0.425	**56**
0.212	**20**
0.150	**14**
0.063	**12**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**22**
SAND	**66**
SILT/CLAY	**12**

Soil Description:

Brown very sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**

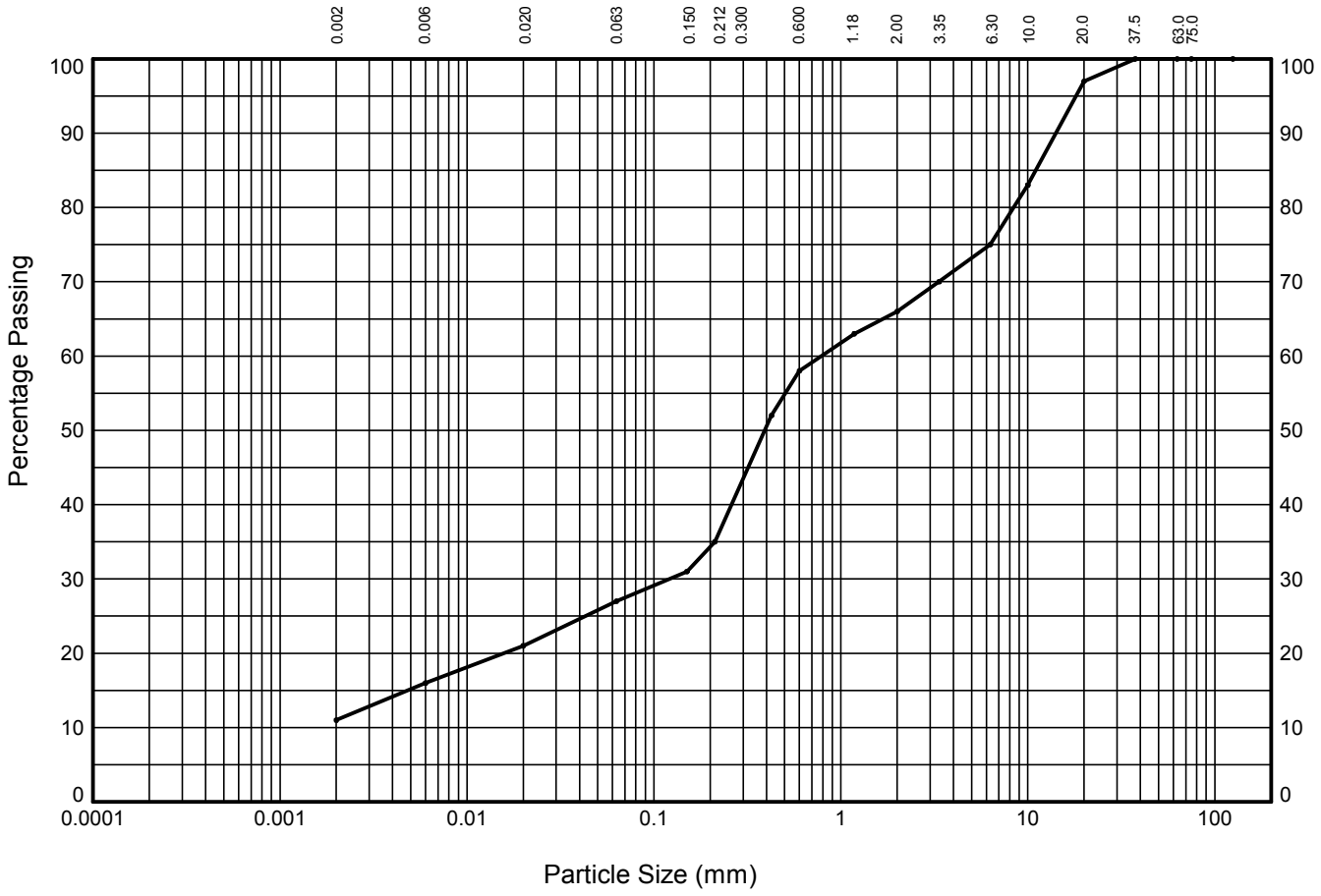
Contract	Contract Ref:
Willen Road	**782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



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	**97**
10.0	**83**
6.30	**75**
3.35	**70**
2.00	**66**
1.18	**63**
0.600	**58**
0.425	**52**
0.212	**35**
0.150	**31**
0.063	**27**

Particle Diameter (mm)	Percent Passing (%)
0.02	**21**
0.006	**16**
0.002	**11**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**34**
SAND	**39**
SILT	**16**
CLAY	**11**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

Contract Ref: **782551**

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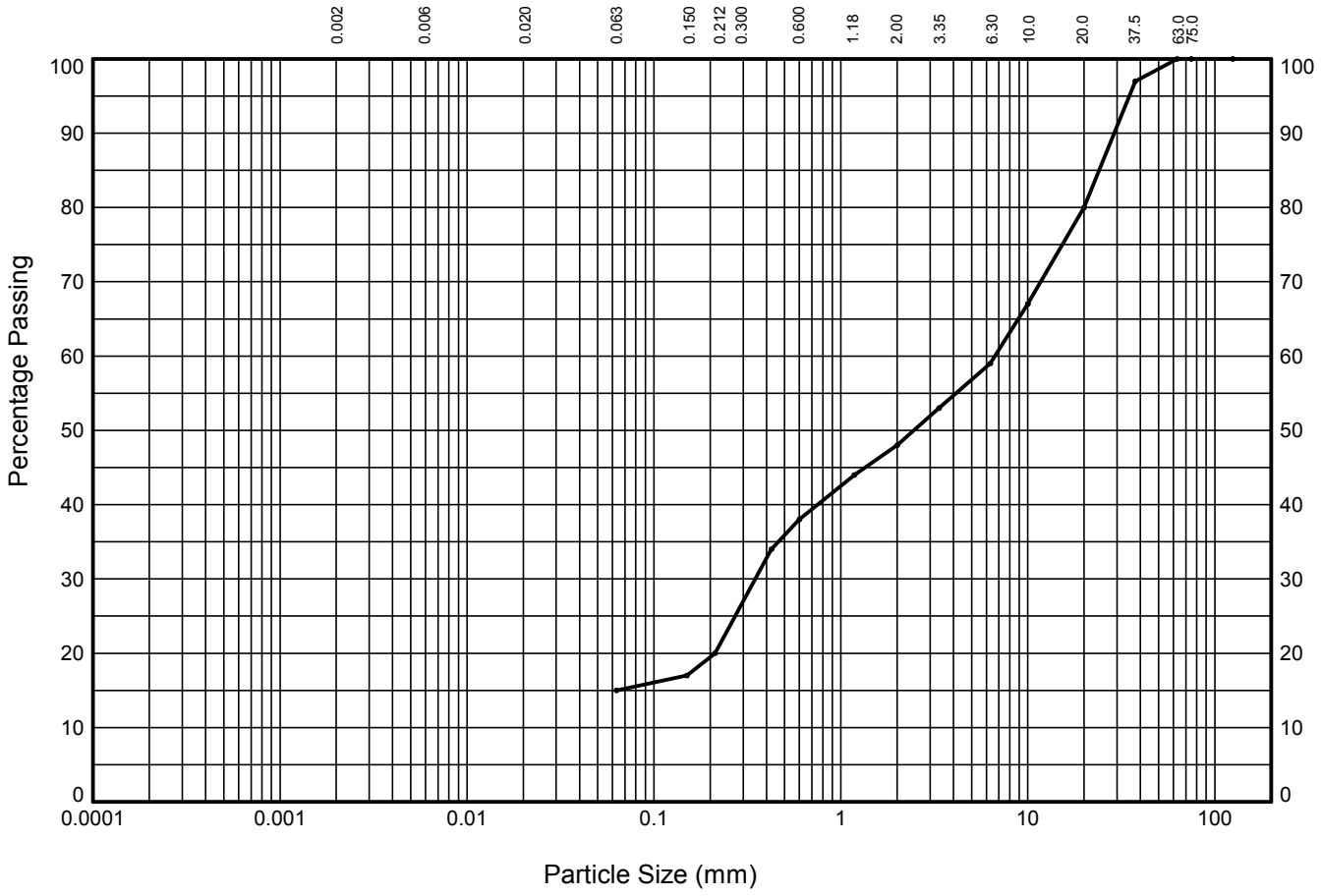
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP134** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



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	**97**
20.0	**80**
10.0	**67**
6.30	**59**
3.35	**53**
2.00	**48**
1.18	**44**
0.600	**38**
0.425	**34**
0.212	**20**
0.150	**17**
0.063	**15**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**52**
SAND	**33**
SILT/CLAY	**15**

Soil Description:

Brown slightly sandy gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

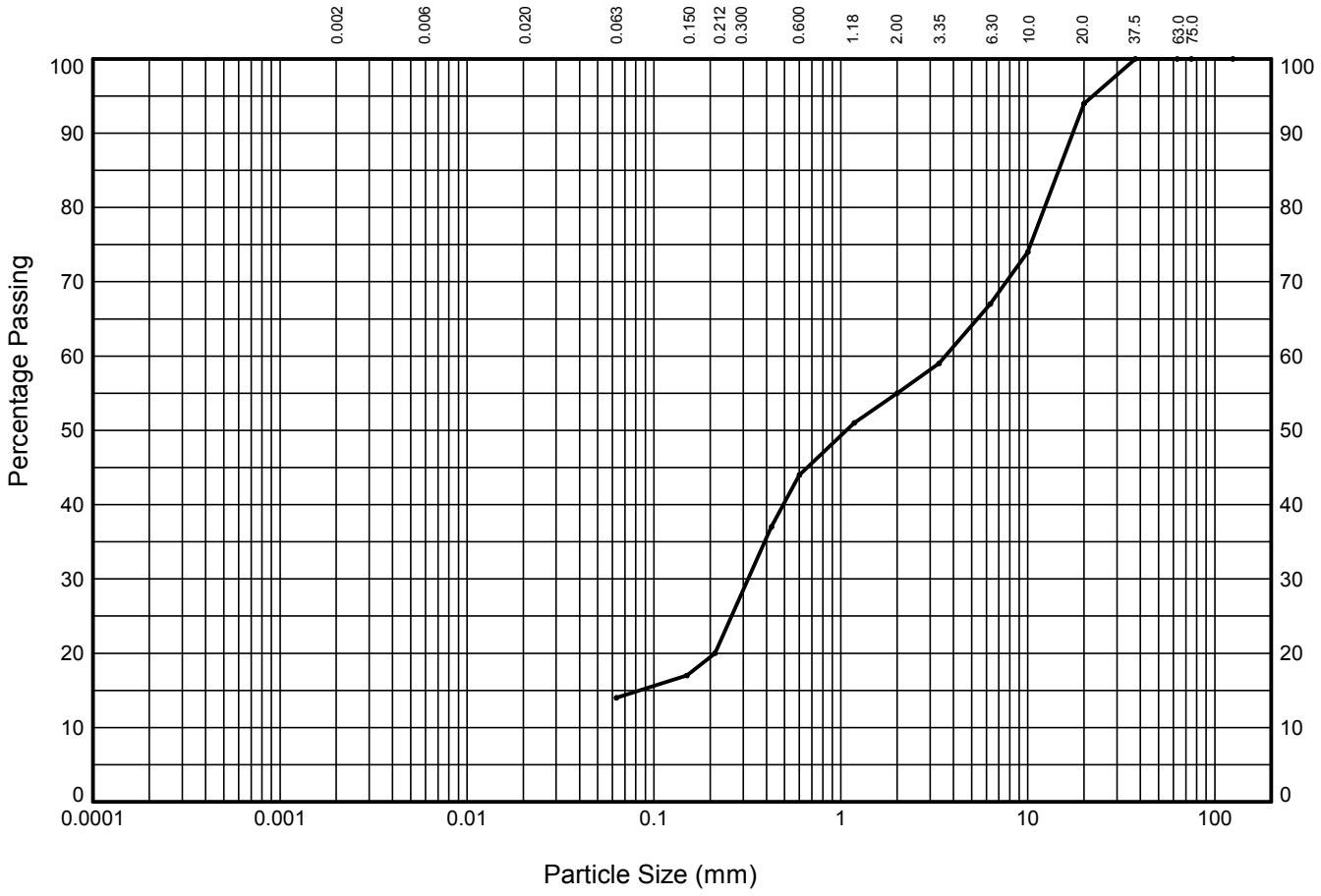
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2 of BS1377:Part 2:1990

Trial Pit: **TP134** 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	**94**
10.0	**74**
6.30	**67**
3.35	**59**
2.00	**55**
1.18	**51**
0.600	**44**
0.425	**37**
0.212	**20**
0.150	**17**
0.063	**14**

Particle Diameter (mm)	Percent Passing (%)

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**45**
SAND	**41**
SILT/CLAY	**14**

Soil Description:

Brown clayey SAND and GRAVEL

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MAUREEN FISHER**

Date: **22/05/17**

Contract: **Willen Road**

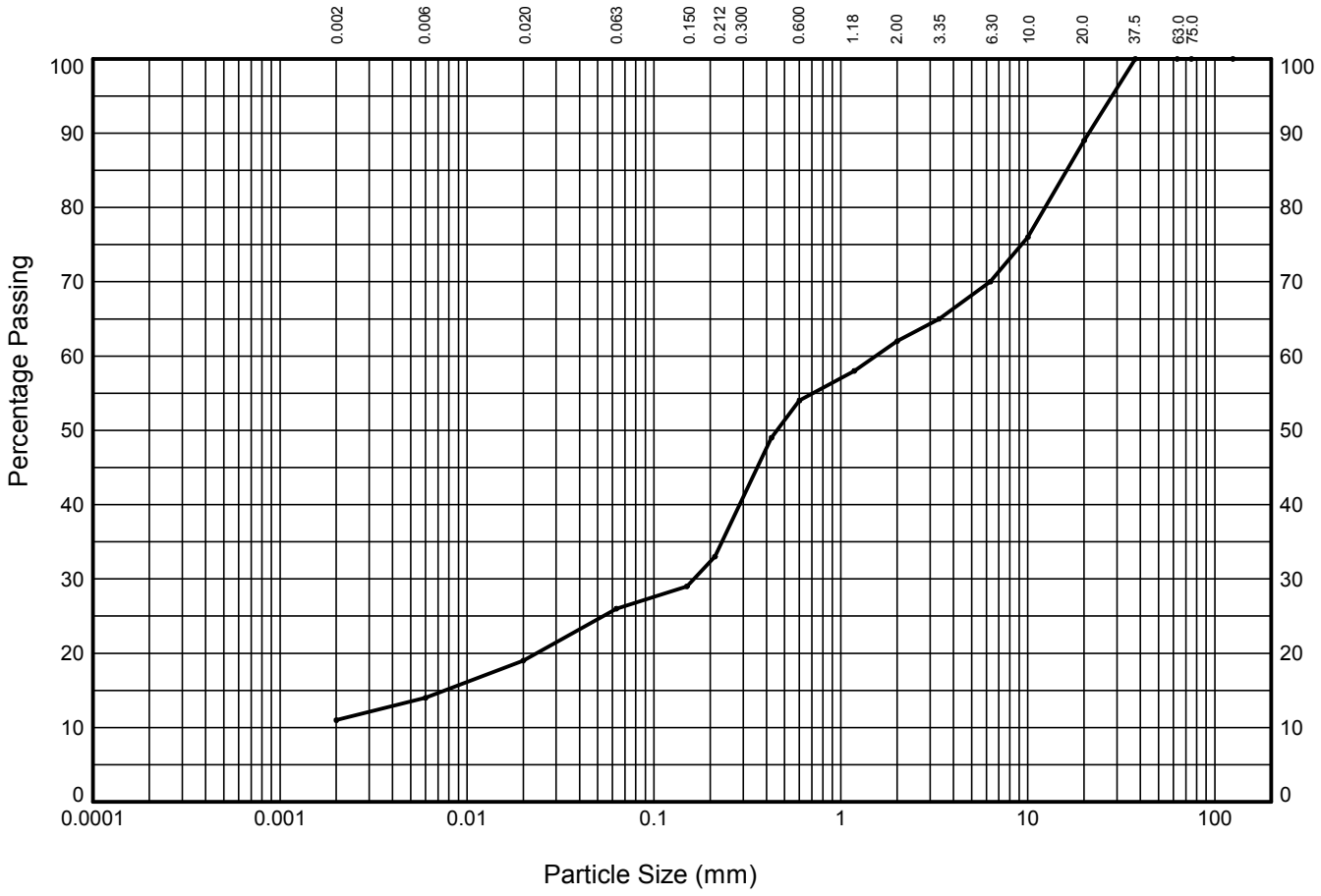
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP135** Sample Ref: **1** Sample Type: **B** Depth (m): **0.90**



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	**89**
10.0	**76**
6.30	**70**
3.35	**65**
2.00	**62**
1.18	**58**
0.600	**54**
0.425	**49**
0.212	**33**
0.150	**29**
0.063	**26**

Particle Diameter (mm)	Percent Passing (%)
0.02	**19**
0.006	**14**
0.002	**11**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**38**
SAND	**36**
SILT	**15**
CLAY	**11**

Soil Description:

Brown sandy gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

Contract Ref: **782551**

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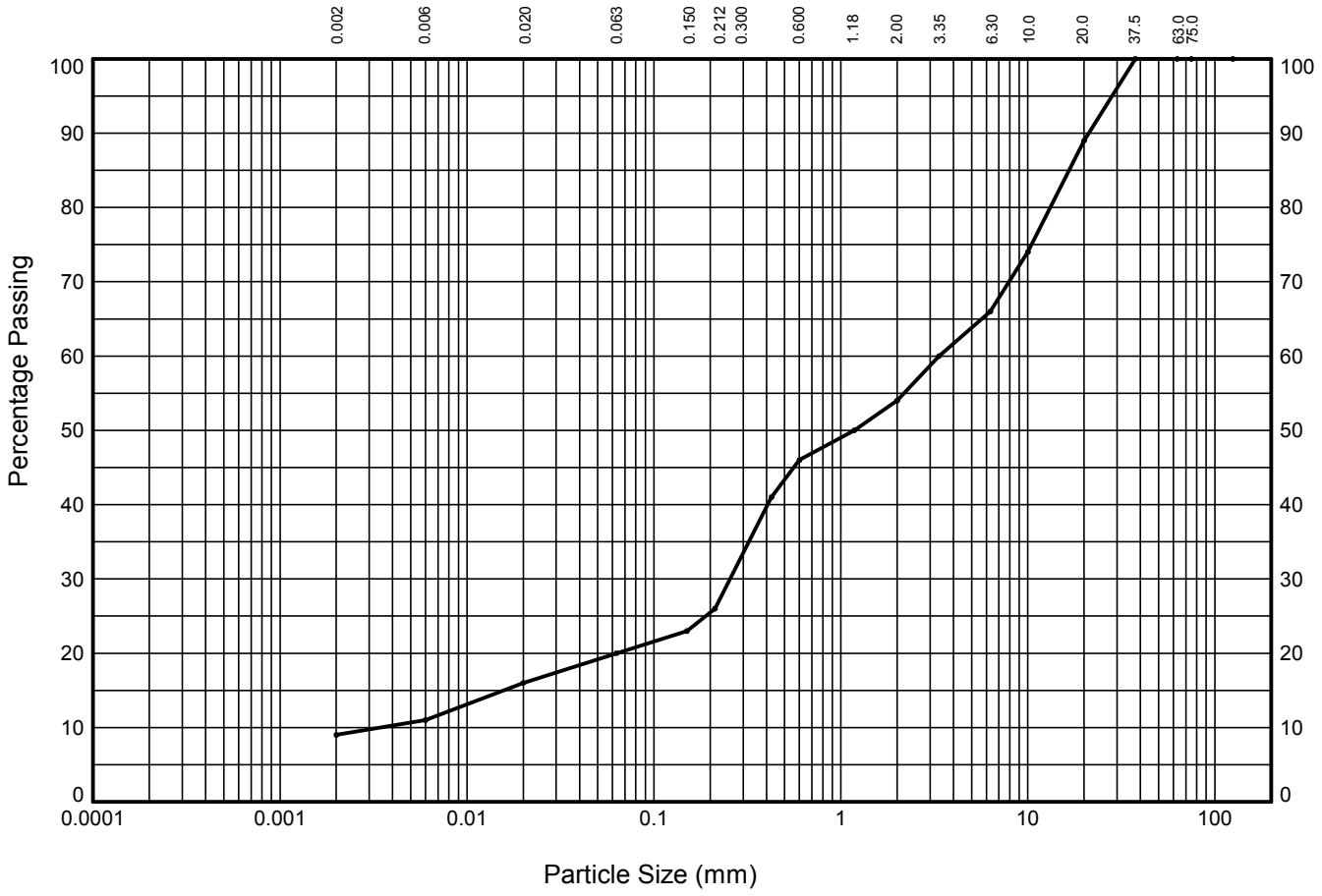
PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP136** 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	**89**
10.0	**74**
6.30	**66**
3.35	**60**
2.00	**54**
1.18	**50**
0.600	**46**
0.425	**41**
0.212	**26**
0.150	**23**
0.063	**20**

Particle Diameter (mm)	Percent Passing (%)
0.02	**16**
0.006	**11**
0.002	**9**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**46**
SAND	**34**
SILT	**11**
CLAY	**9**

Soil Description:

Dark brown slightly sandy gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contract: **Willen Road**

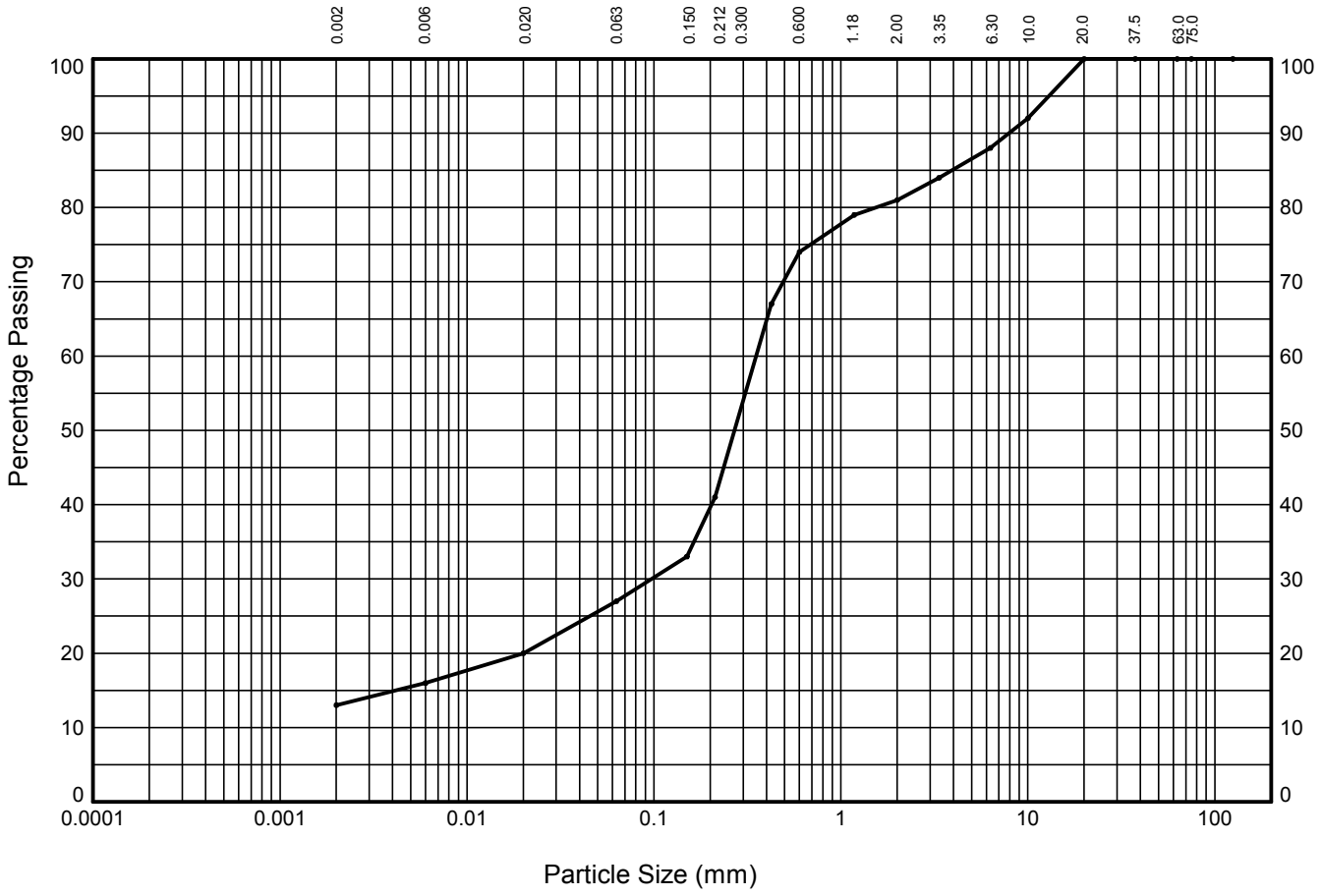
Contract Ref: **782551**

AGS

PARTICLE SIZE DISTRIBUTION TEST

In accordance with clauses 9.2, 9.5 of BS1377:Part 2:1990

Trial Pit: **TP136** Sample Ref: **2** Sample Type: **B** Depth (m): **1.90**



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	**92**
6.30	**88**
3.35	**84**
2.00	**81**
1.18	**79**
0.600	**74**
0.425	**67**
0.212	**41**
0.150	**33**
0.063	**27**

Particle Diameter (mm)	Percent Passing (%)
0.02	**20**
0.006	**16**
0.002	**13**

Sedimentation sample was not pre-treated

Soil Fraction	Sieve Percentage (%)
GRAVEL	**19**
SAND	**54**
SILT	**14**
CLAY	**13**

Soil Description:

Brown sandy slightly gravelly CLAY

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **CATHERINE COLE**

Date: **22/05/17**

Contrac

Willen Road

Contract Ref: **782551**

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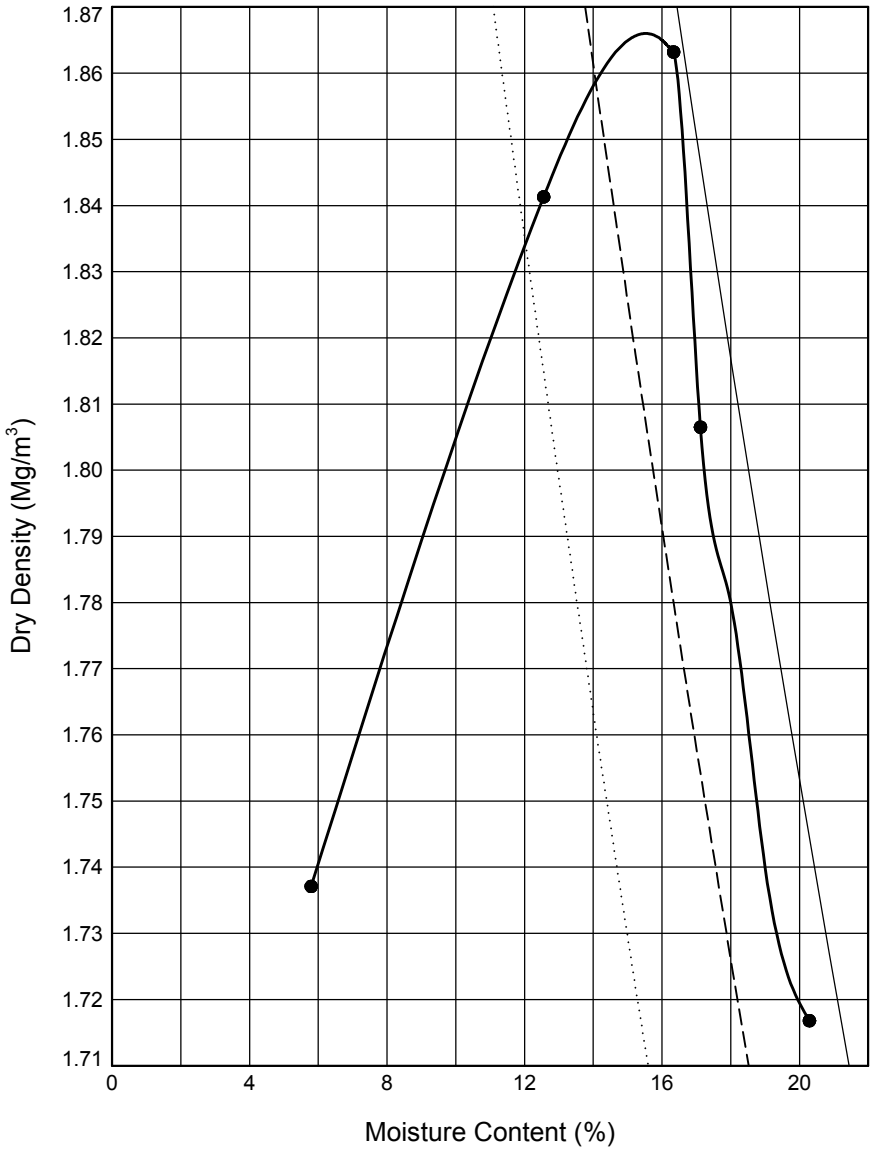
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**5.8**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m³)	:	**1.87**
% Retained on 37.5mm BS Sieve	:	**2**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**16**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.70**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Grey brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

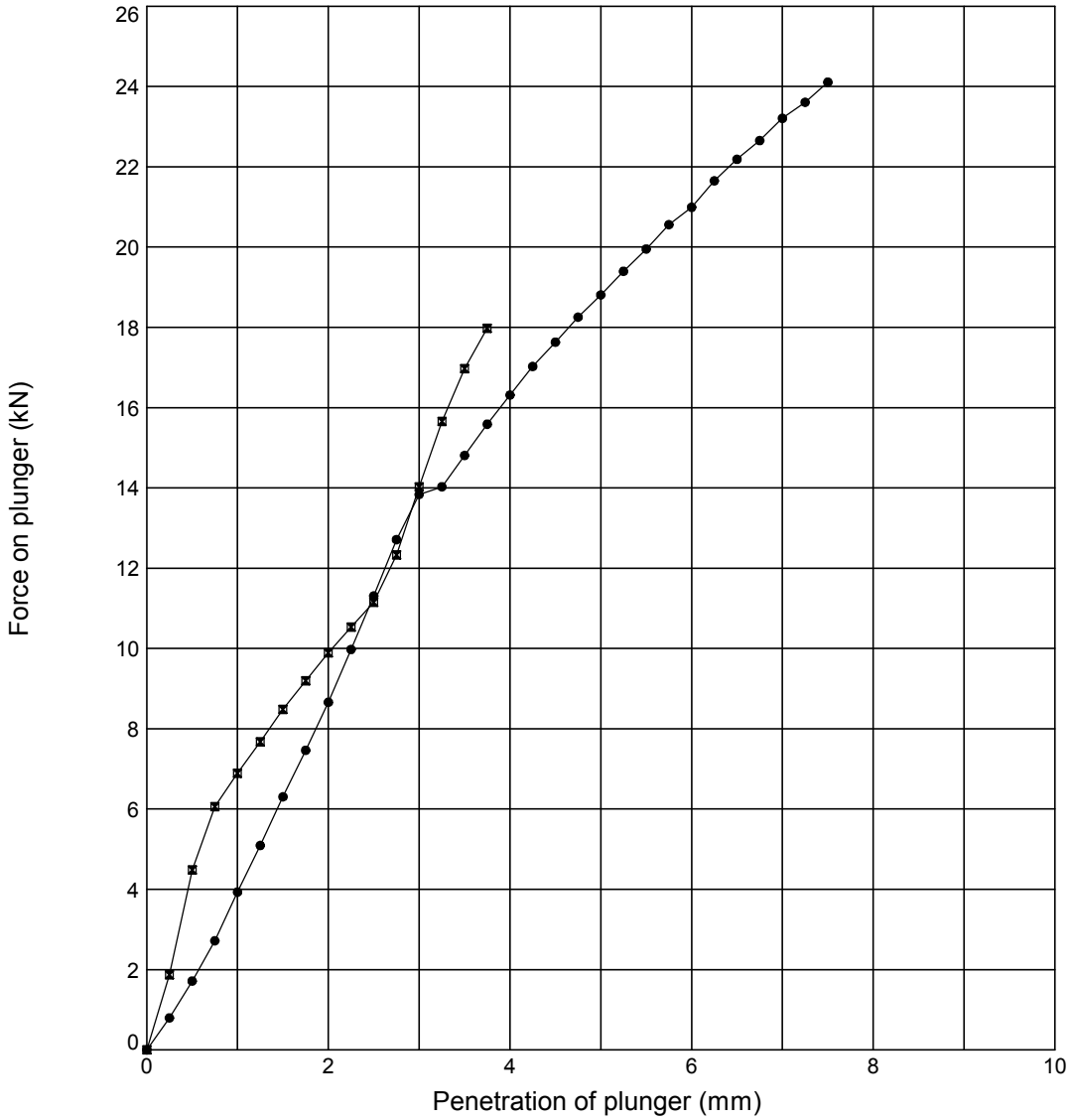
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**22/05/17**
Contr **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**5.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.2**	**6.1**
Initial Bulk Density (Mg/m^3)	:	**1.83**	Surcharge (kg)	:	**4.0**	CBR value (%)	**94**	**84**
Initial Dry Density (Mg/m^3)	:	**1.73**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted] **MAUREEN FISHER**	**22/05/17**

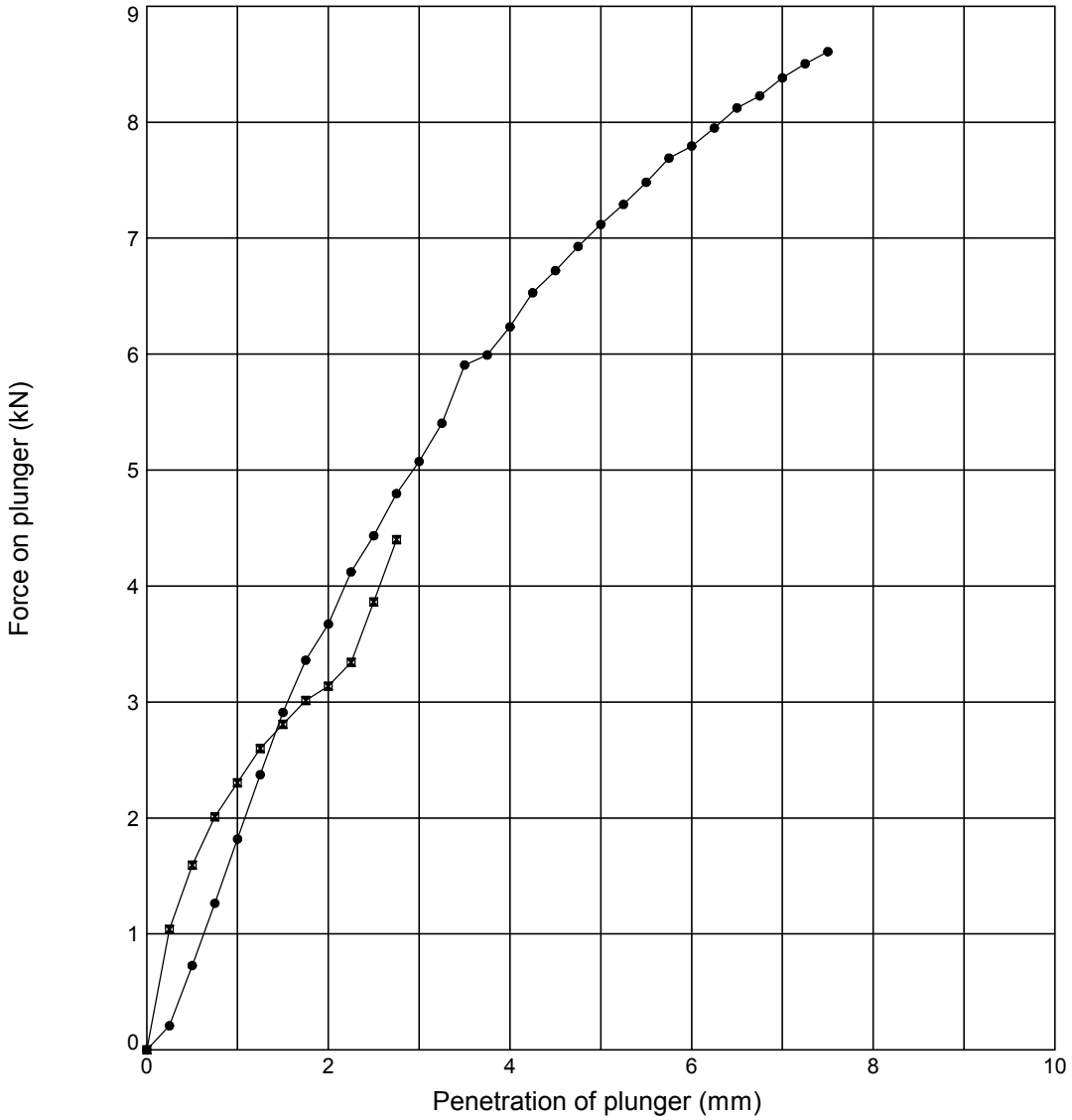
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**36**	**29**
Initial Dry Density (Mg/m^3)	:	**1.83**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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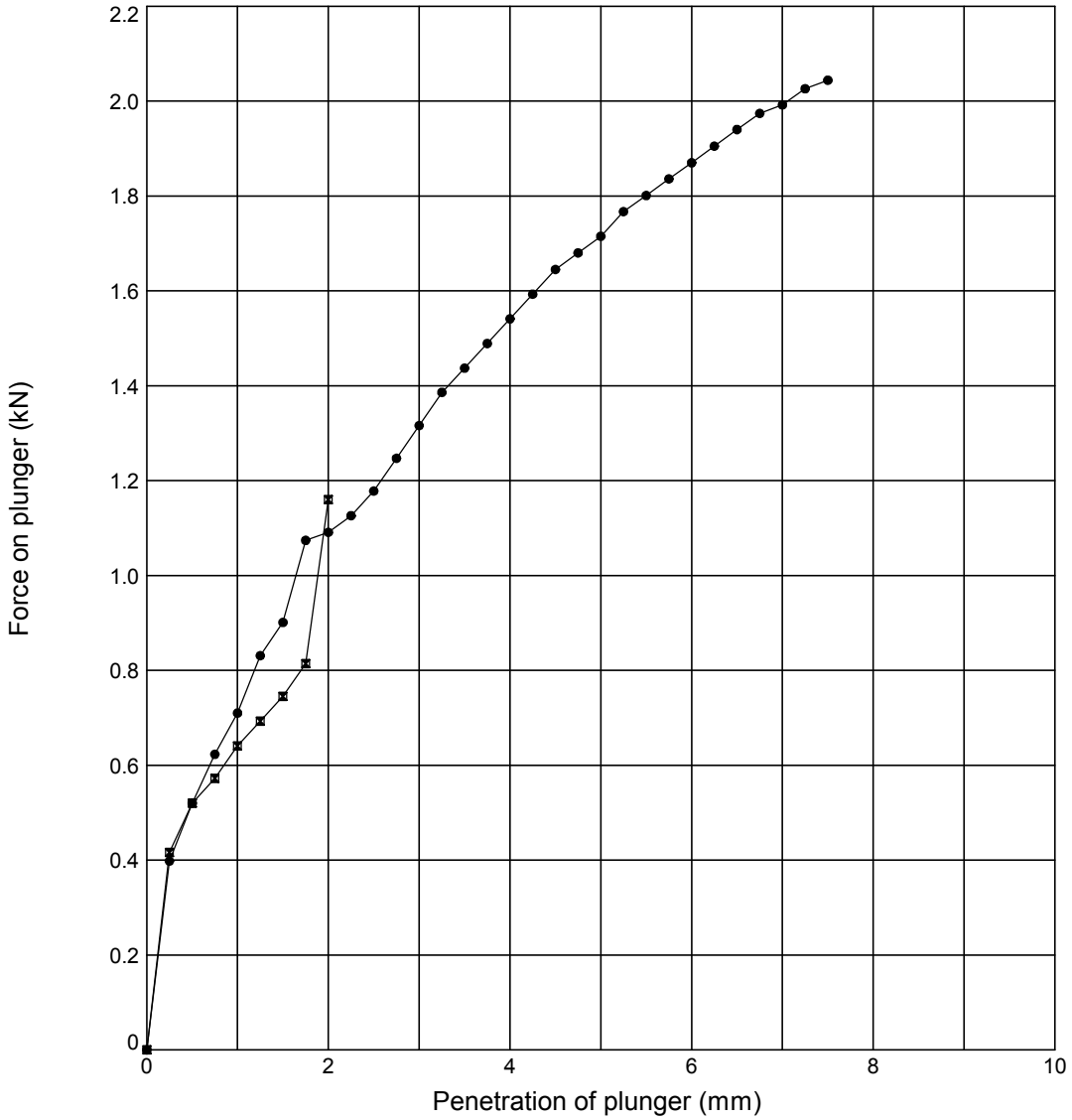
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**
Contrac[redacted] **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**17**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**16**
Initial Bulk Density (Mg/m^3)	:	**2.16**	Surcharge (kg)	:	**4.0**	CBR value (%)	**8.9**	**0.00**
Initial Dry Density (Mg/m^3)	:	**1.84**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MAUREEN FISHER	**22/05/17**

Contra [redacted]
Willen Road

Contract Ref:
782551

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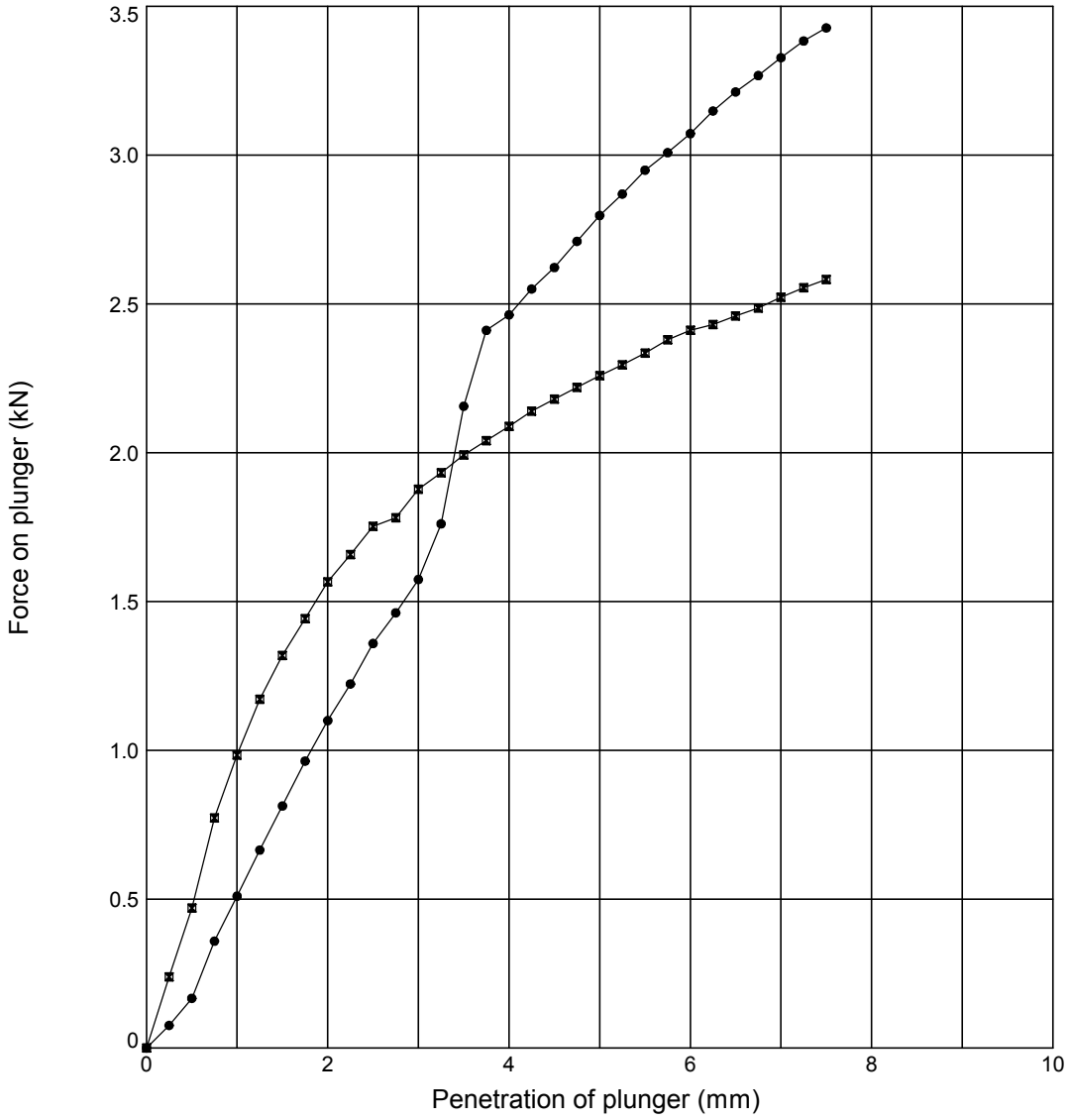
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**17**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**16**
Initial Bulk Density (Mg/m^3)	:	**2.11**	Surcharge (kg)	:	**4.0**	CBR value (%)	**14**	**13**
Initial Dry Density (Mg/m^3)	:	**1.80**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MAUREEN FISHER	**22/05/17**

Contrac[redacted]

Willen Road

Contract Ref:

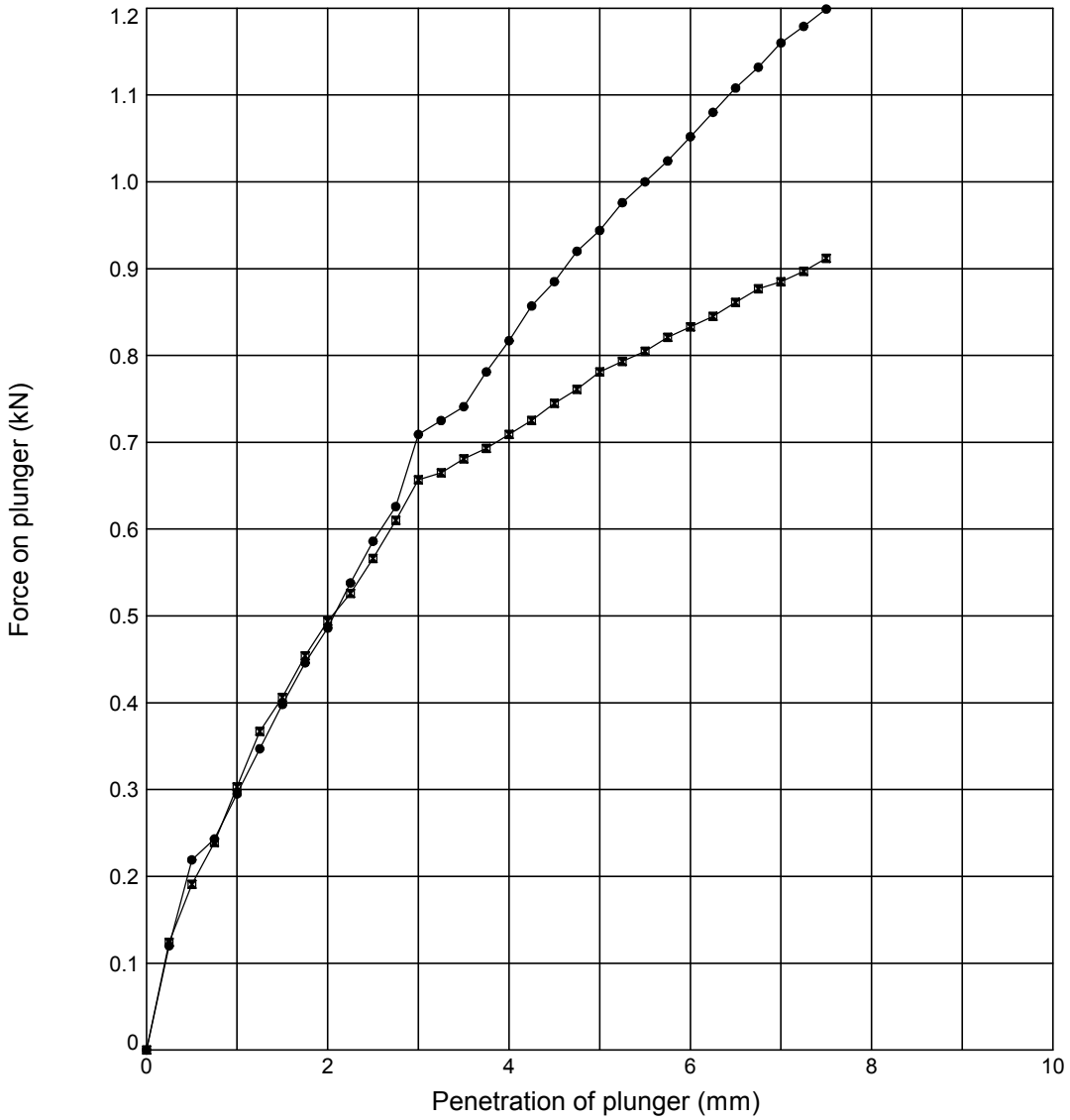
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **1** Sample Type: **B** Depth (m): **0.80**



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)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.7**	**4.3**
Initial Dry Density (Mg/m^3)	:	**1.71**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted] **MAUREEN FISHER**	**22/05/17**

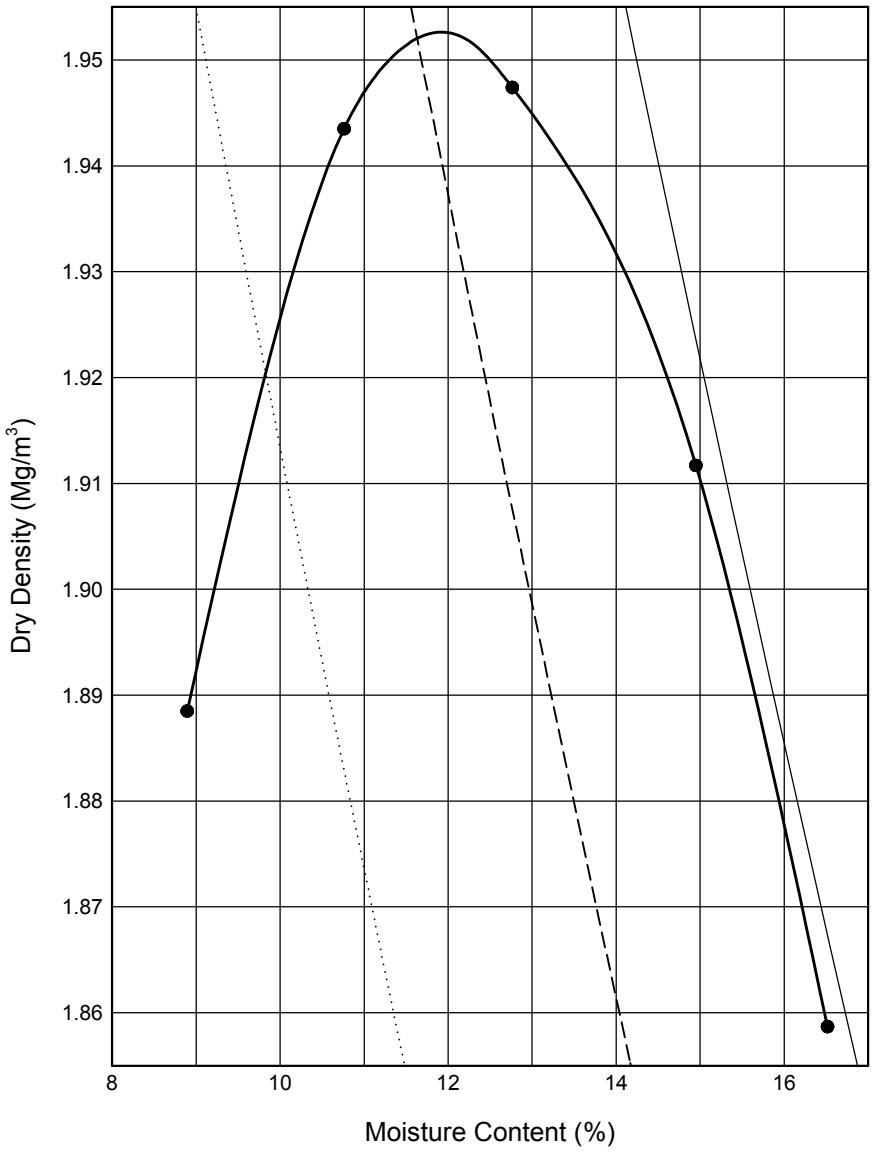
Contract	Contract Ref:
Willen Road	**782551**

AGS

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: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **11**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	: **1.95**
% Retained on 37.5mm BS Sieve	: **0**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **12**
% Retained on 20.0mm BS Sieve	: **3**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**	
Particle Density - assumed (Mg/m^3)	: **2.70**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

Sample Description	Key to Air Voids Lines		
Light brown slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
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W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**22/05/17**

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Willen Road

Contract Ref:

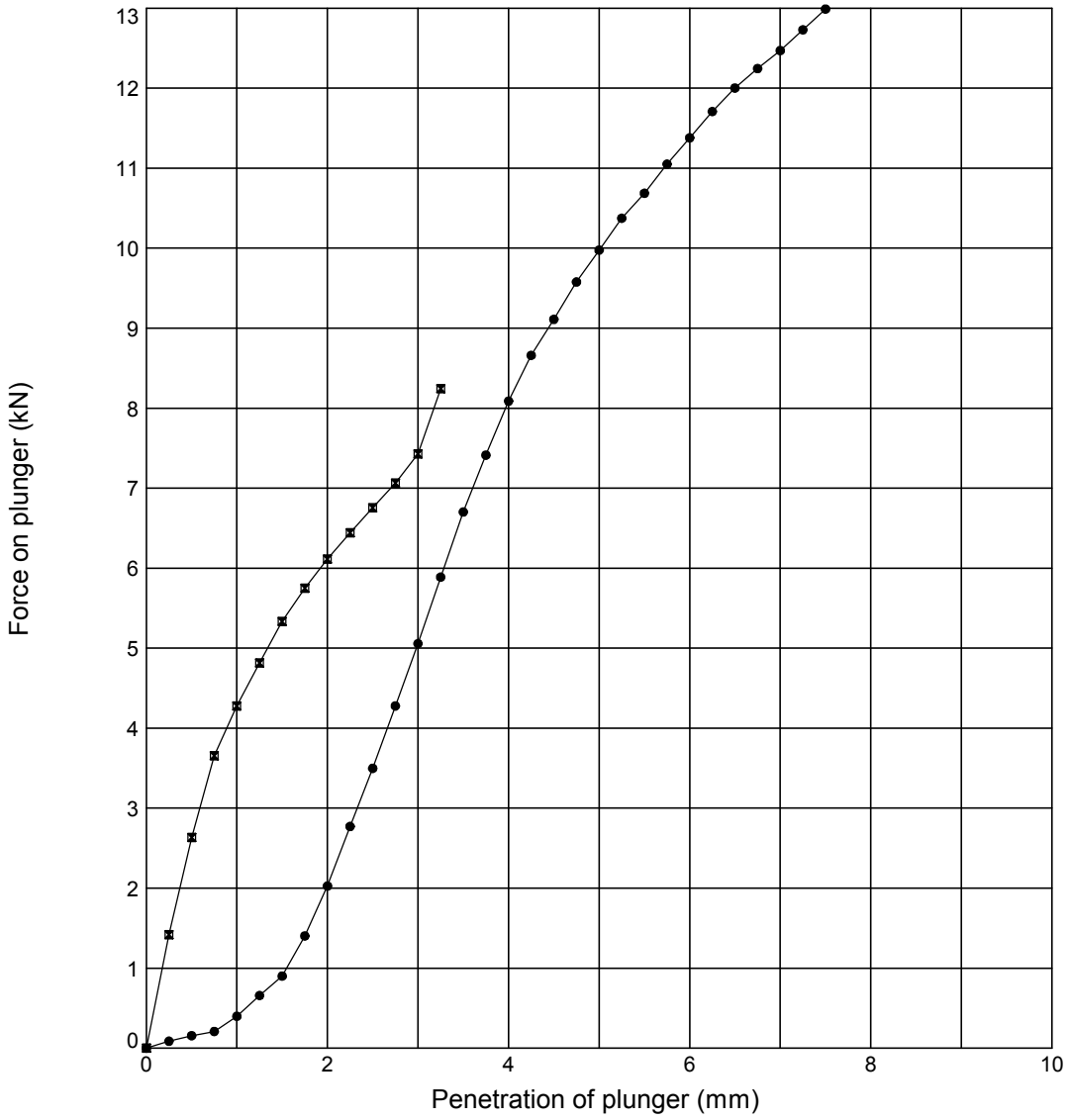
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**7.4**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**50**	**51**
Initial Dry Density (Mg/m^3)	:	**1.93**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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[redacted] Compiled By: **MAUREEN FISHER** Date: **22/05/17**

Contract: **Willen Road** Contract Ref: **782551**

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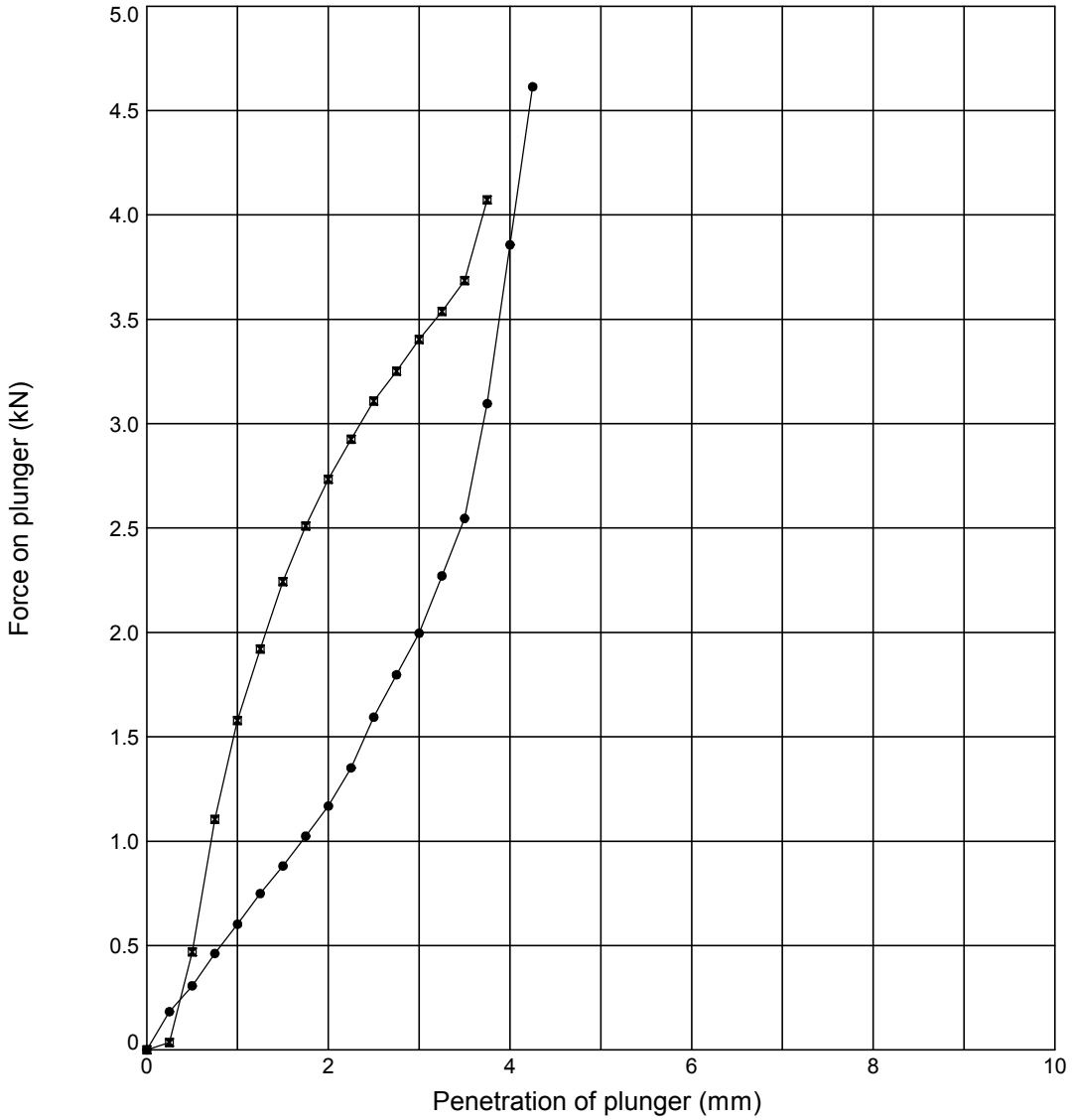
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.19**	Surcharge (kg)	:	**4.0**	CBR value (%)	**12**	**23**
Initial Dry Density (Mg/m^3)	:	**1.93**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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[redacted] Compiled By: **MAUREEN FISHER** Date: **22/05/17**

Contract: **Willen Road**

Contract Ref: **782551**

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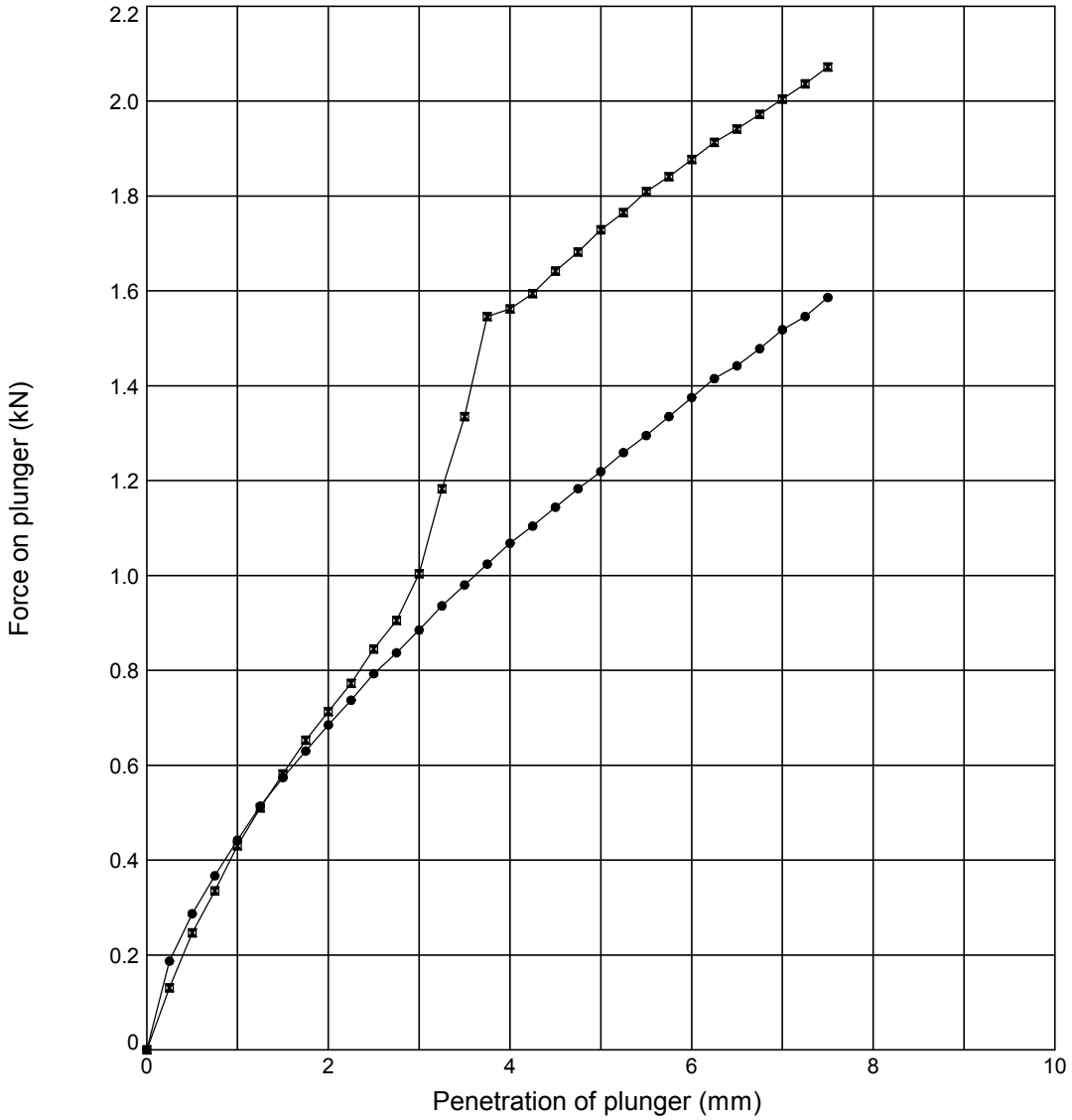
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**15**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.19**	Surcharge (kg)	:	**4.0**	CBR value (%)	**6.1**	**8.7**
Initial Dry Density (Mg/m^3)	:	**1.90**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted] **MAUREEN FISHER**	**22/05/17**

Contract: **Willen Road**

Contract Ref: **782551**

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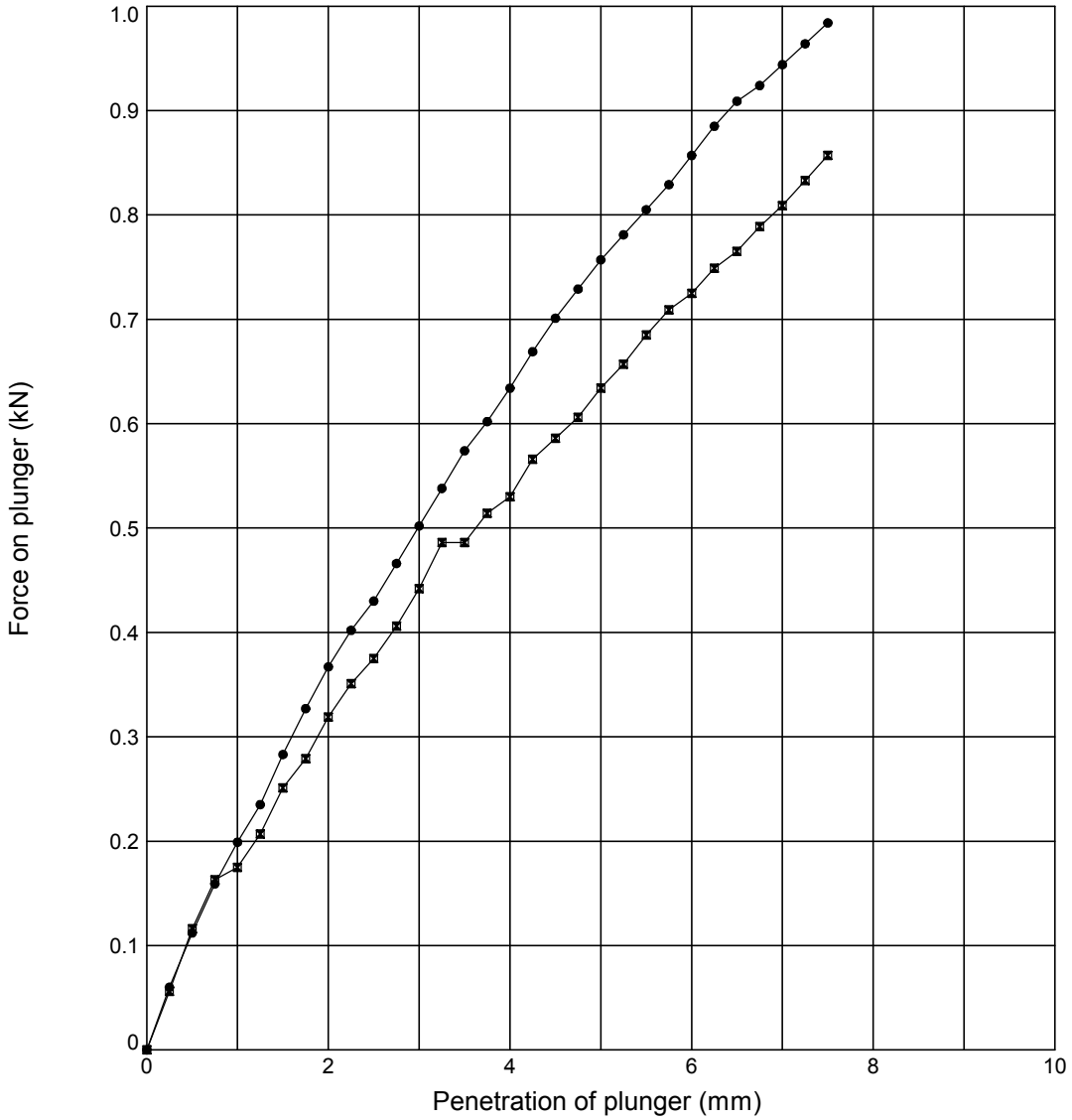
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**17**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**17**
Initial Bulk Density (Mg/m^3)	:	**2.16**	Surcharge (kg)	:	**4.0**	CBR value (%)	**3.8**	**3.2**
Initial Dry Density (Mg/m^3)	:	**1.84**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
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Compiled By	Date
[redacted]	
MAUREEN FISHER	**22/05/17**

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Willen Road

Contract Ref:

782551

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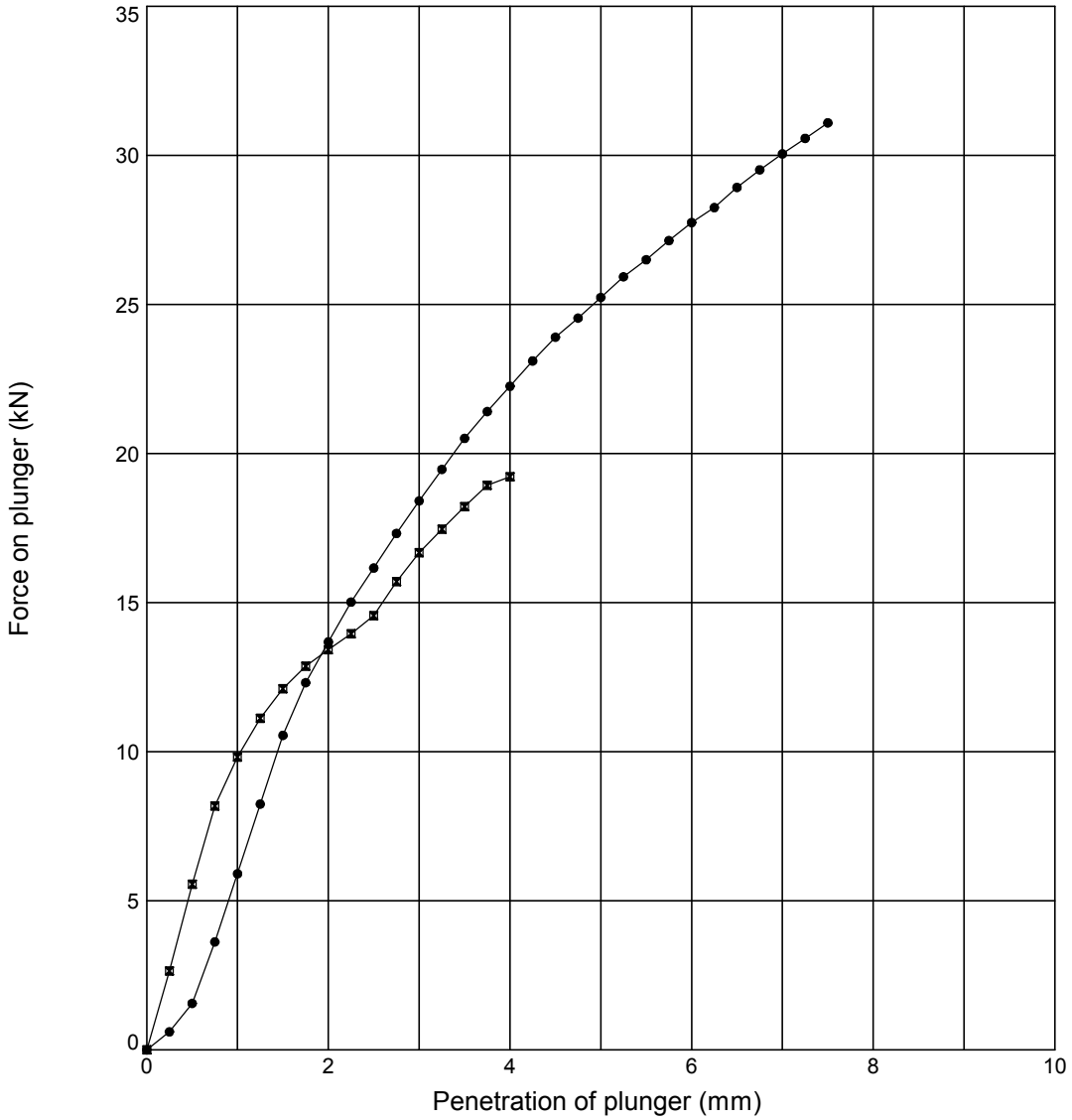
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP104** Sample Ref: **3** Sample Type: **B** Depth (m): **2.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**8.9**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**4.2**	**7.5**
Initial Bulk Density (Mg/m^3)	:	**2.05**	Surcharge (kg)	:	**4.0**	CBR value (%)	**126**	**110**
Initial Dry Density (Mg/m^3)	:	**1.88**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By: [redacted] | Date: **22/05/17**

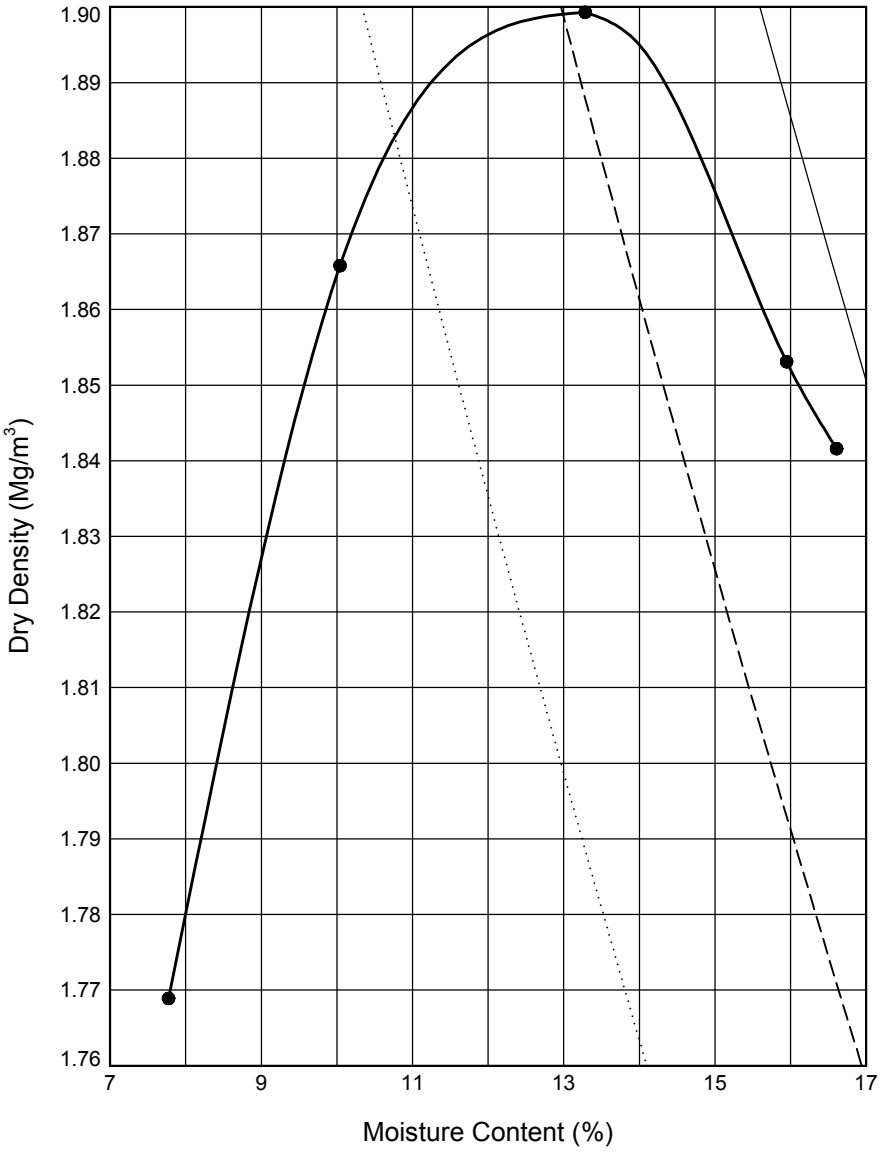
Contr: **Willen Road** | Contract Ref: **782551**

AGS

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: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **7.8**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	: **1.90**
% Retained on 37.5mm BS Sieve	: **3**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **13**
% Retained on 20.0mm BS Sieve	: **7**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**	
Particle Density - assumed (Mg/m^3)	: **2.70**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

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: [redacted] **MARK ATHORNE** Date: **22/05/17**

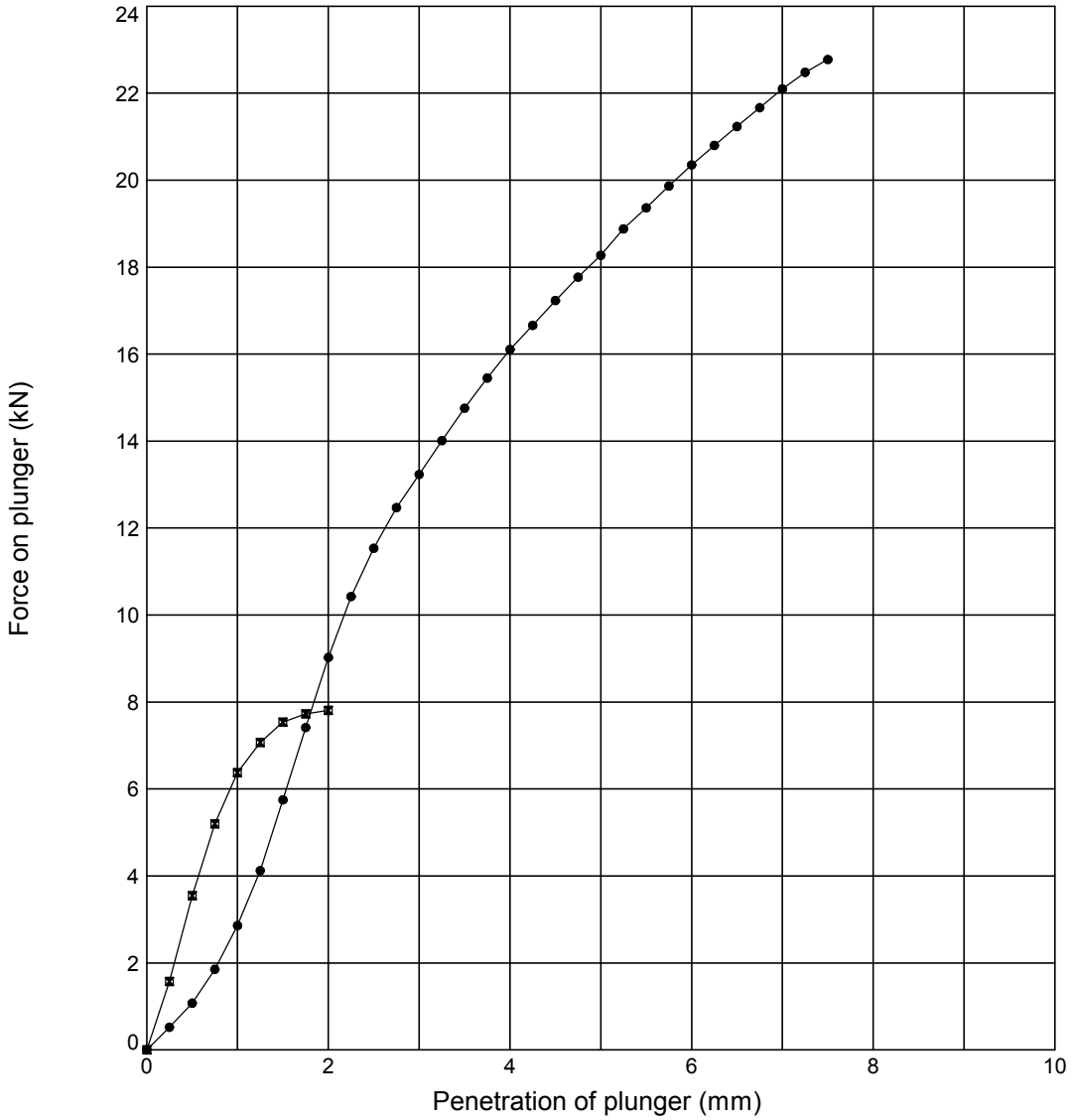
Contract: **Willen Road** Contract Ref: **782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**4.3**	**3.6**
Initial Bulk Density (Mg/m^3)	:	**1.90**	Surcharge (kg)	:	**4.0**	CBR value (%)	**92**	**0.00**
Initial Dry Density (Mg/m^3)	:	**1.76**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**10**	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
[redacted]	**MAUREEN FISHER** **22/05/17**

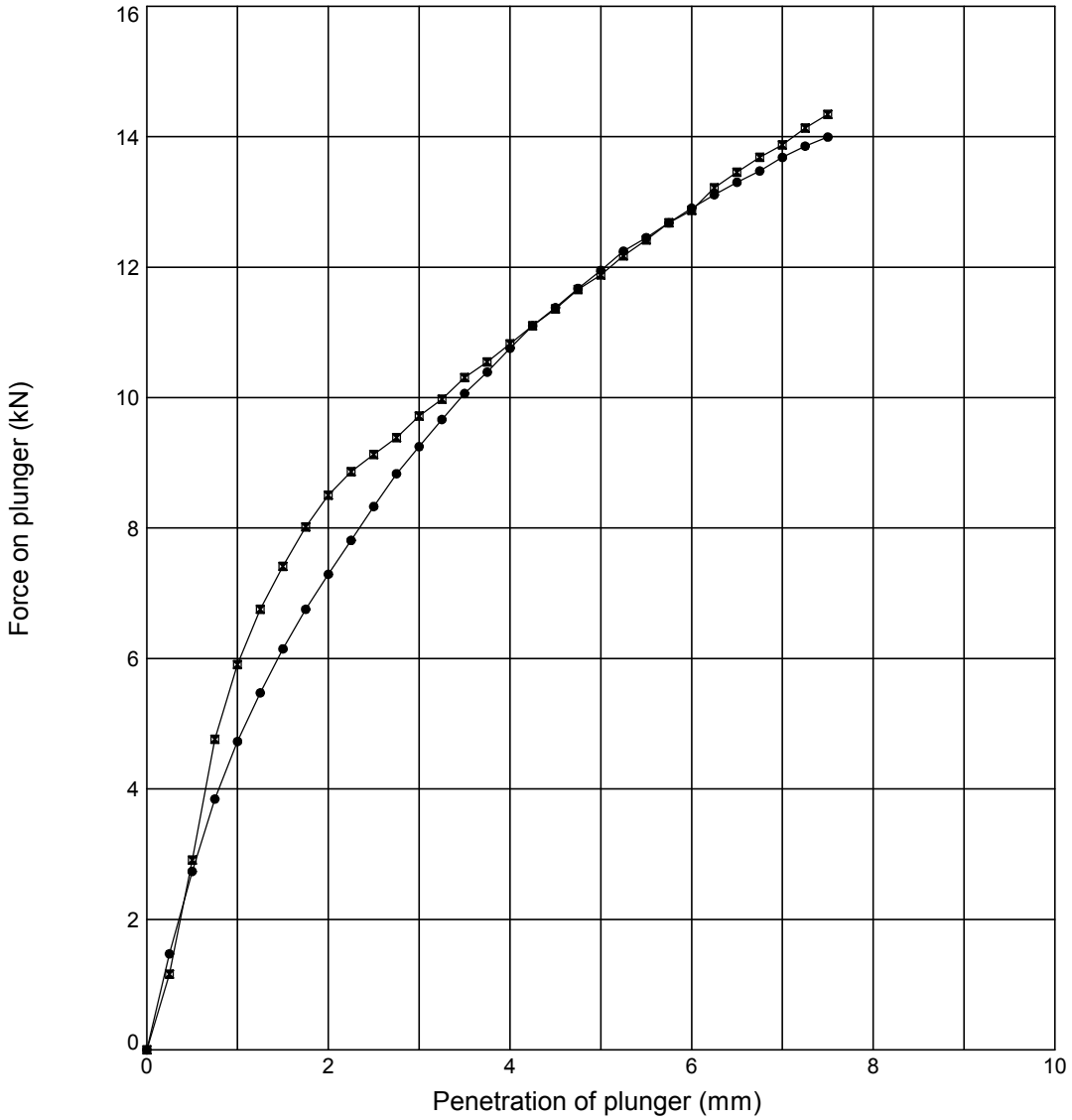
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.0**	**7.1**
Initial Bulk Density (Mg/m^3)	:	**2.04**	Surcharge (kg)	:	**4.0**	CBR value (%)	**63**	**69**
Initial Dry Density (Mg/m^3)	:	**1.85**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**10**	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
[redacted] **MAUREEN FISHER**	**22/05/17**

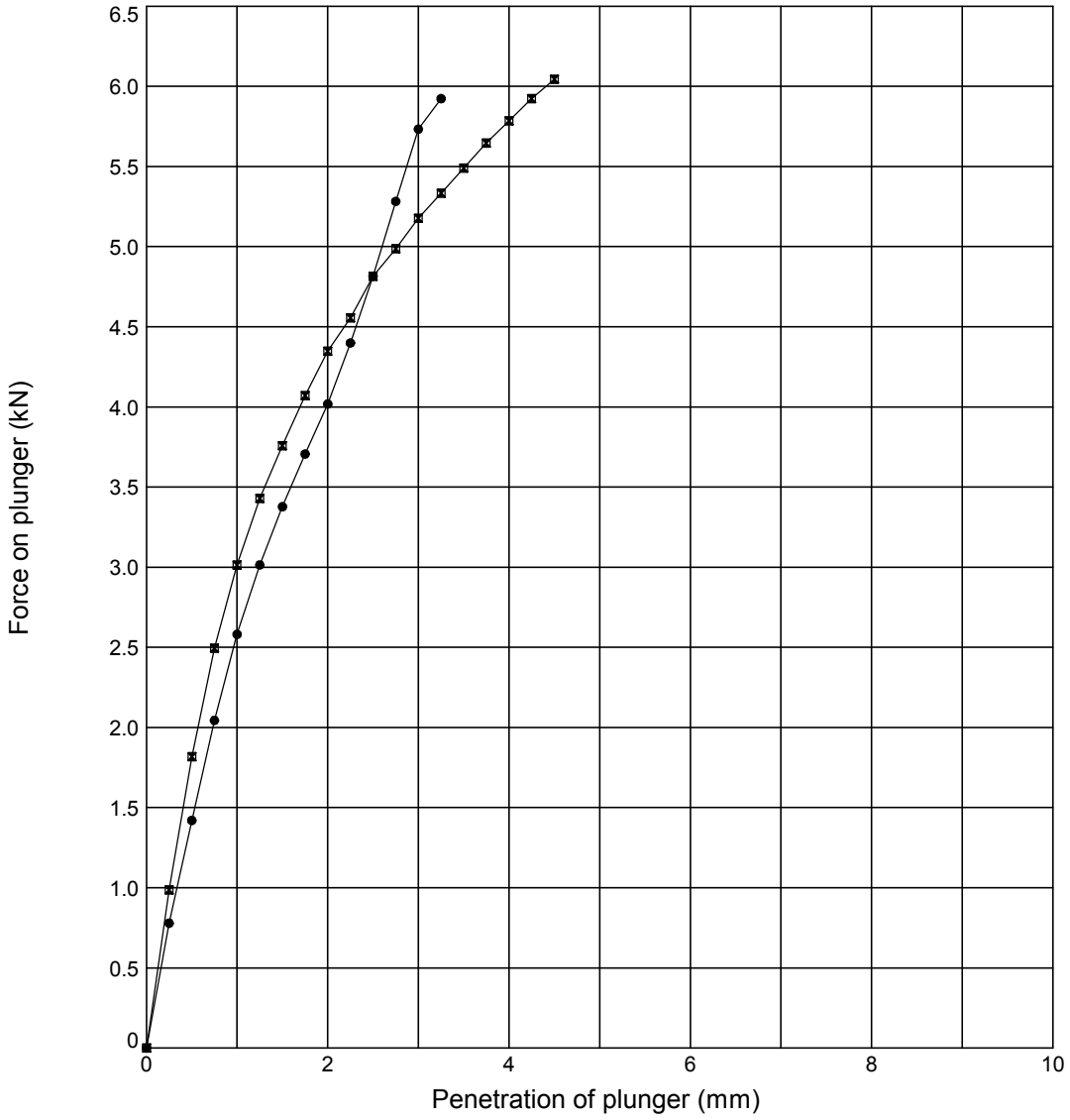
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**36**	**36**
Initial Dry Density (Mg/m^3)	:	**1.90**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**10**	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
[redacted] **MAUREEN FISHER**	**22/05/17**

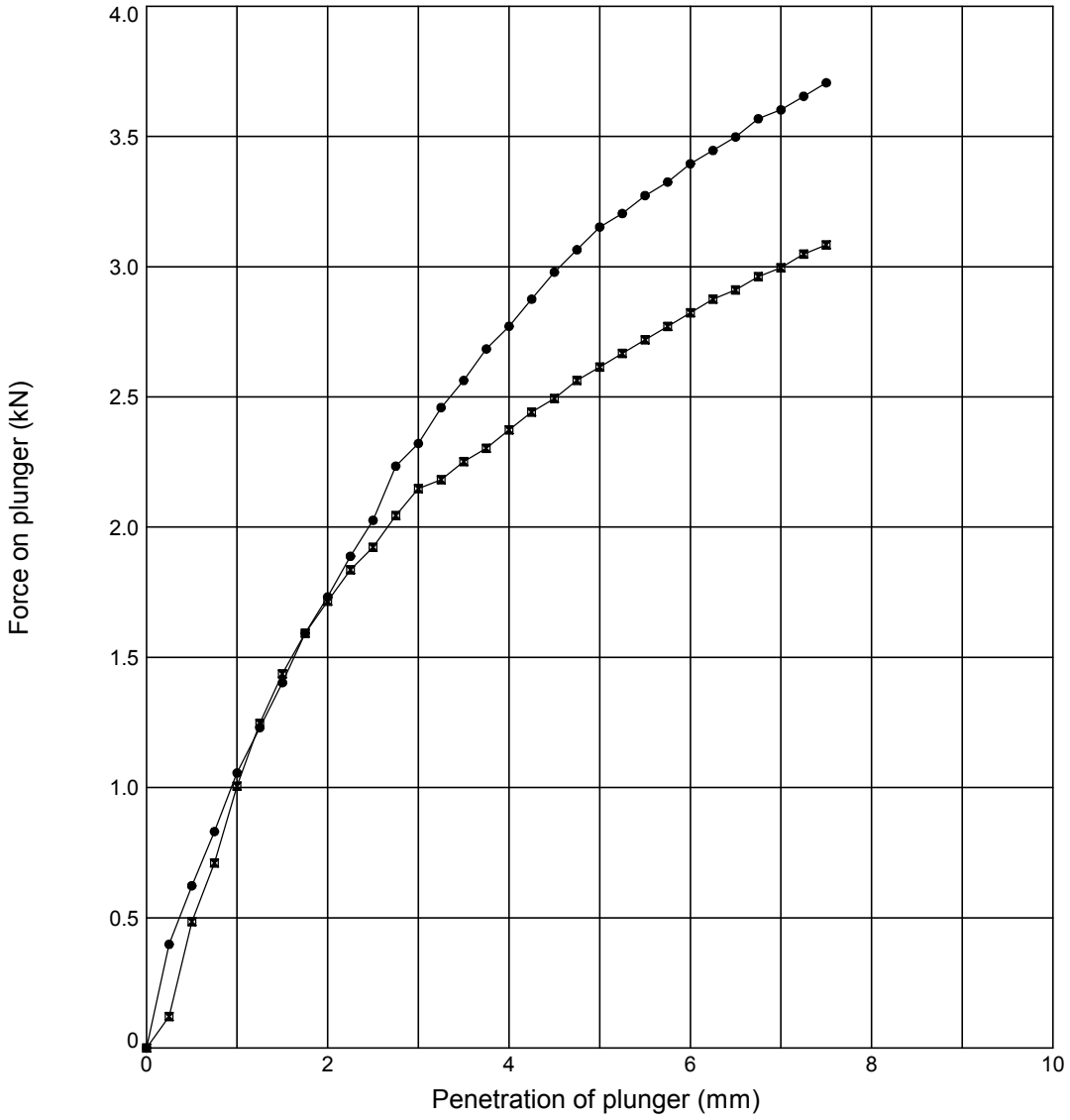
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**16**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**16**	**15**
Initial Dry Density (Mg/m^3)	:	**1.84**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**10**	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
MAUREEN FISHER	**22/05/17**

Contra [redacted]

Willen Road

Contract Ref:

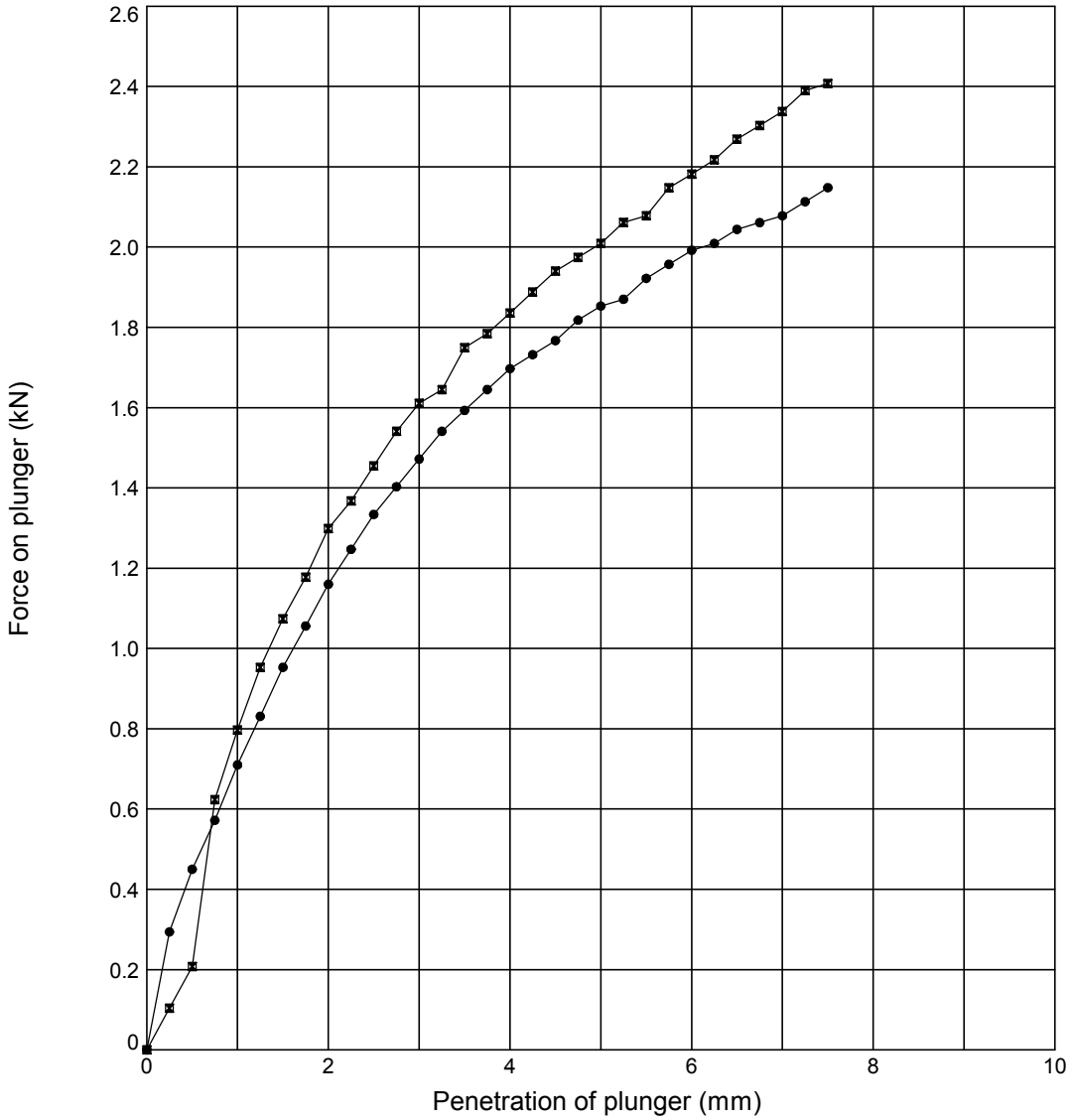
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **1** Sample Type: **B** Depth (m): **0.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**17**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**17**	**17**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**10**	**11**
Initial Dry Density (Mg/m^3)	:	**1.84**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**10**	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: [redacted] — **MAUREEN FISHER** — Date: **22/05/17**

Contract: **Willen Road**

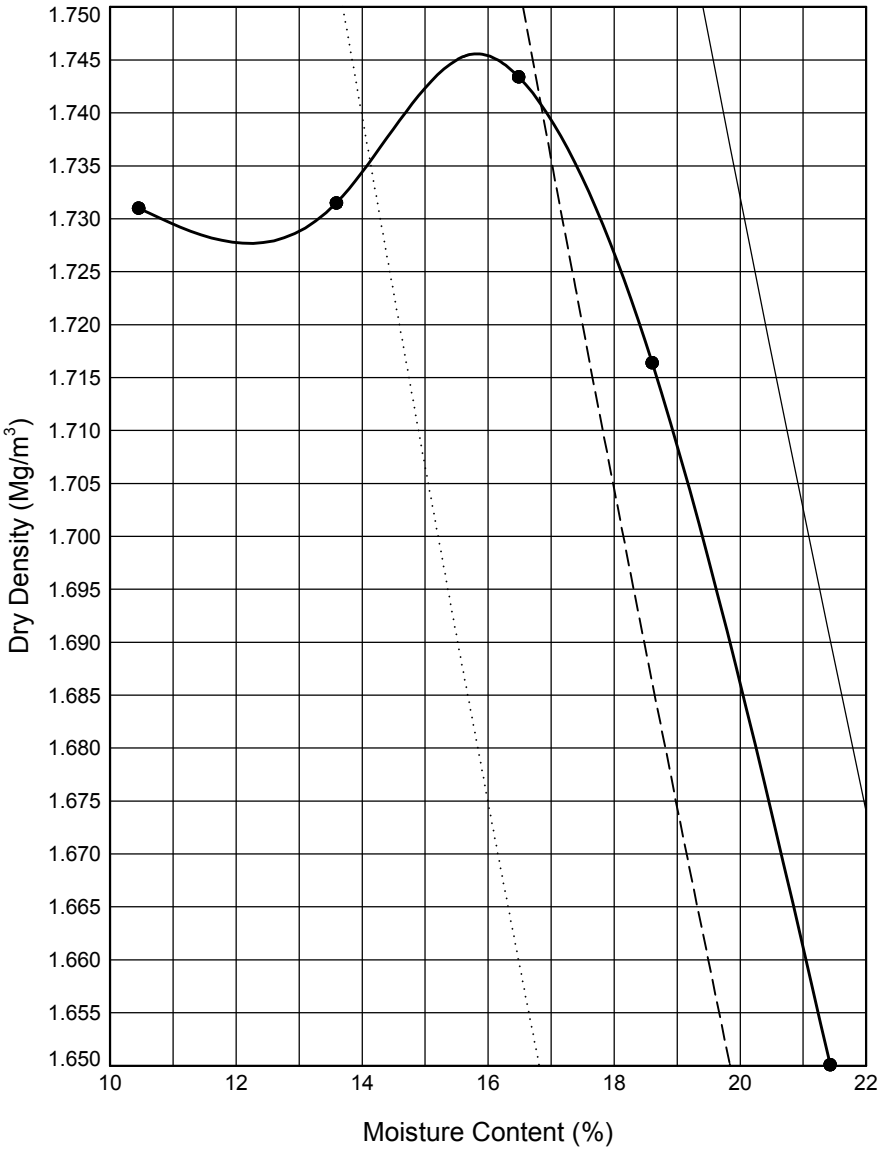
Contract Ref: **782551**

AGS

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: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**10.0**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m³)	:	**1.75**
% Retained on 37.5mm BS Sieve	:	**1**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**16**
% Retained on 20.0mm BS Sieve	:	**7**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Light brown grey slightly sandy slightly gravelly chalky CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MARK ATHORNE** Date: **22/05/17**

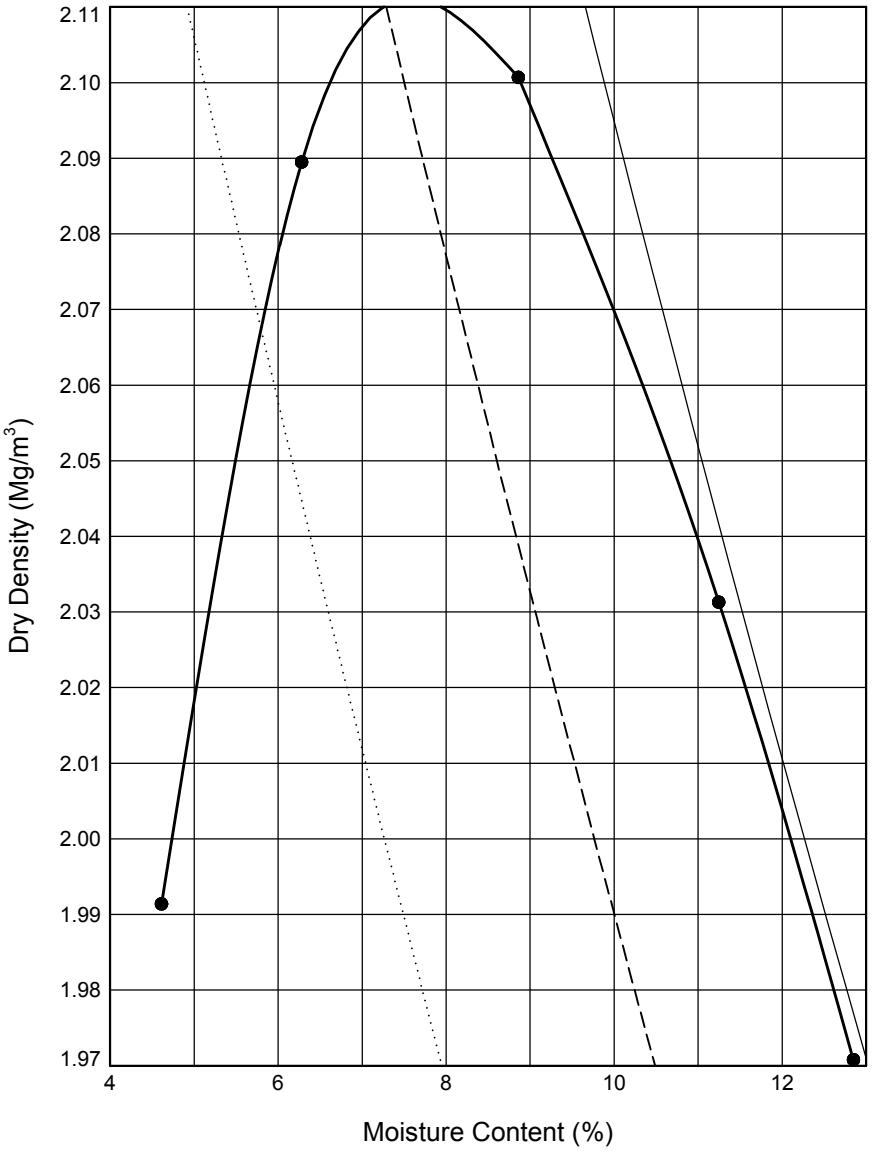
Contract: **Willen Road** Contract Ref: **782551**

AGS

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: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**4.6**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.11**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**8**
% Retained on 20.0mm BS Sieve	:	**4**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

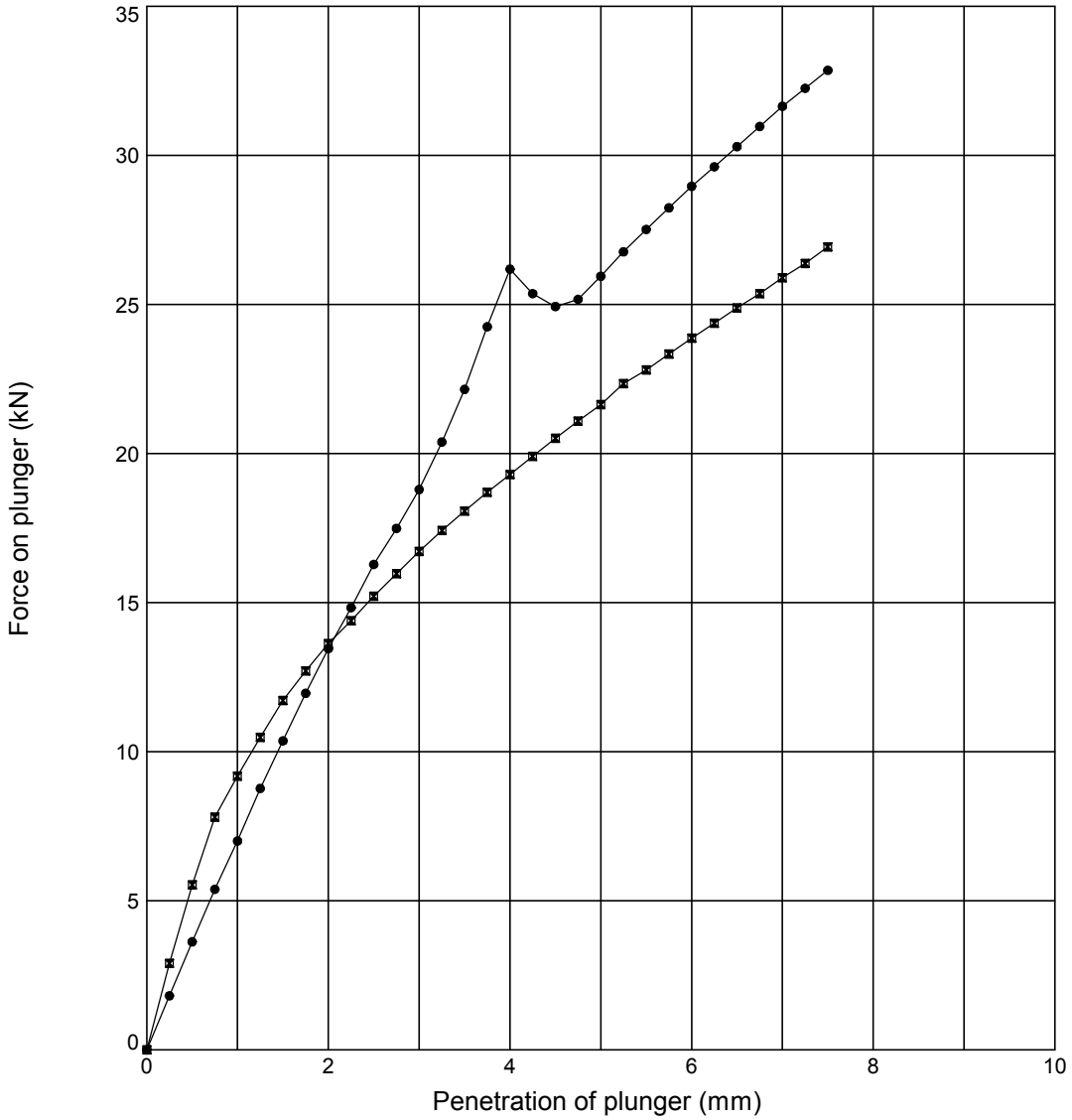
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

	[redacted] ompiled By	Date
	MARK ATHORNE	**23/05/17**
Contract	Contract Ref:	
Willen Road	**782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**4.6**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**4.1**	**4.7**
Initial Bulk Density (Mg/m^3)	:	**2.07**	Surcharge (kg)	:	**4.0**	CBR value (%)	**130**	**115**
Initial Dry Density (Mg/m^3)	:	**1.98**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref: **782551**

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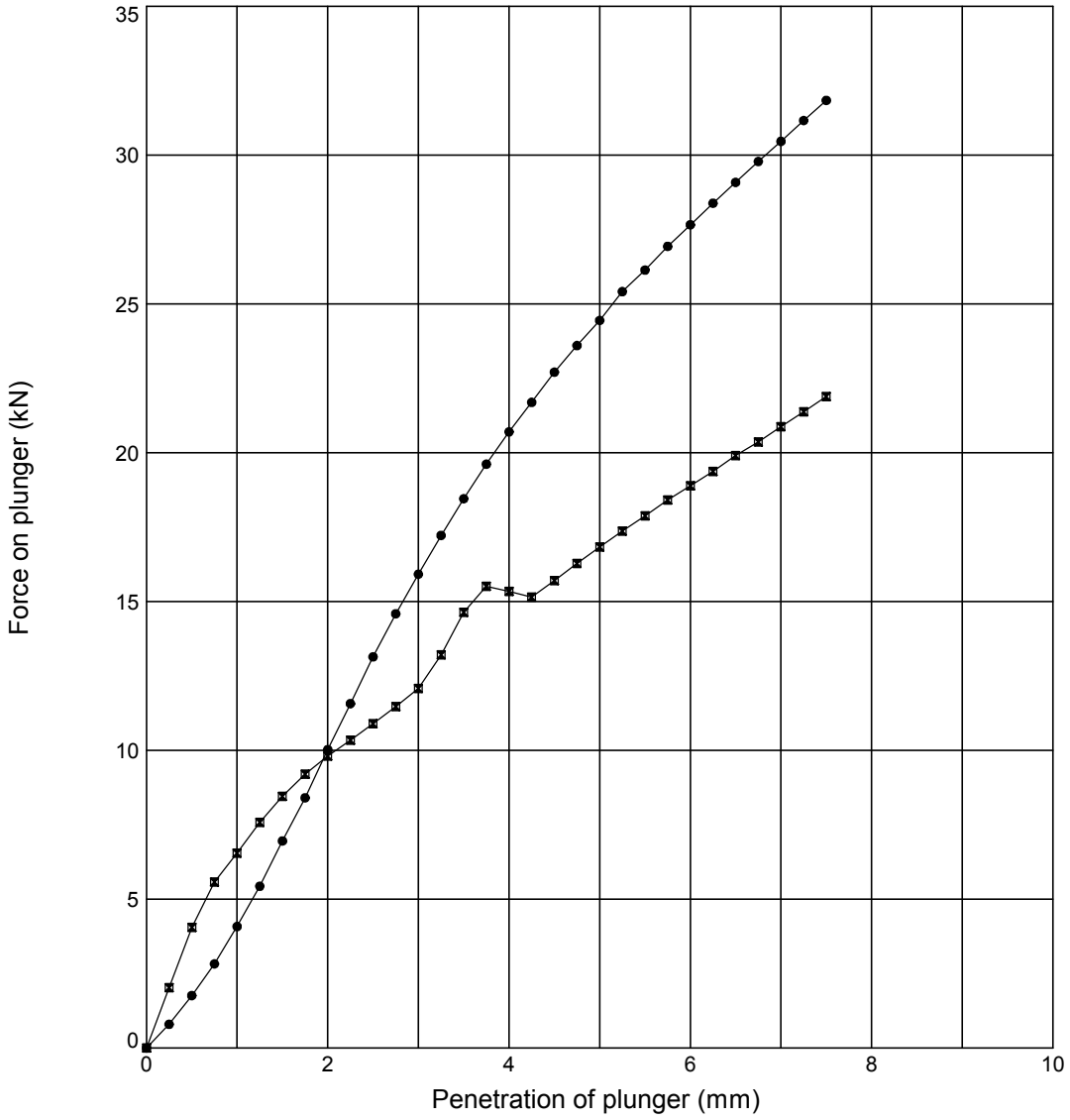
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**6.3**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.6**	**6.6**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**122**	**84**
Initial Dry Density (Mg/m^3)	:	**2.08**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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The Potteries
Pottery Street
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Compiled By		Date
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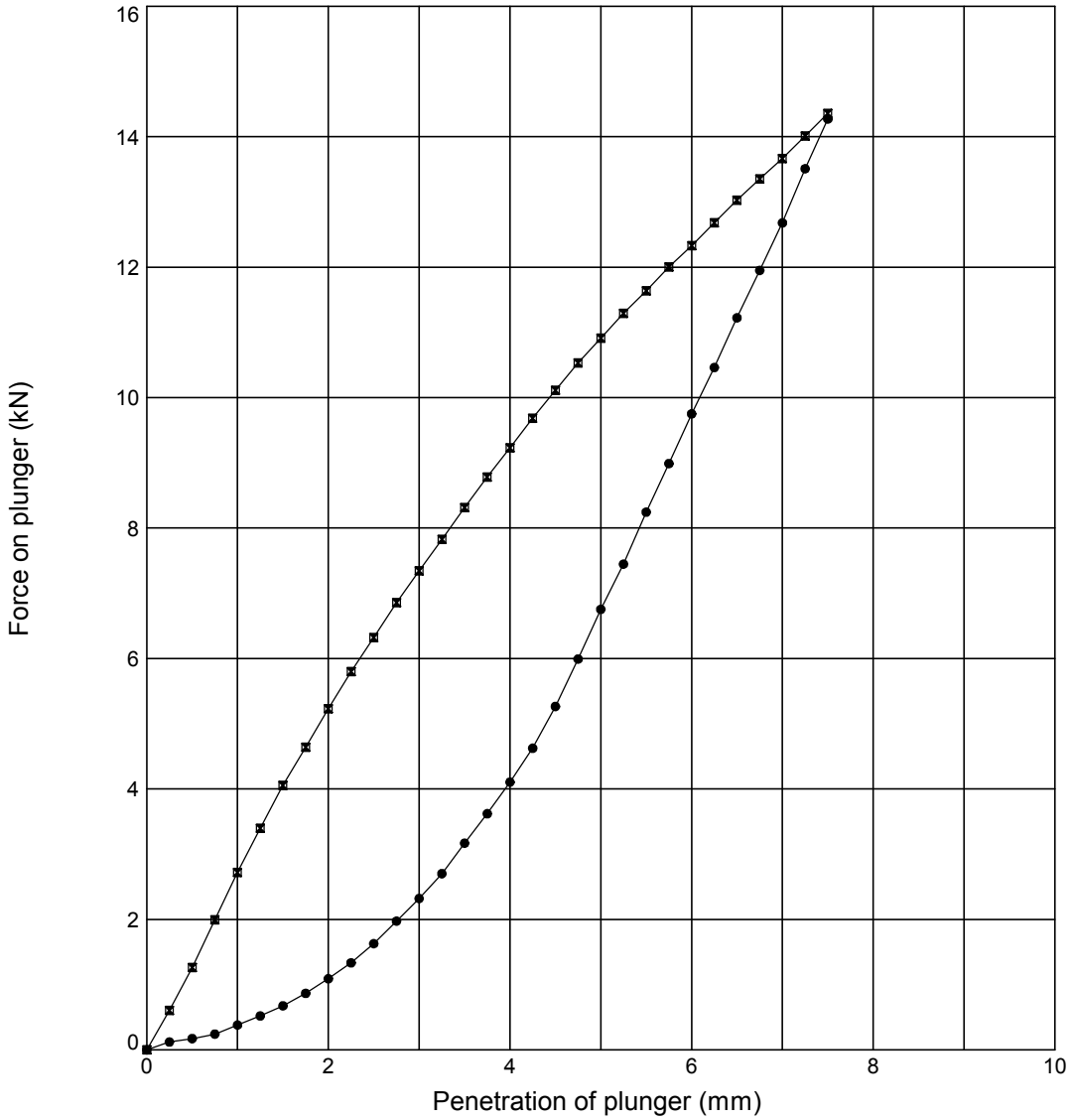
Contr [redacted]	Contract Ref:	
Willen Road	**782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**8.9**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.0**	**9.0**
Initial Bulk Density (Mg/m^3)	:	**2.28**	Surcharge (kg)	:	**4.0**	CBR value (%)	**34**	**55**
Initial Dry Density (Mg/m^3)	:	**2.09**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Contract	Contract Ref:
Willen Road	**782551**

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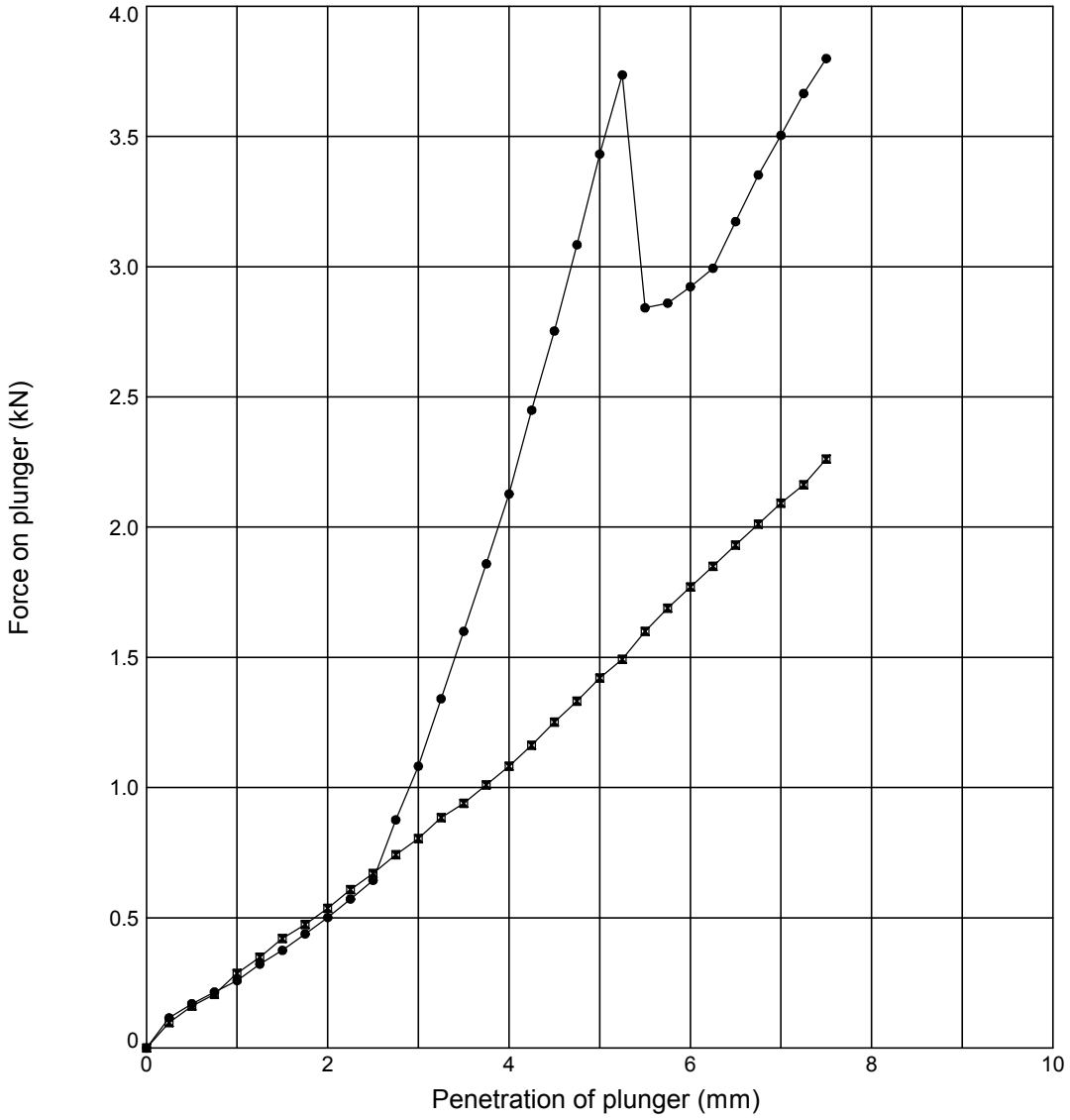
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**11**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.25**	Surcharge (kg)	:	**4.0**	CBR value (%)	**17**	**7.1**
Initial Dry Density (Mg/m^3)	:	**2.03**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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The Potteries
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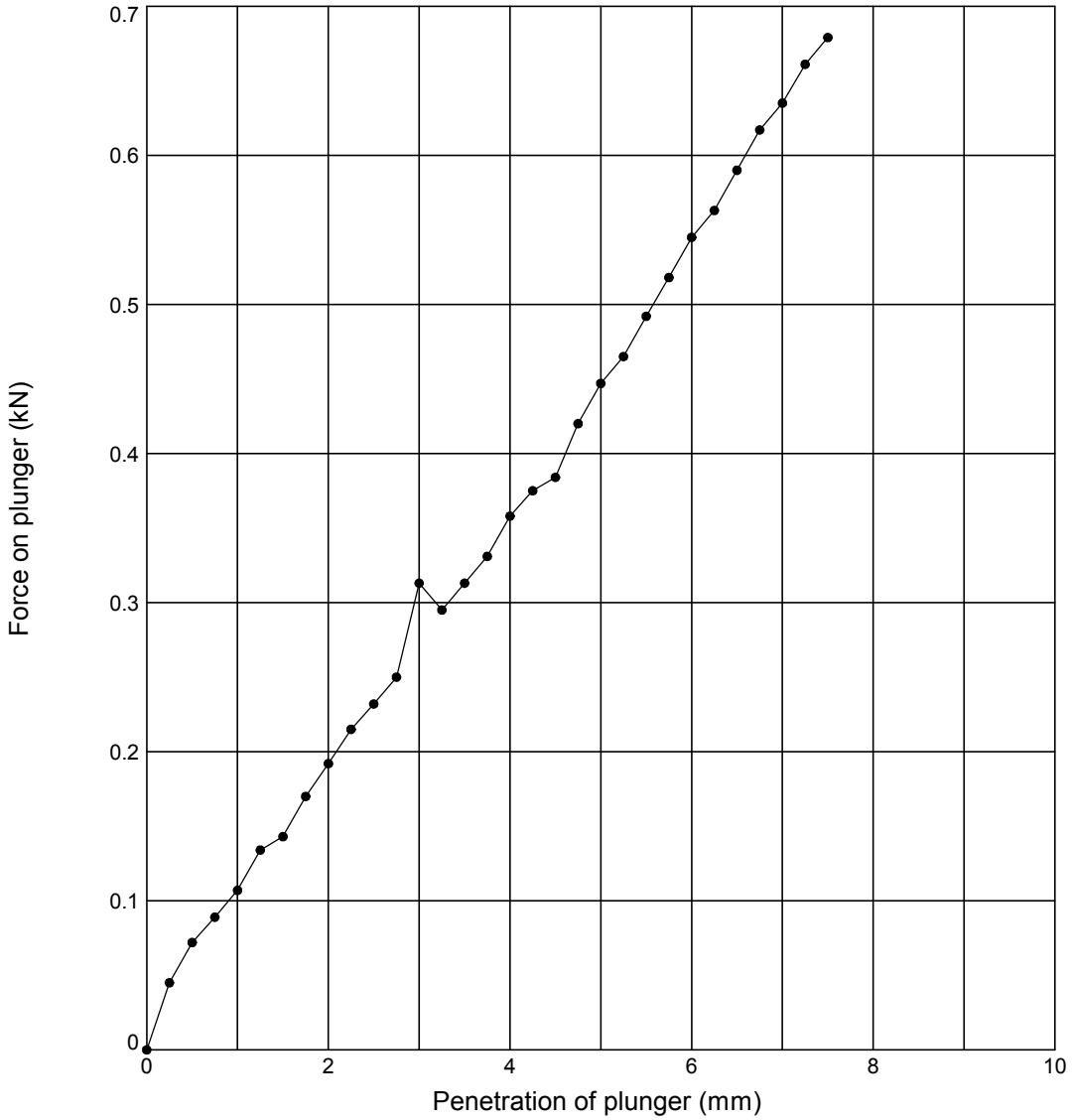
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**2.2**	**0.00**
Initial Dry Density (Mg/m^3)	:	**1.96**	Soaking Time (hrs)	:	**-**	Remarks: **Test on top of sample**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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The Potteries
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Contract Ref:

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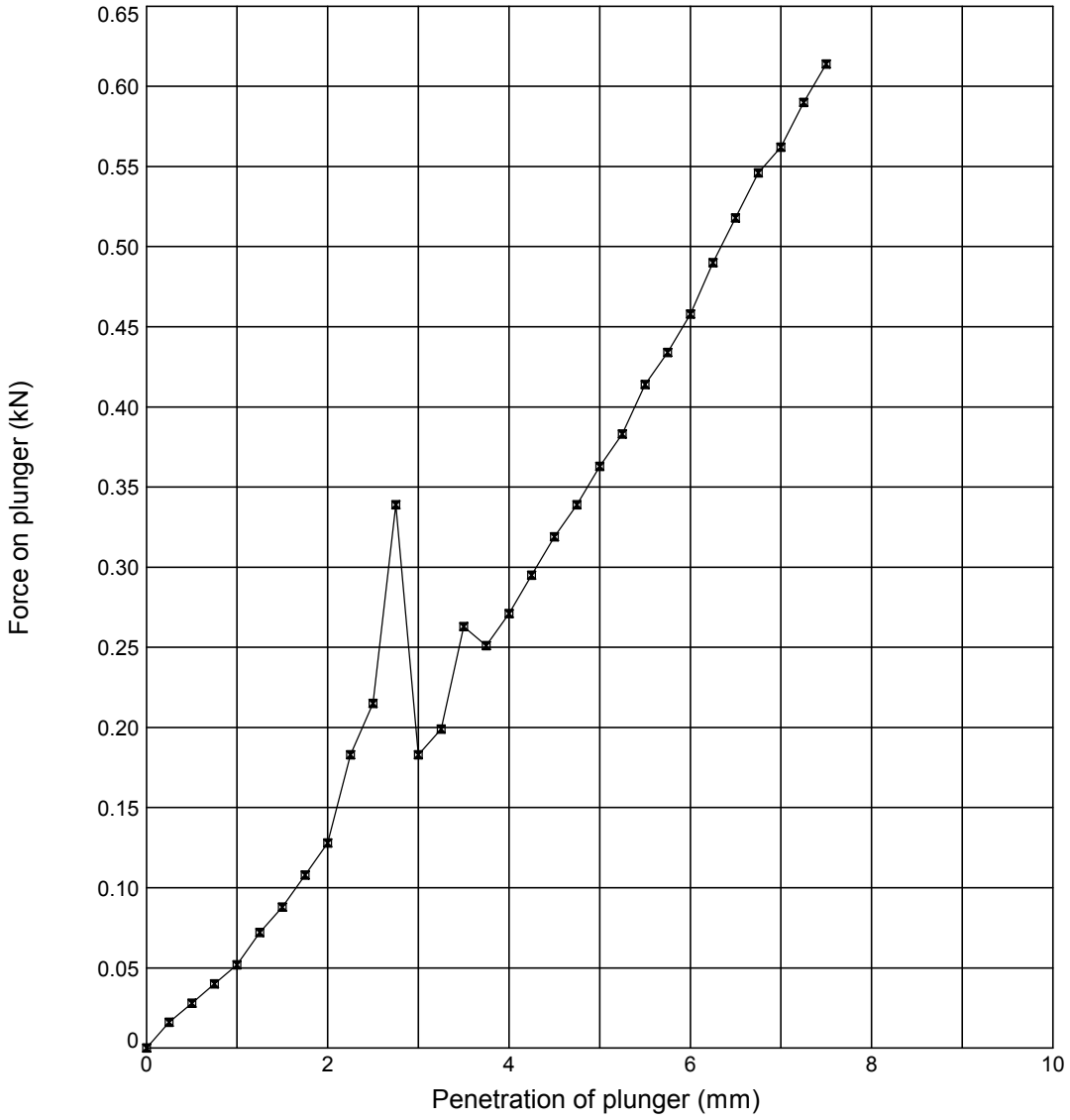
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **4** Sample Type: **B** Depth (m): **2.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.00**	**1.8**
Initial Dry Density (Mg/m^3)	:	**1.96**	Soaking Time (hrs)	:	**-**	Remarks: **Test on base of sample**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref: **782551**

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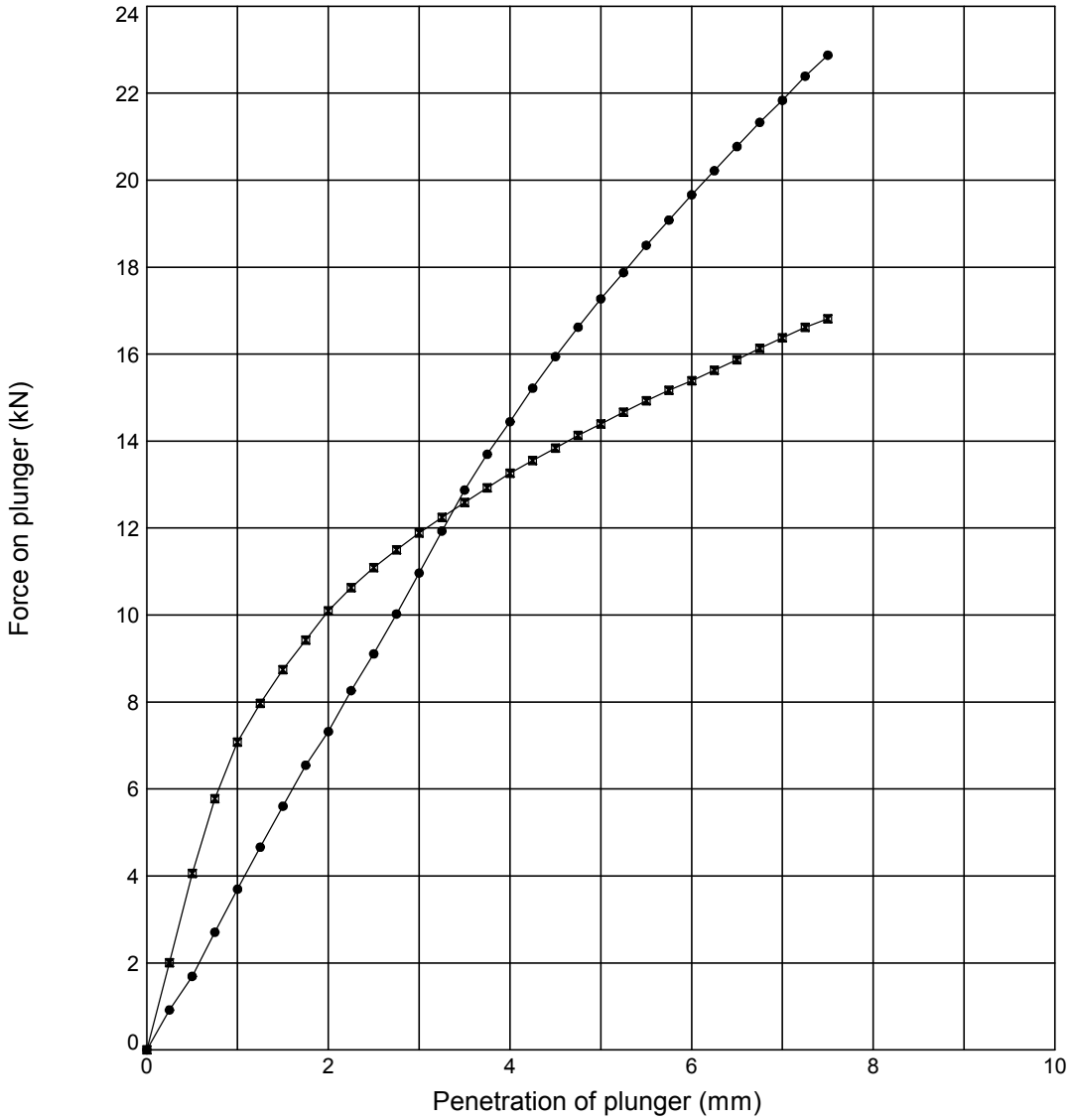
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**11**
Initial Bulk Density (Mg/m^3)	:	**1.92**	Surcharge (kg)	:	**4.0**	CBR value (%)	**87**	**84**
Initial Dry Density (Mg/m^3)	:	**1.75**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**8**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown grey slightly sandy slightly gravelly chalky CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By: [redacted] — **MARK ATHORNE**

Date: **22/05/17**

Contr: **Willen Road**

Contract Ref: **782551**

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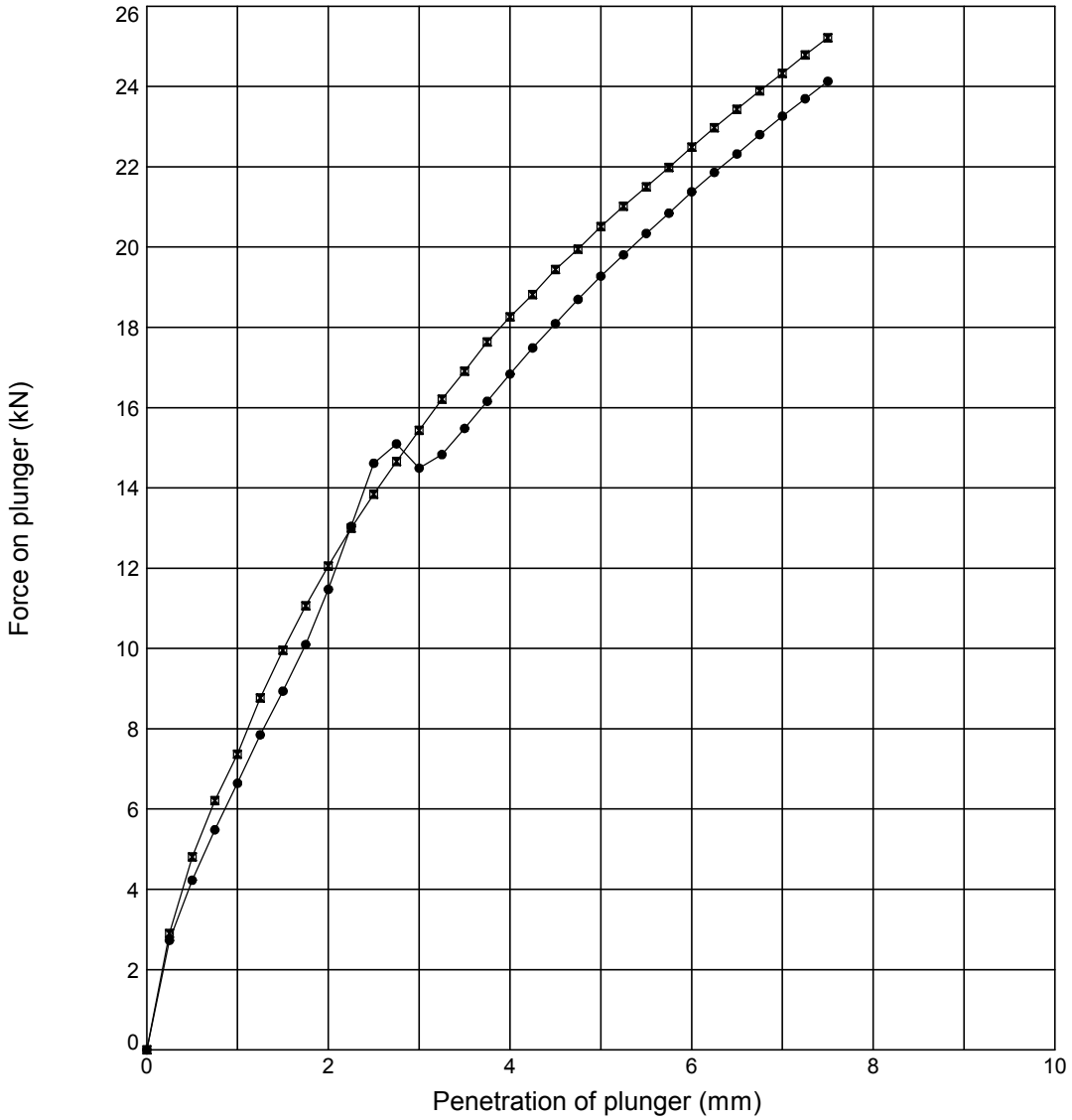
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**14**
Initial Bulk Density (Mg/m^3)	:	**1.98**	Surcharge (kg)	:	**4.0**	CBR value (%)	**110**	**105**
Initial Dry Density (Mg/m^3)	:	**1.74**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**8**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown grey slightly sandy slightly gravelly chalky CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
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Compiled By	[redacted]	Date
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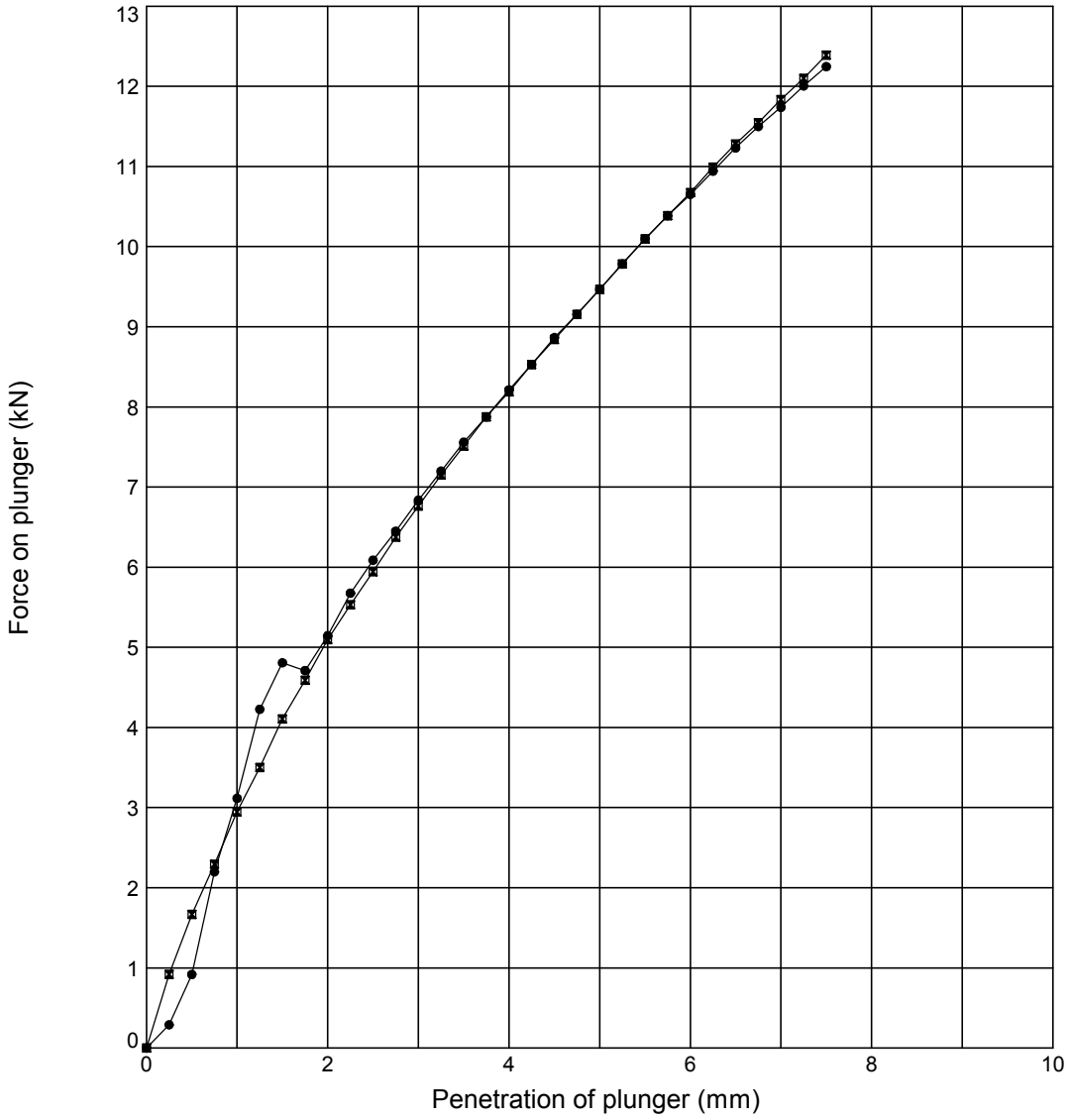
Contra		Contract Ref: **782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**16**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**16**
Initial Bulk Density (Mg/m^3)	:	**2.04**	Surcharge (kg)	:	**4.0**	CBR value (%)	**47**	**47**
Initial Dry Density (Mg/m^3)	:	**1.76**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**8**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown grey slightly sandy slightly gravelly chalky CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

[redacted] ompiled By	**MARK ATHORNE**	Date **22/05/17**
Con **Willen Road**		Contract Ref: **782551**

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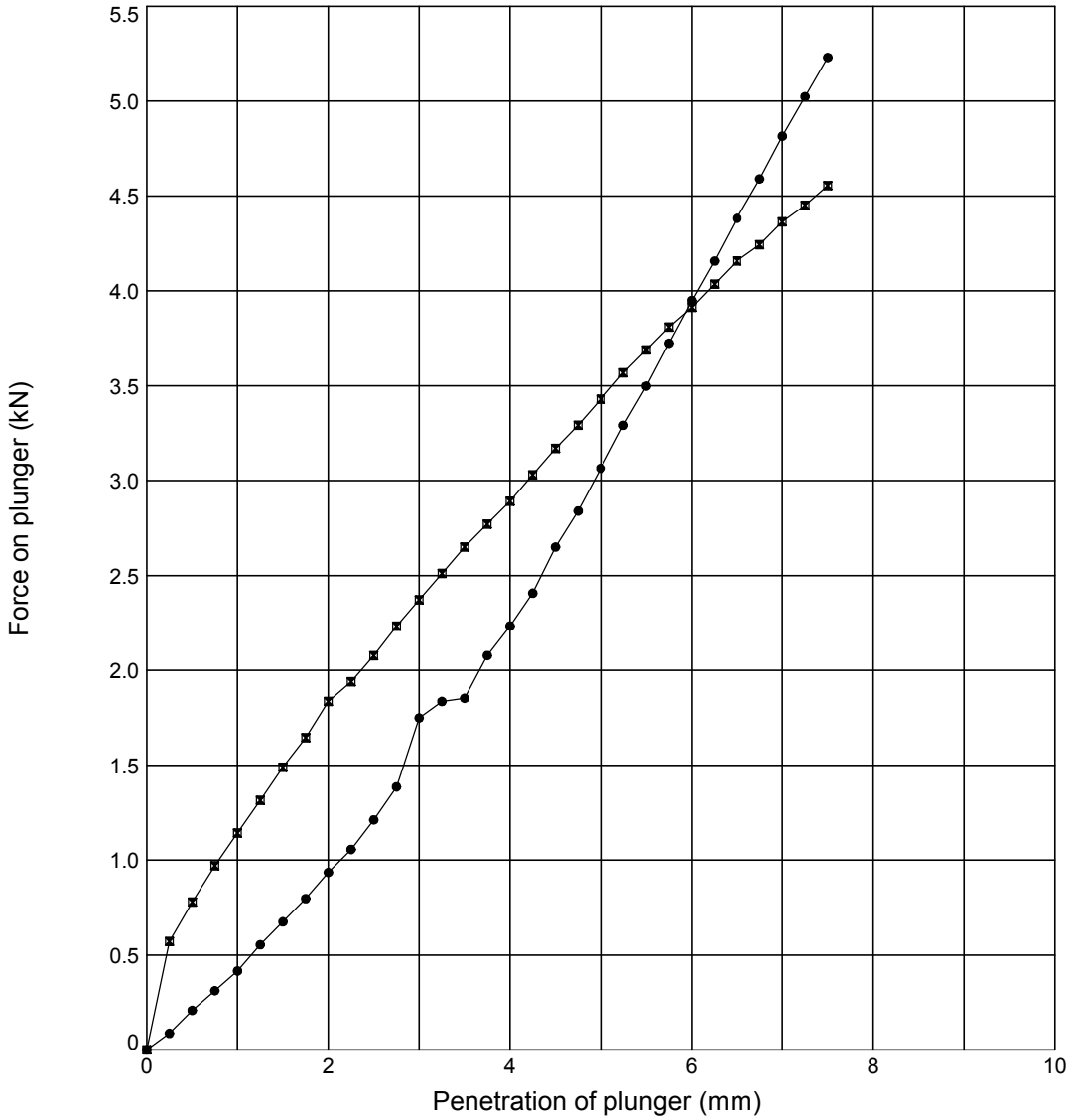
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**19**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**19**	**18**
Initial Bulk Density (Mg/m^3)	:	**2.05**	Surcharge (kg)	:	**4.0**	CBR value (%)	**15**	**17**
Initial Dry Density (Mg/m^3)	:	**1.72**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**8**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown grey slightly sandy slightly gravelly chalky CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**22/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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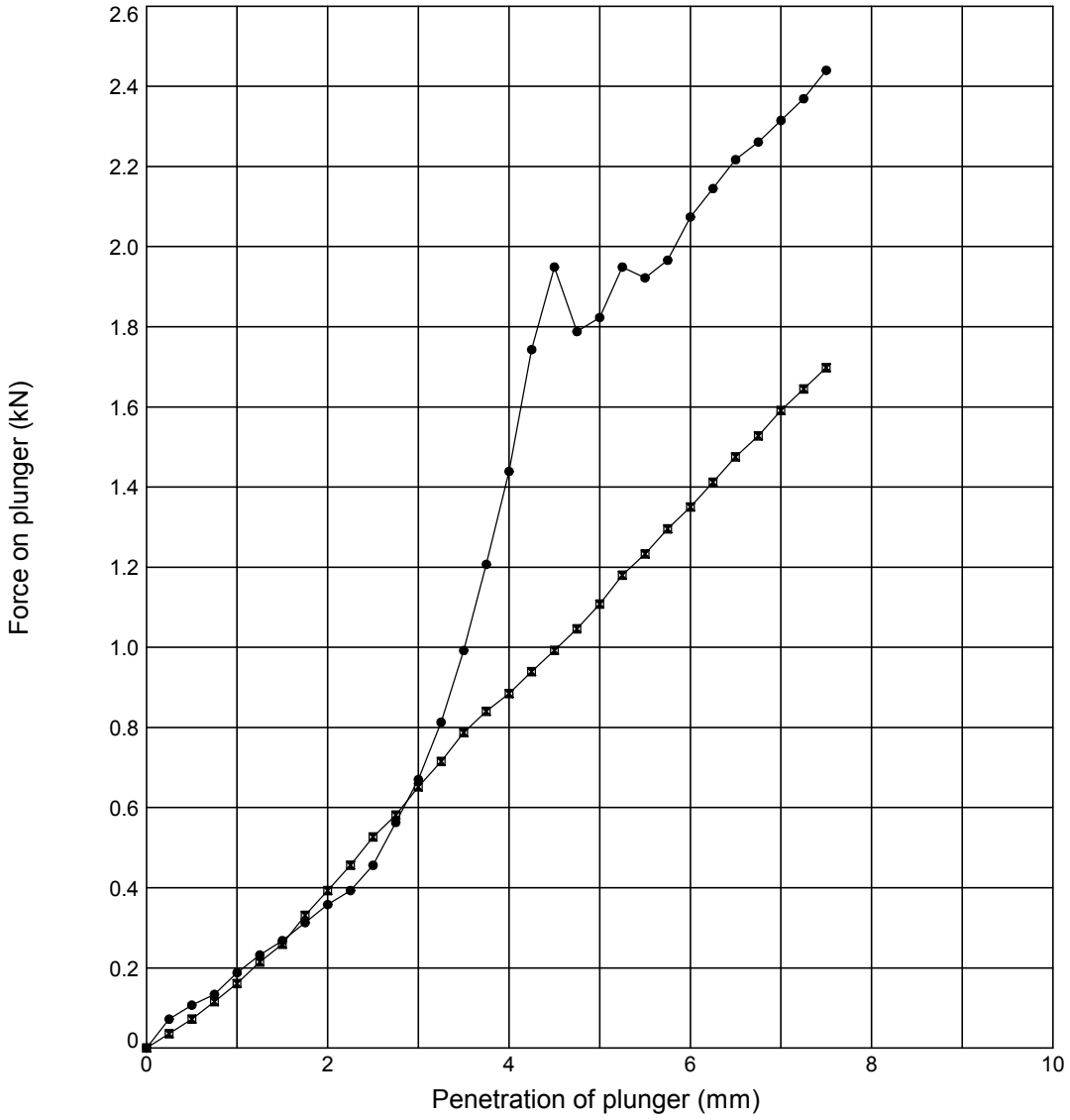
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP105** Sample Ref: **3** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**21**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**22**	**20**
Initial Bulk Density (Mg/m^3)	:	**2.02**	Surcharge (kg)	:	**4.0**	CBR value (%)	**9.1**	**5.6**
Initial Dry Density (Mg/m^3)	:	**1.67**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**8**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown grey slightly sandy slightly gravelly chalky CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted] **MAUREEN FISHER**	**22/05/17**

Contract: **Willen Road**

Contract Ref: **782551**

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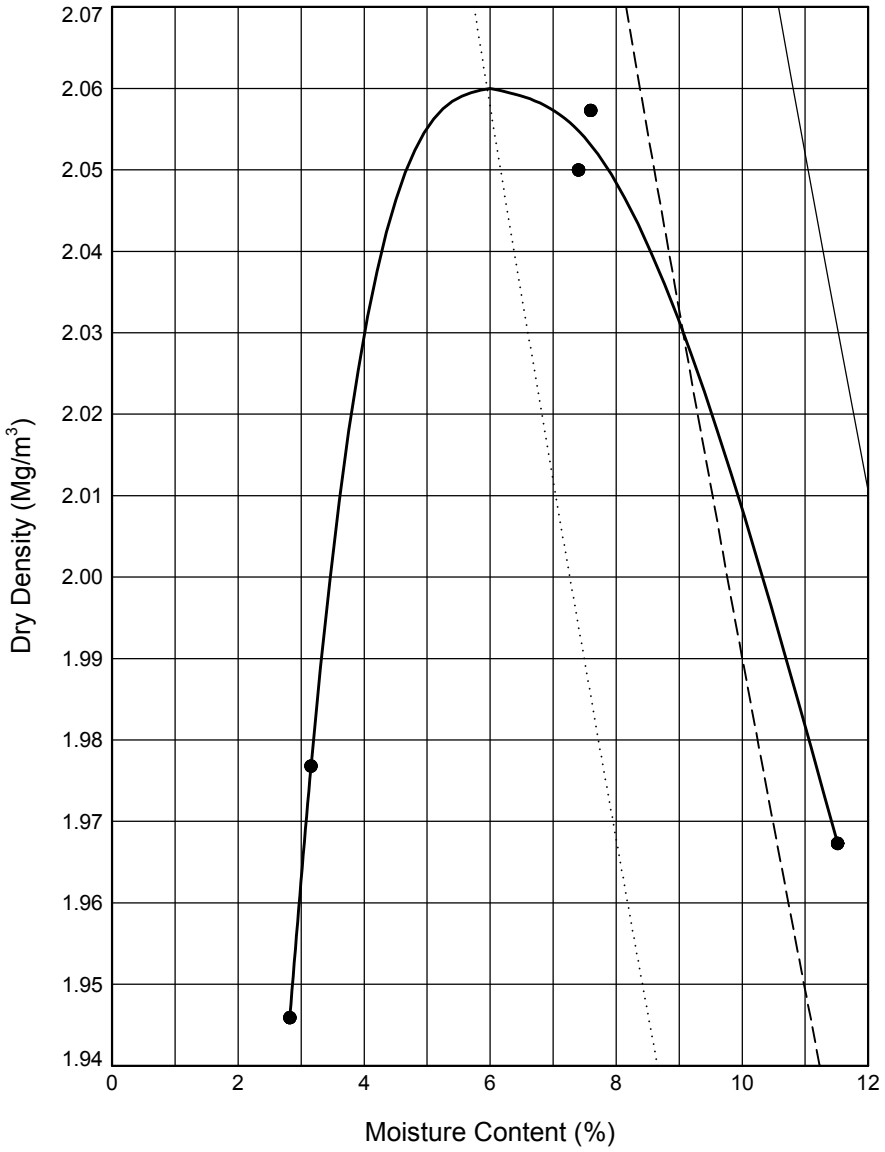
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**2.8**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.06**
% Retained on 37.5mm BS Sieve	:	**1**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**6**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<2**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Grey brown slightly sandy gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
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W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contract: **Willen Road**	Contract Ref: **782551**	

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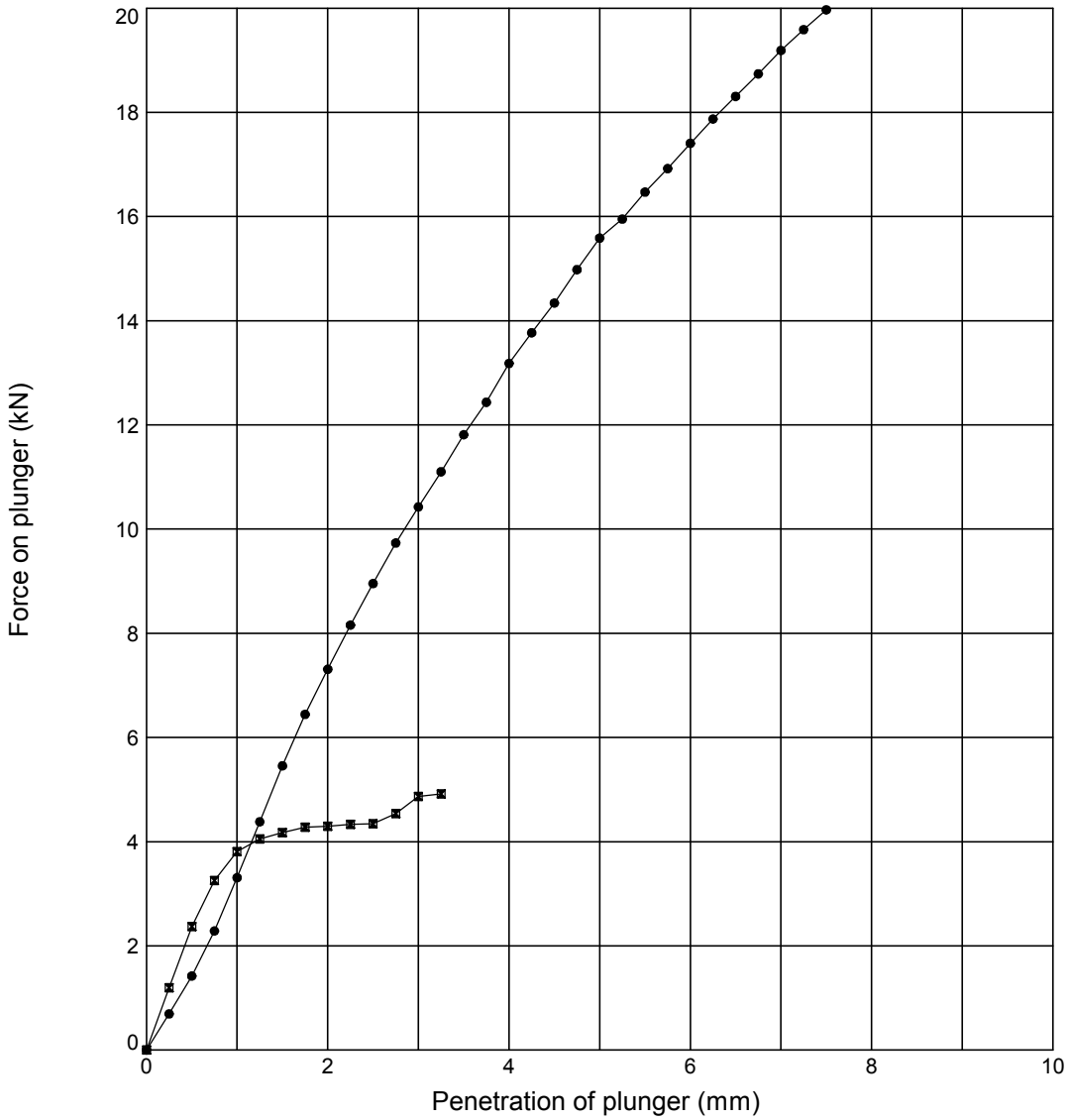
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**2.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**2.3**	**2.8**
Initial Bulk Density (Mg/m^3)	:	**1.99**	Surcharge (kg)	:	**4.0**	CBR value (%)	**78**	**33**
Initial Dry Density (Mg/m^3)	:	**1.94**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown slightly sandy gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MARK ATHORNE** Date: **23/05/17**

Co **Willen Road**

Contract Ref: **782551**

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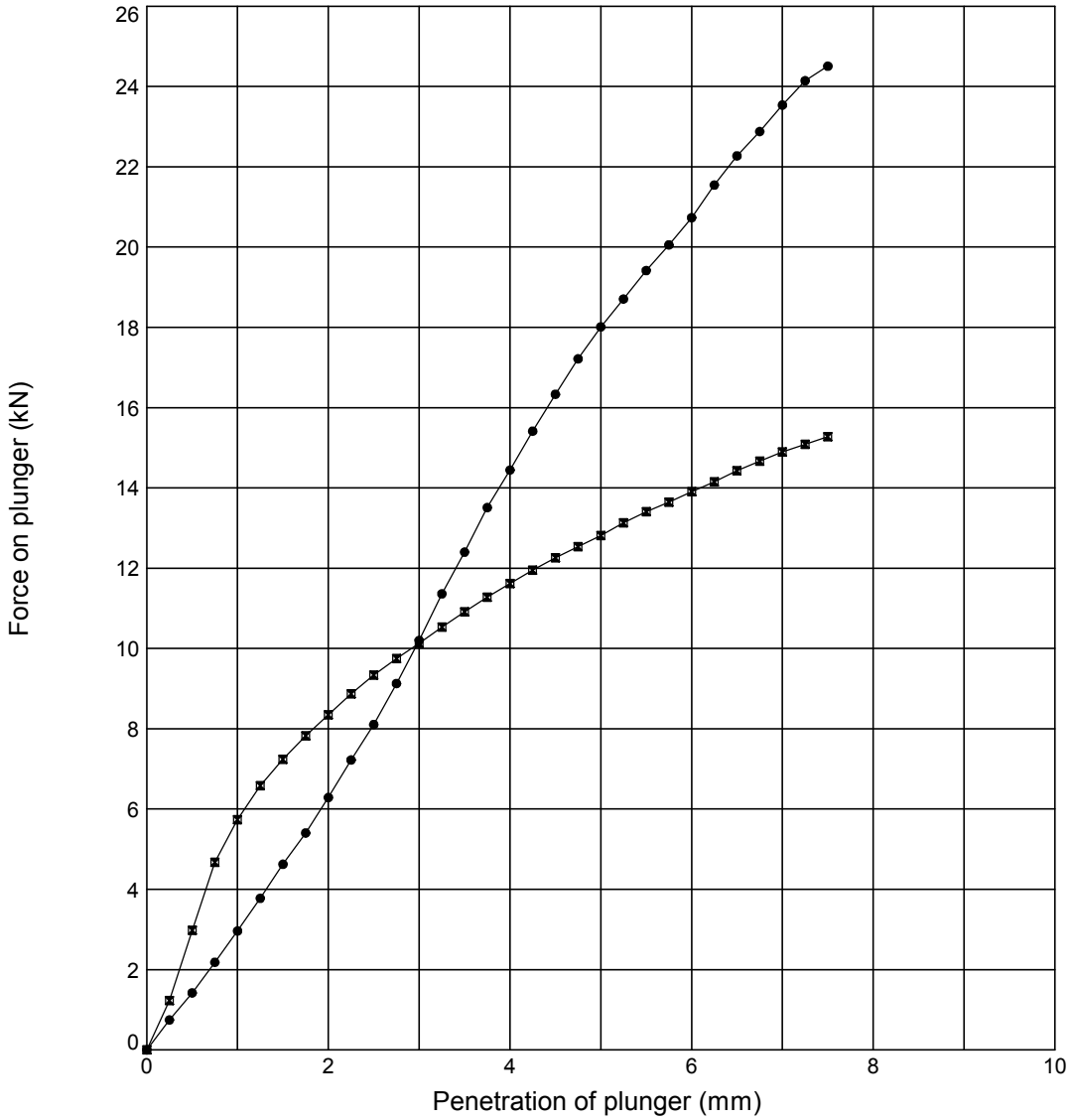
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**3.2**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**3.8**	**3.5**
Initial Bulk Density (Mg/m^3)	:	**2.03**	Surcharge (kg)	:	**4.0**	CBR value (%)	**90**	**71**
Initial Dry Density (Mg/m^3)	:	**1.97**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown slightly sandy gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted]	**MARK ATHORNE** **23/05/17**

Co **Willen Road**

Contract Ref: **782551**

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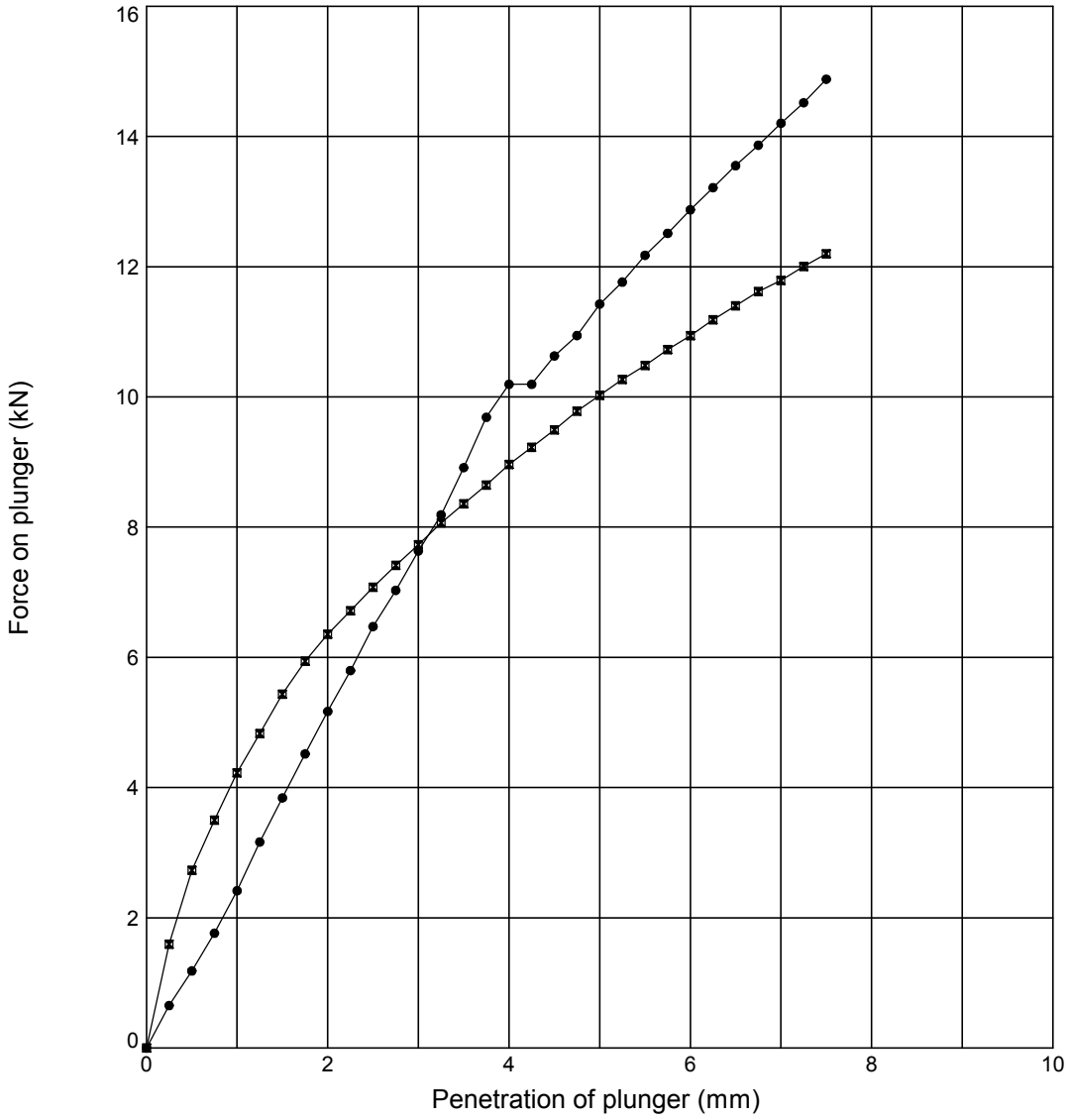
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.4**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**7.0**	**7.5**
Initial Bulk Density (Mg/m^3)	:	**2.19**	Surcharge (kg)	:	**4.0**	CBR value (%)	**57**	**53**
Initial Dry Density (Mg/m^3)	:	**2.04**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown slightly sandy gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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Contract	Contract Ref:
Willen Road	**782551**

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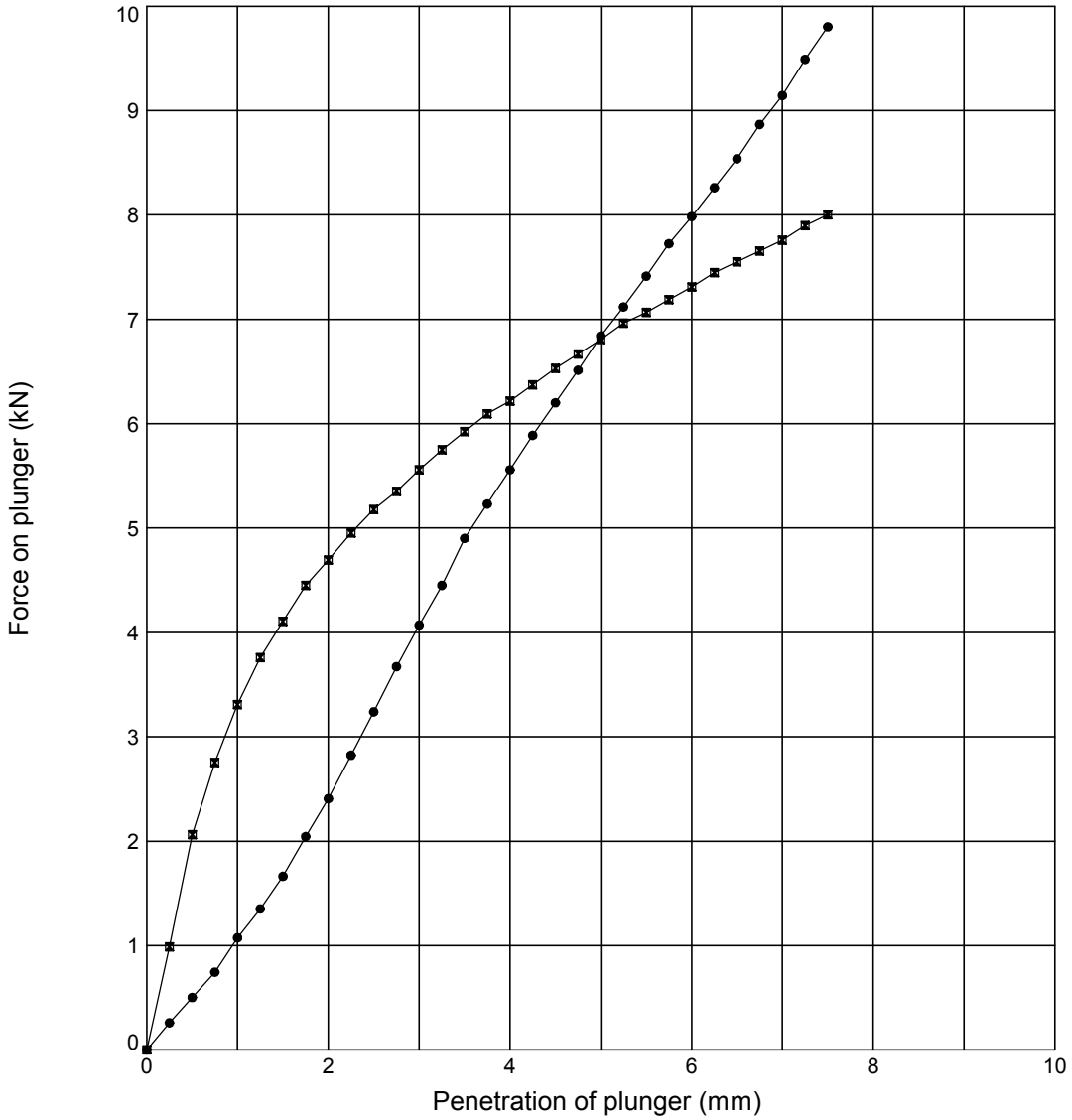
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.6**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**8.1**	**8.4**
Initial Bulk Density (Mg/m^3)	:	**2.20**	Surcharge (kg)	:	**4.0**	CBR value (%)	**34**	**39**
Initial Dry Density (Mg/m^3)	:	**2.05**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown slightly sandy gravelly CLAY	● **Top** ⊠ **Base**

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Compiled By	Date
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Contra: **Willen Road**

Contract Ref: **782551**

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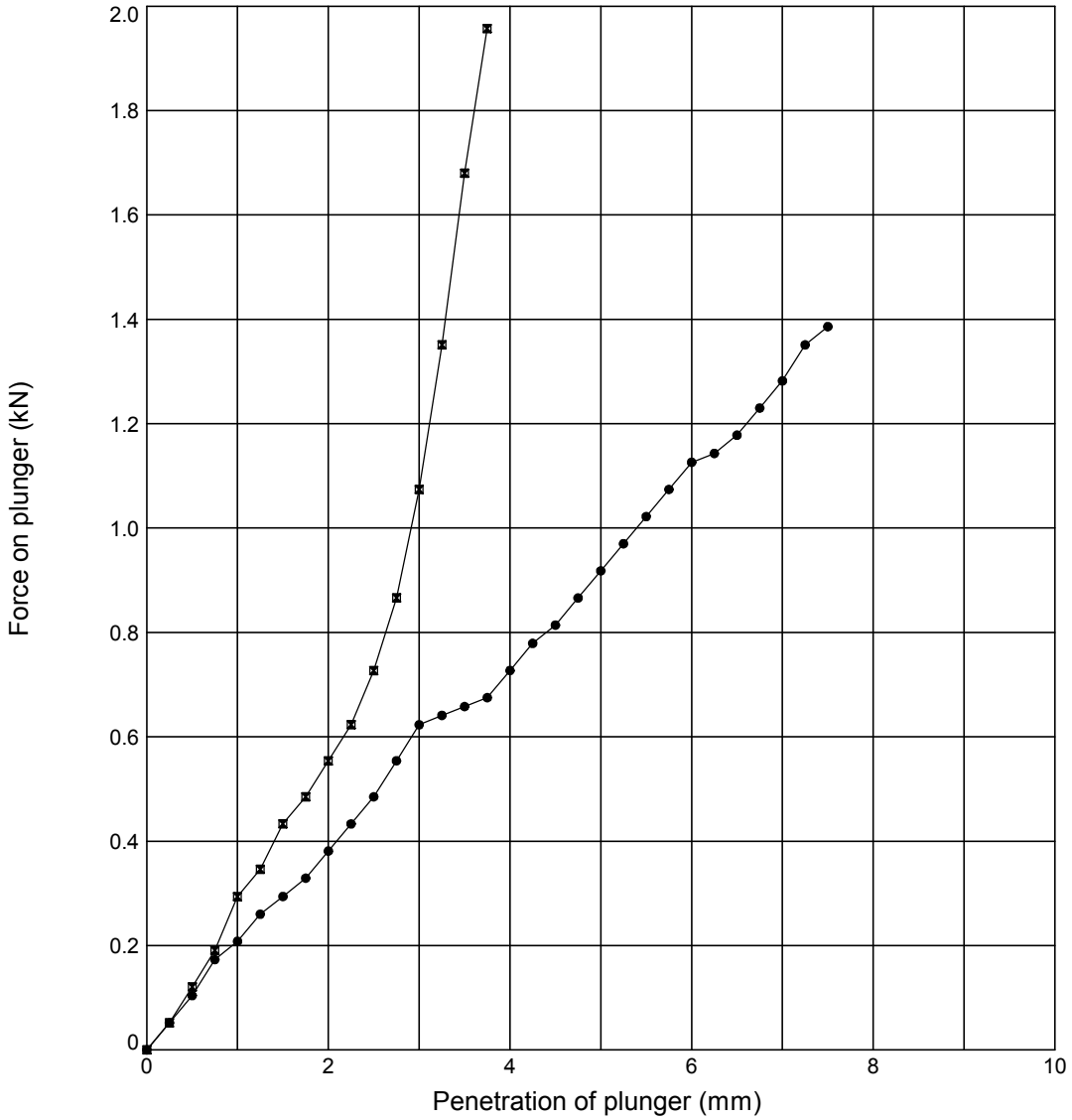
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **1** Sample Type: **B** Depth (m): **0.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**11**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.18**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.6**	**5.5**
Initial Dry Density (Mg/m^3)	:	**1.95**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Grey brown slightly sandy gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

Contra [redacted]

Willen Road

Contract Ref:

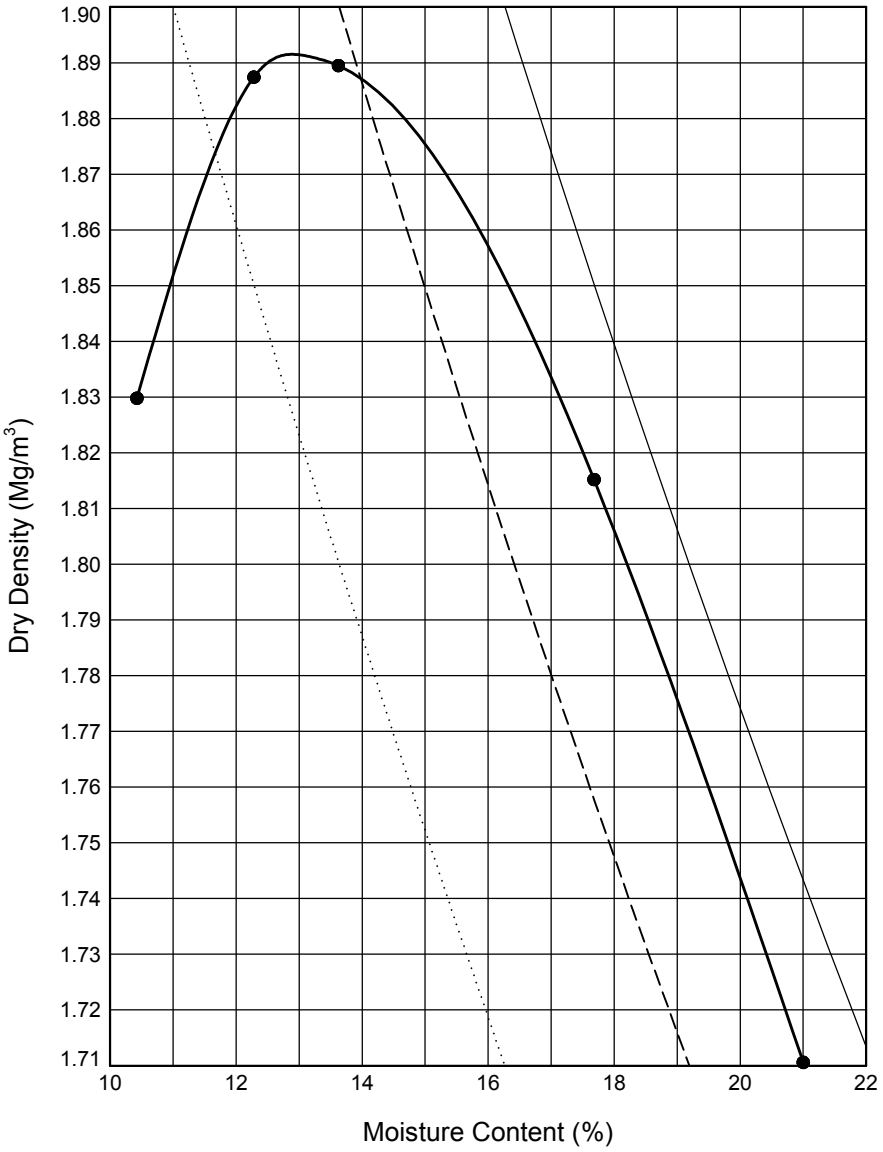
782551

AGS

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: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**10.0**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m³)	:	**1.89**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**13**
% Retained on 20.0mm BS Sieve	:	**1**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.75**				Remarks:		
Size of Soil Pieces	:	**<20**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Dark grey slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

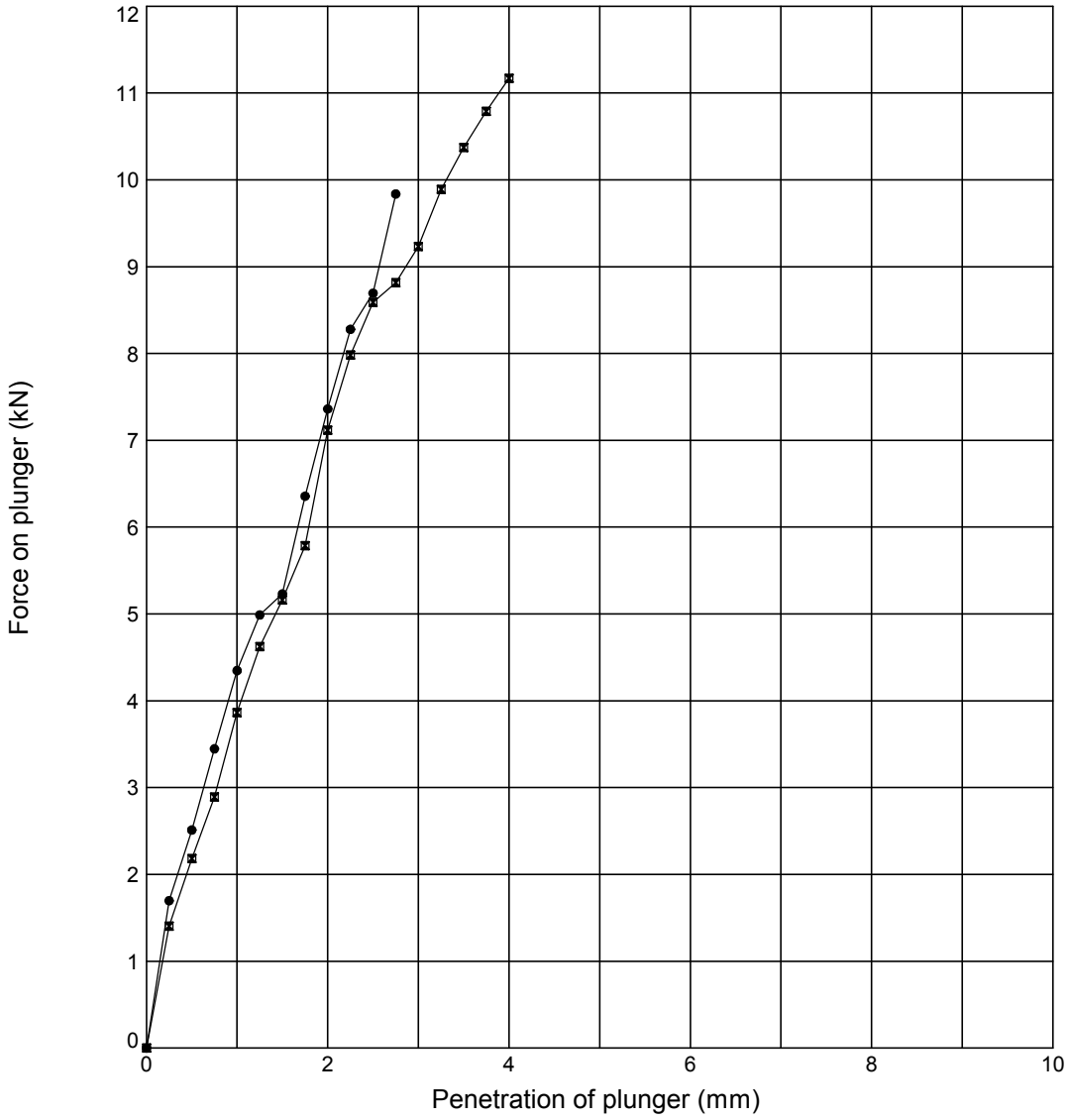
Contract: **Willen Road**

Contract Ref: **782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**10**
Initial Bulk Density (Mg/m^3)	:	**2.01**	Surcharge (kg)	:	**4.0**	CBR value (%)	**66**	**65**
Initial Dry Density (Mg/m^3)	:	**1.83**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark grey slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

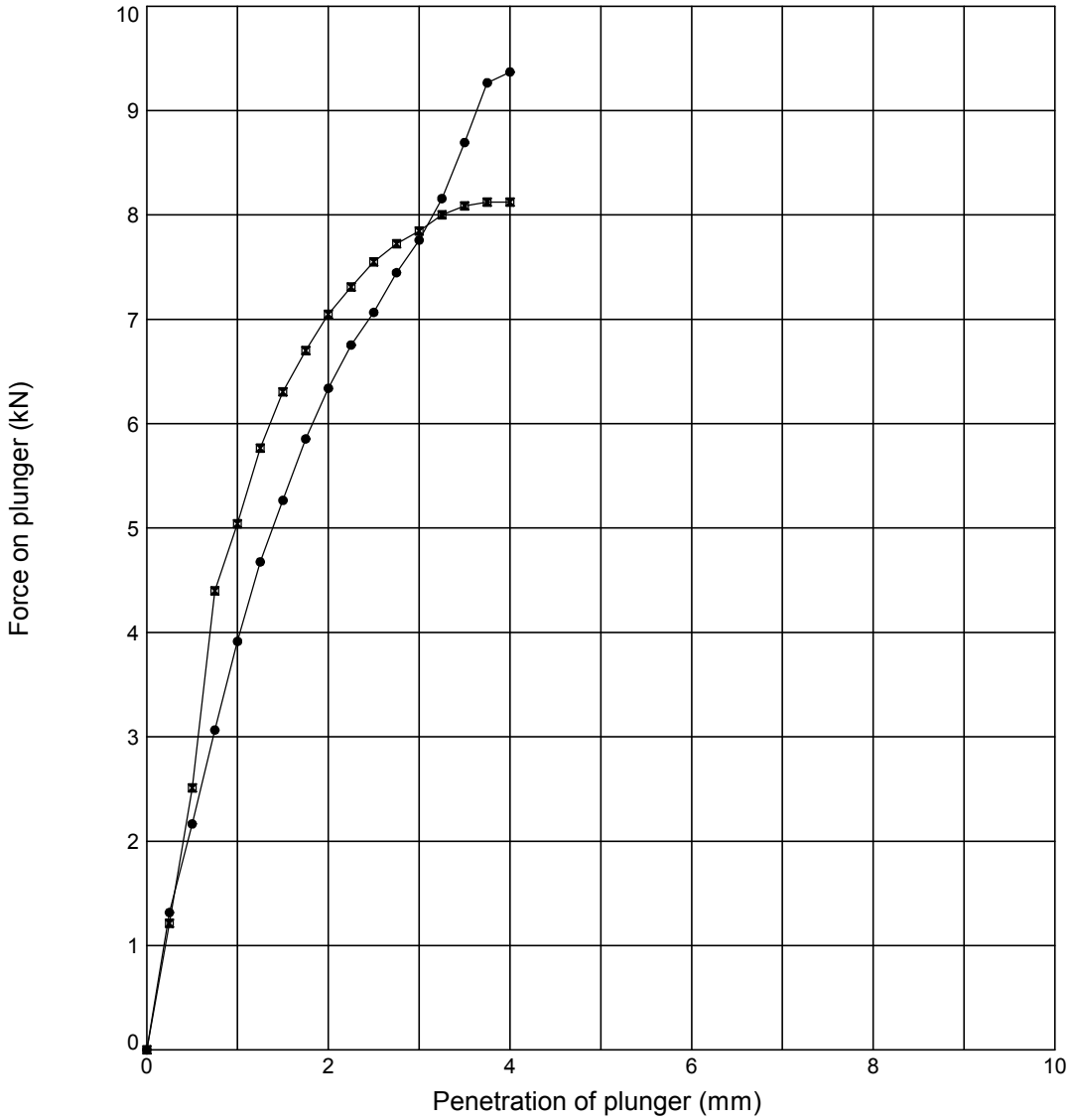
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**12**
Initial Bulk Density (Mg/m^3)	:	**2.11**	Surcharge (kg)	:	**4.0**	CBR value (%)	**53**	**57**
Initial Dry Density (Mg/m^3)	:	**1.88**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark grey slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Contract: **Willen Road** Contract Ref: **782551**

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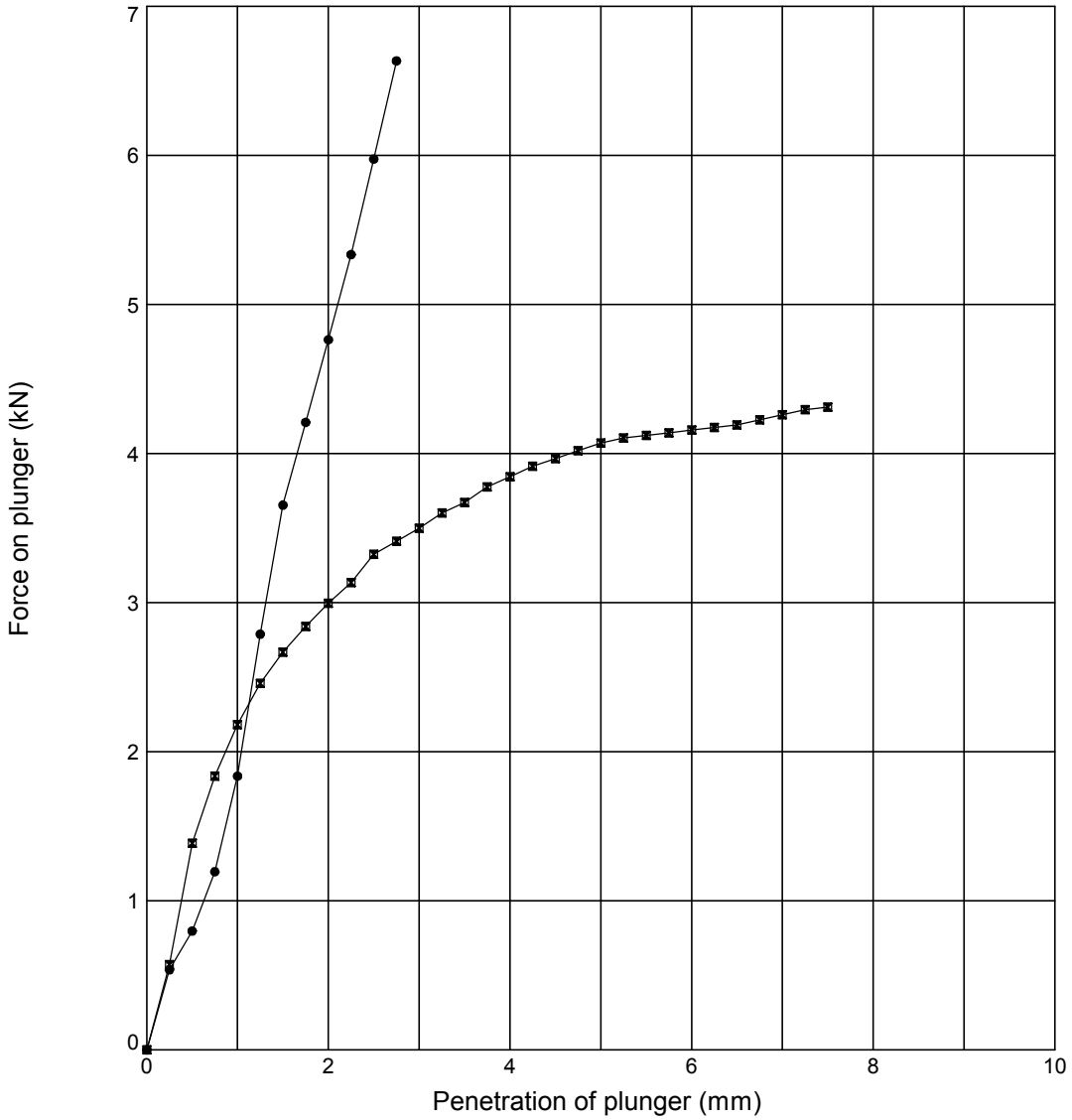
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**45**	**25**
Initial Dry Density (Mg/m^3)	:	**1.87**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark grey slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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Willen Road

Contract Ref:

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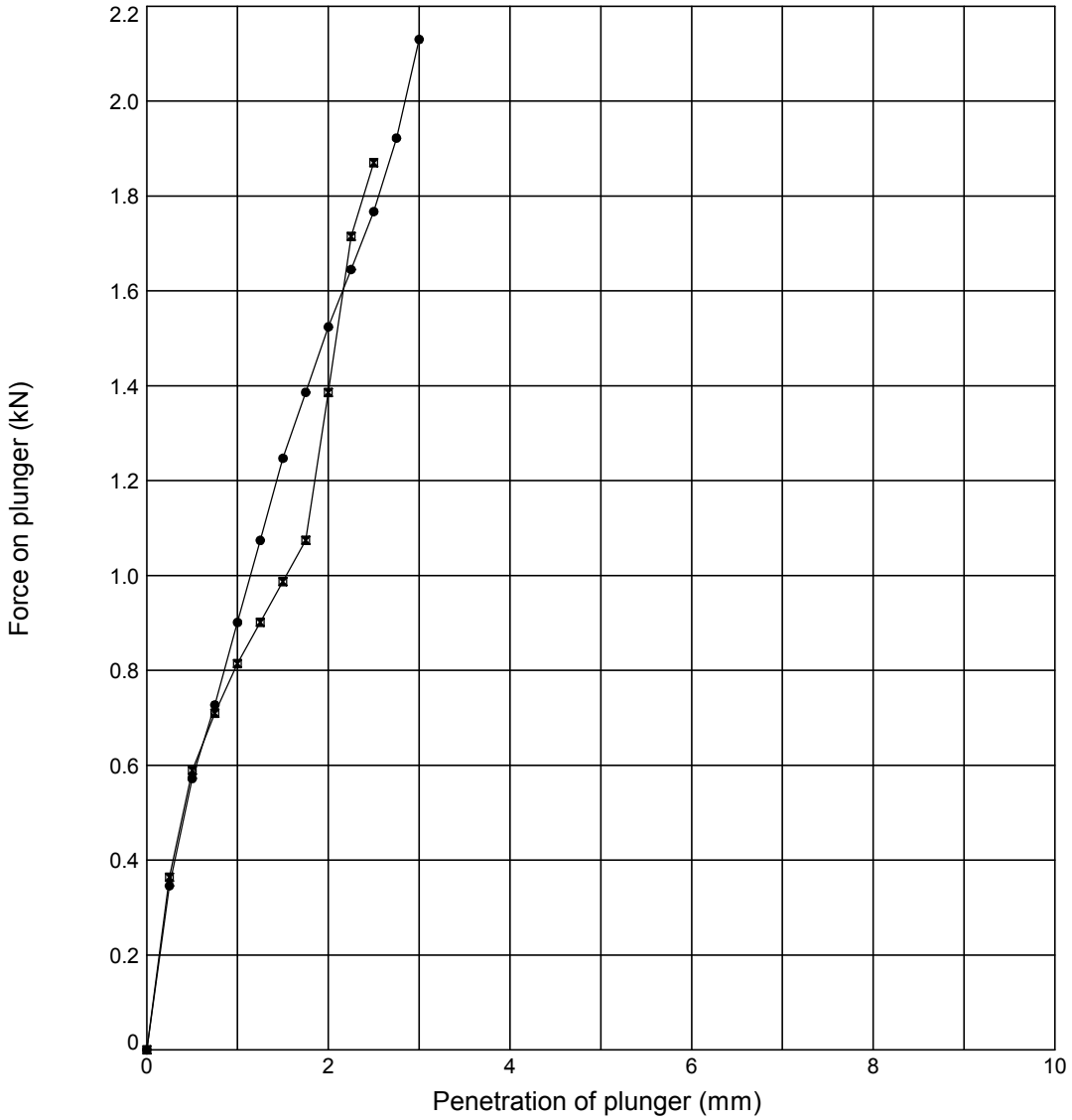
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**18**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**18**	**42**
Initial Bulk Density (Mg/m^3)	:	**2.13**	Surcharge (kg)	:	**4.0**	CBR value (%)	**13**	**14**
Initial Dry Density (Mg/m^3)	:	**1.80**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark grey slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
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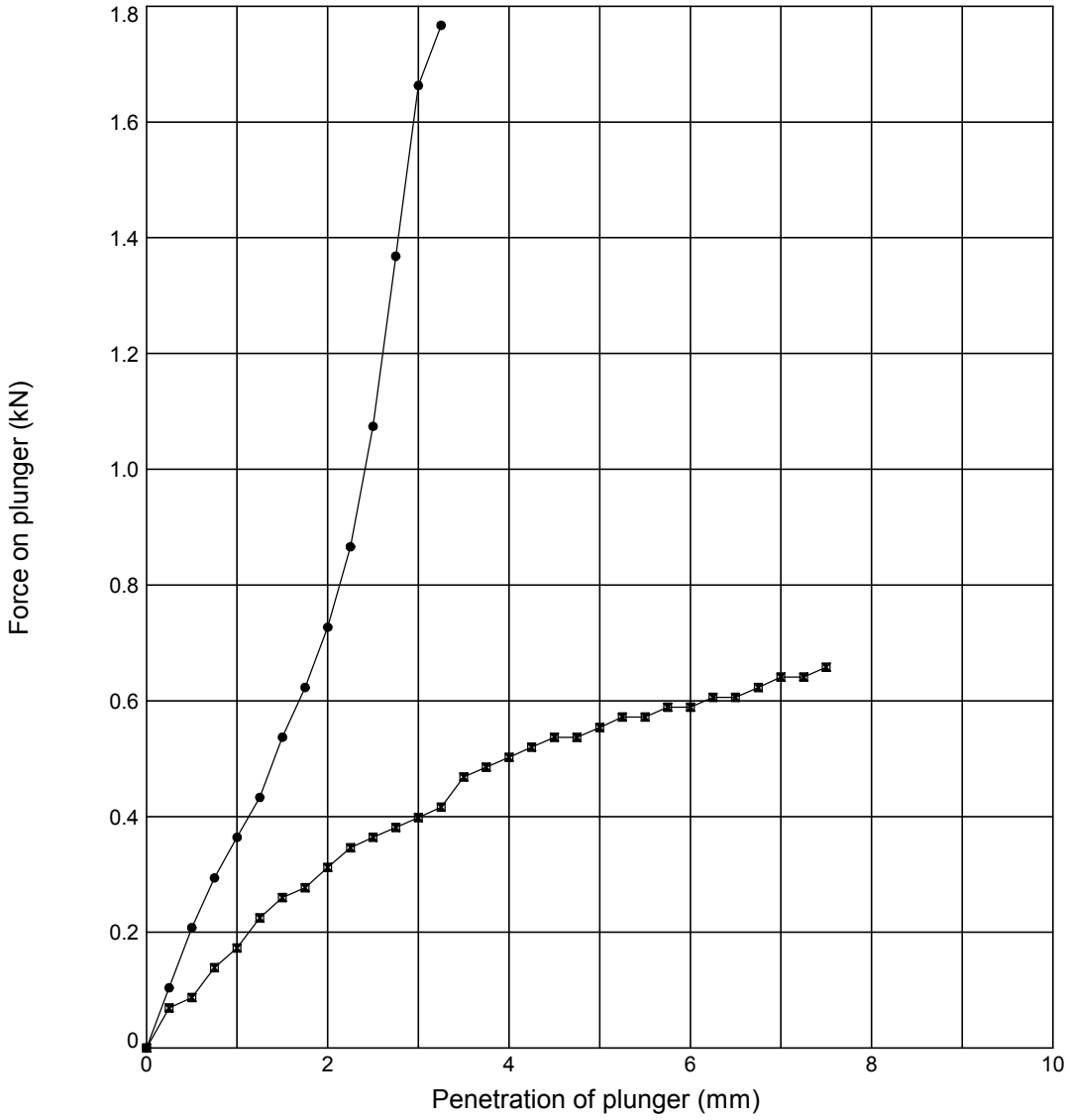
	MARK ATHORNE	**23/05/17**
Willen Road	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP118** Sample Ref: **2** Sample Type: **B** Depth (m): **1.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**21**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**20**	**19**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**8.1**	**2.8**
Initial Dry Density (Mg/m^3)	:	**1.70**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark grey slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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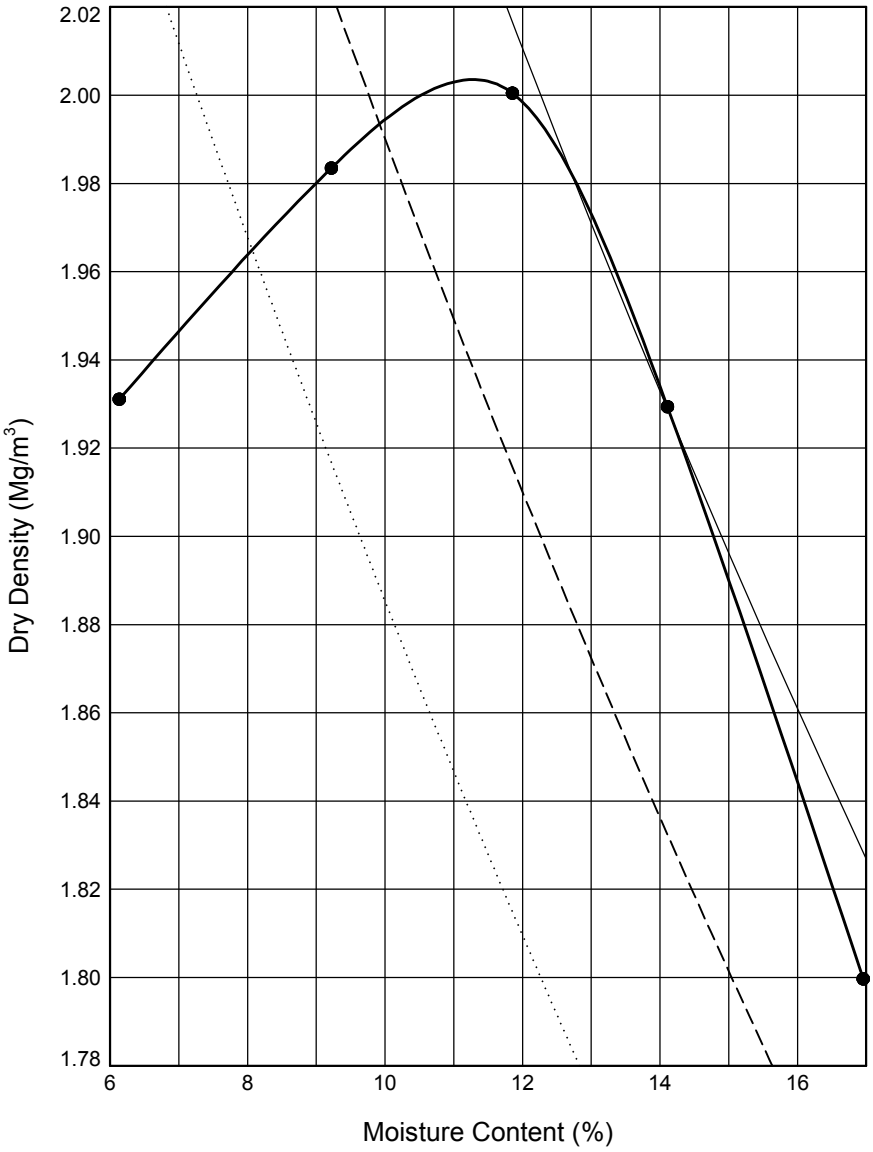
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contract: **Willen Road**	Contract Ref: **782551**	

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: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.00**
% Retained on 37.5mm BS Sieve	:	**1**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**11**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Brown very clayey very gravelly SAND	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
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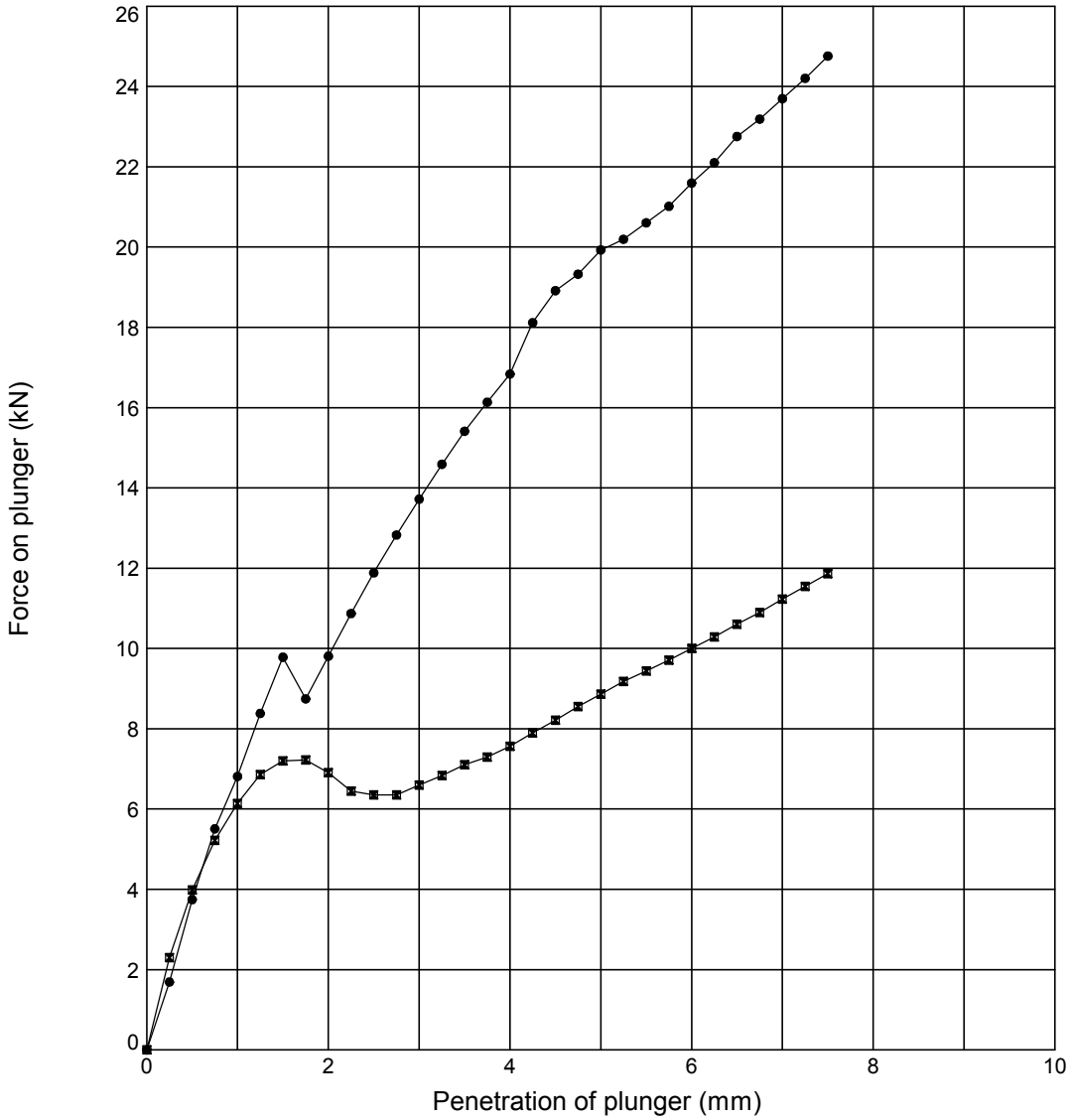
Compiled By	Date
[redacted] **MARK ATHORNE**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**6.1**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**5.6**	**6.2**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**100**	**48**
Initial Dry Density (Mg/m^3)	:	**1.94**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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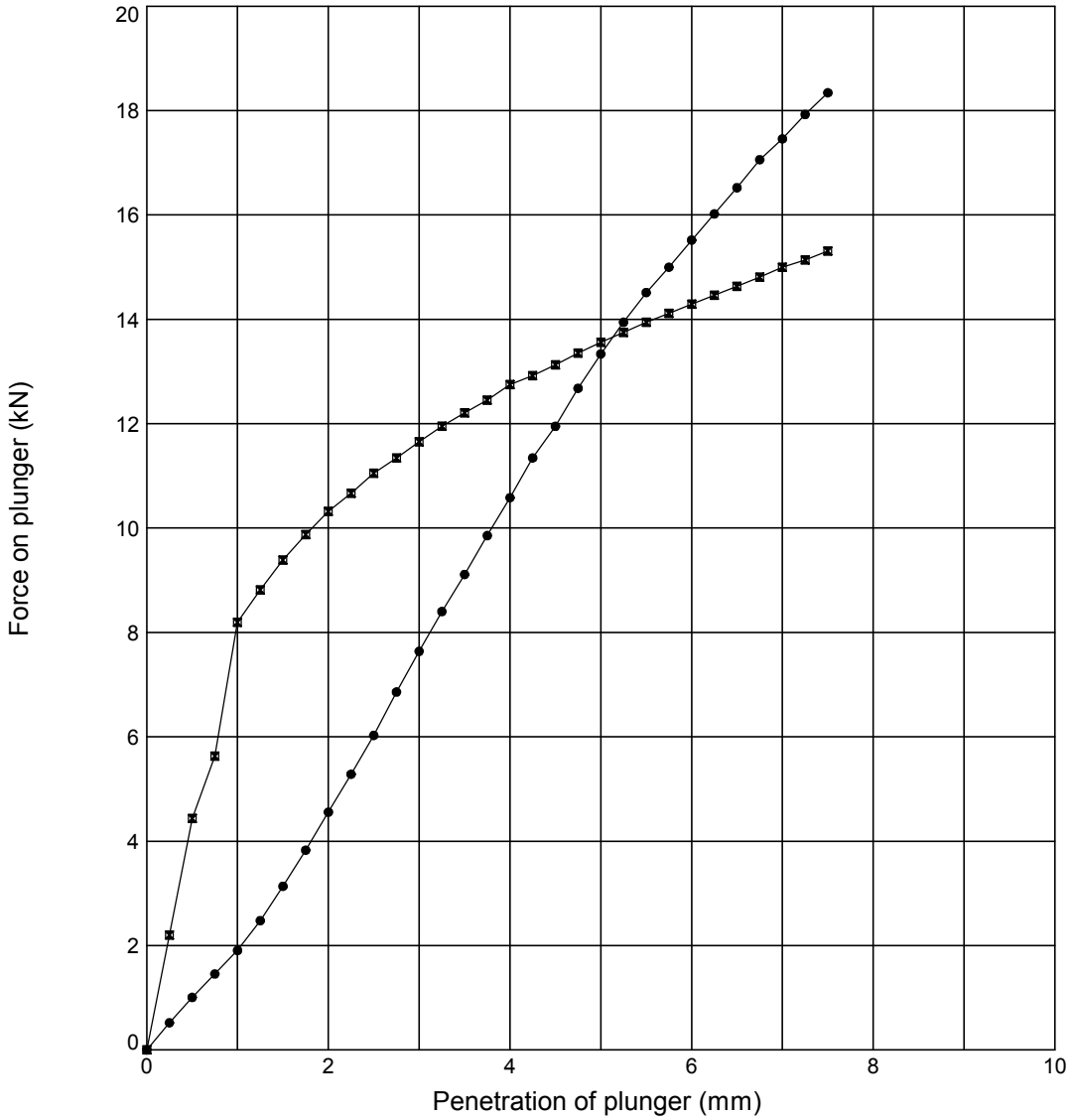
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Con	Contract Ref:	
Willen Road	**782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.2**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.1**	**9.0**
Initial Bulk Density (Mg/m^3)	:	**2.18**	Surcharge (kg)	:	**4.0**	CBR value (%)	**67**	**83**
Initial Dry Density (Mg/m^3)	:	**2.00**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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Compiled By	Date
[redacted] **MARK ATHORNE**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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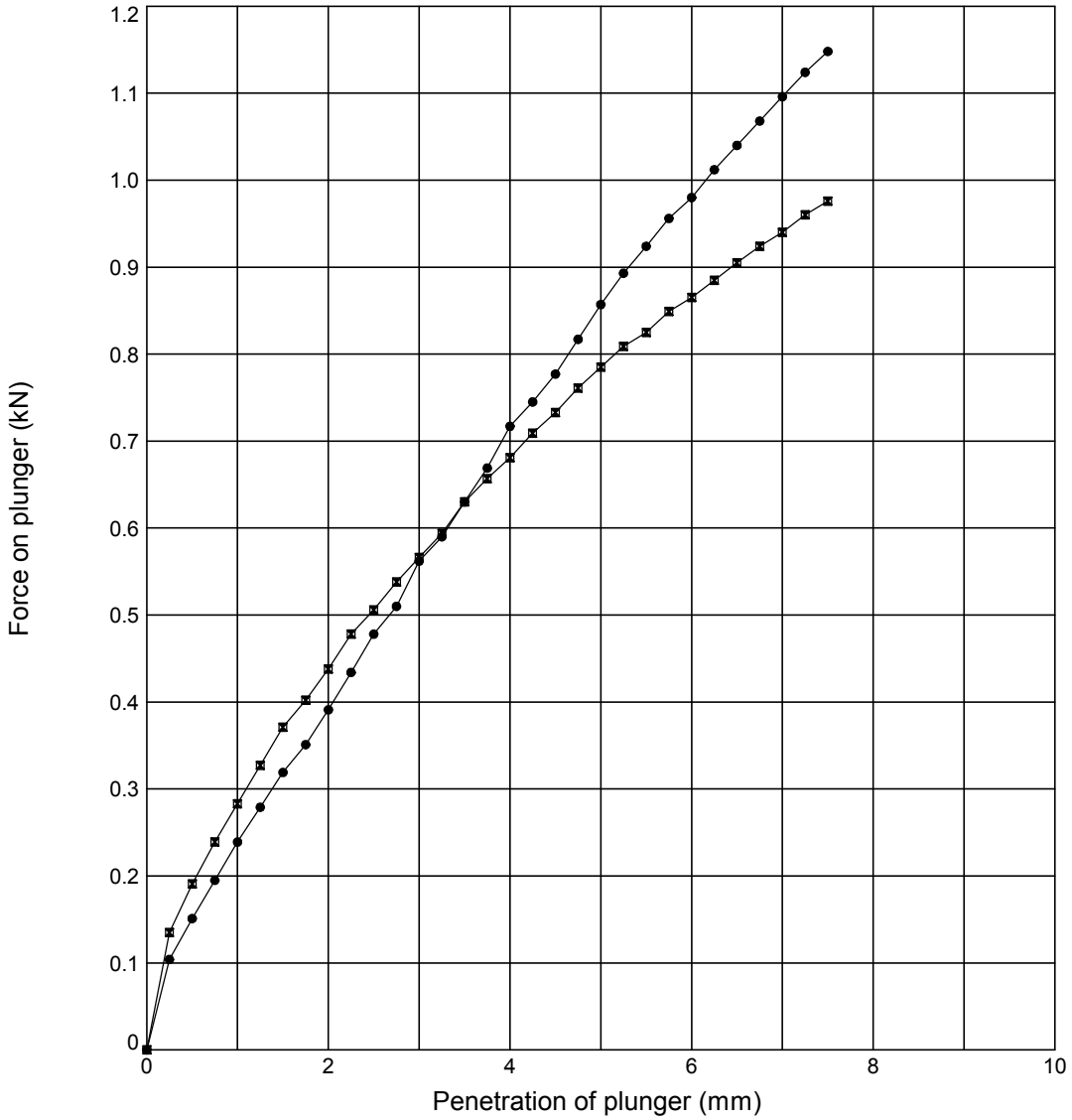
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**12**
Initial Bulk Density (Mg/m^3)	:	**2.25**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.3**	**3.9**
Initial Dry Density (Mg/m^3)	:	**2.01**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⧓ **Base**

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Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

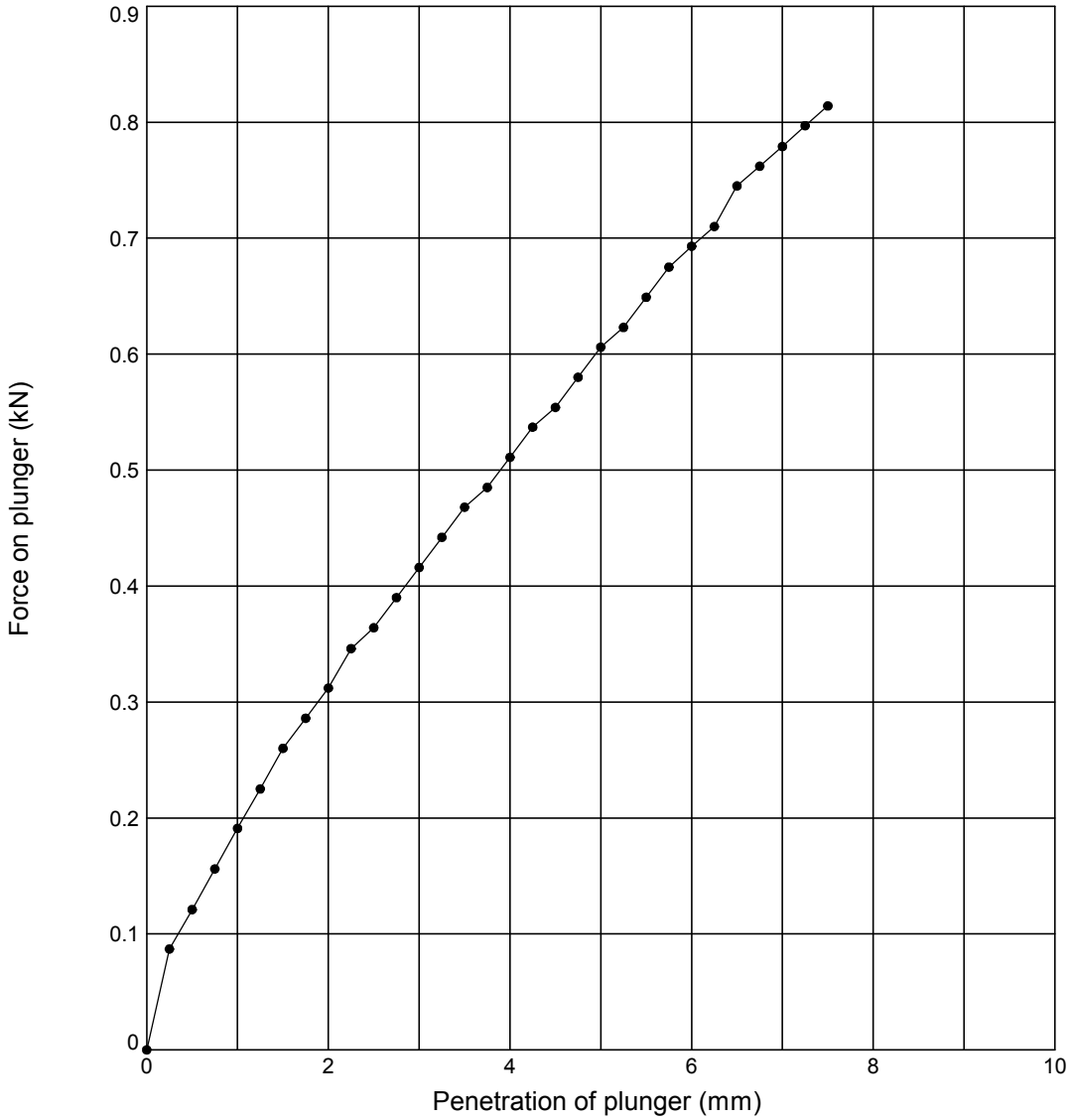
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**3.0**	**0.00**
Initial Dry Density (Mg/m^3)	:	**1.94**	Soaking Time (hrs)	:	**-**	Remarks: **Test on top of sample**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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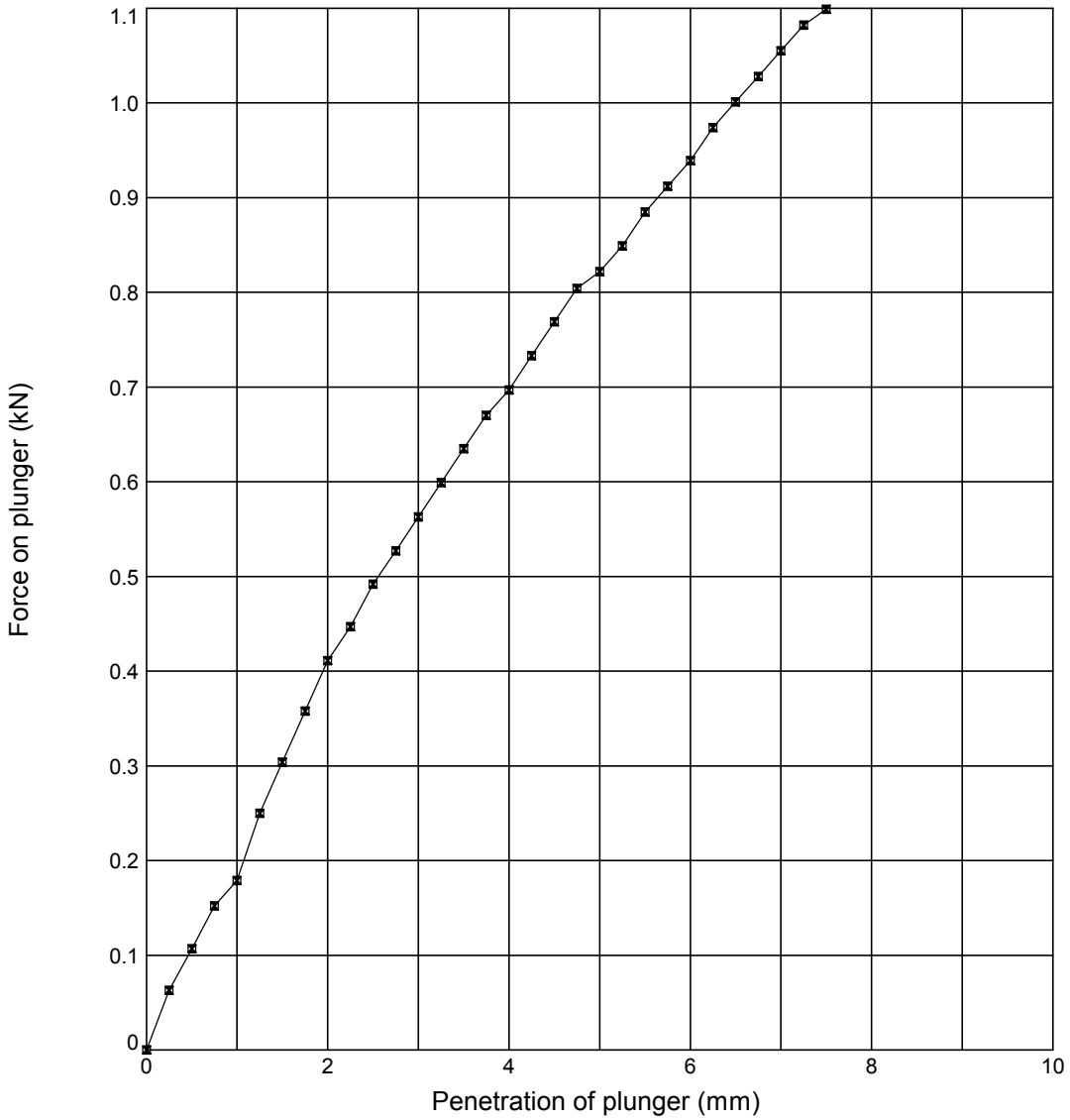
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contr **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.12**	Surcharge (kg)	:	**4.0**	CBR value (%)	**0.00**	**4.1**
Initial Dry Density (Mg/m^3)	:	**1.86**	Soaking Time (hrs)	:	**-**	Remarks: **Test on base of sample**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By		Date
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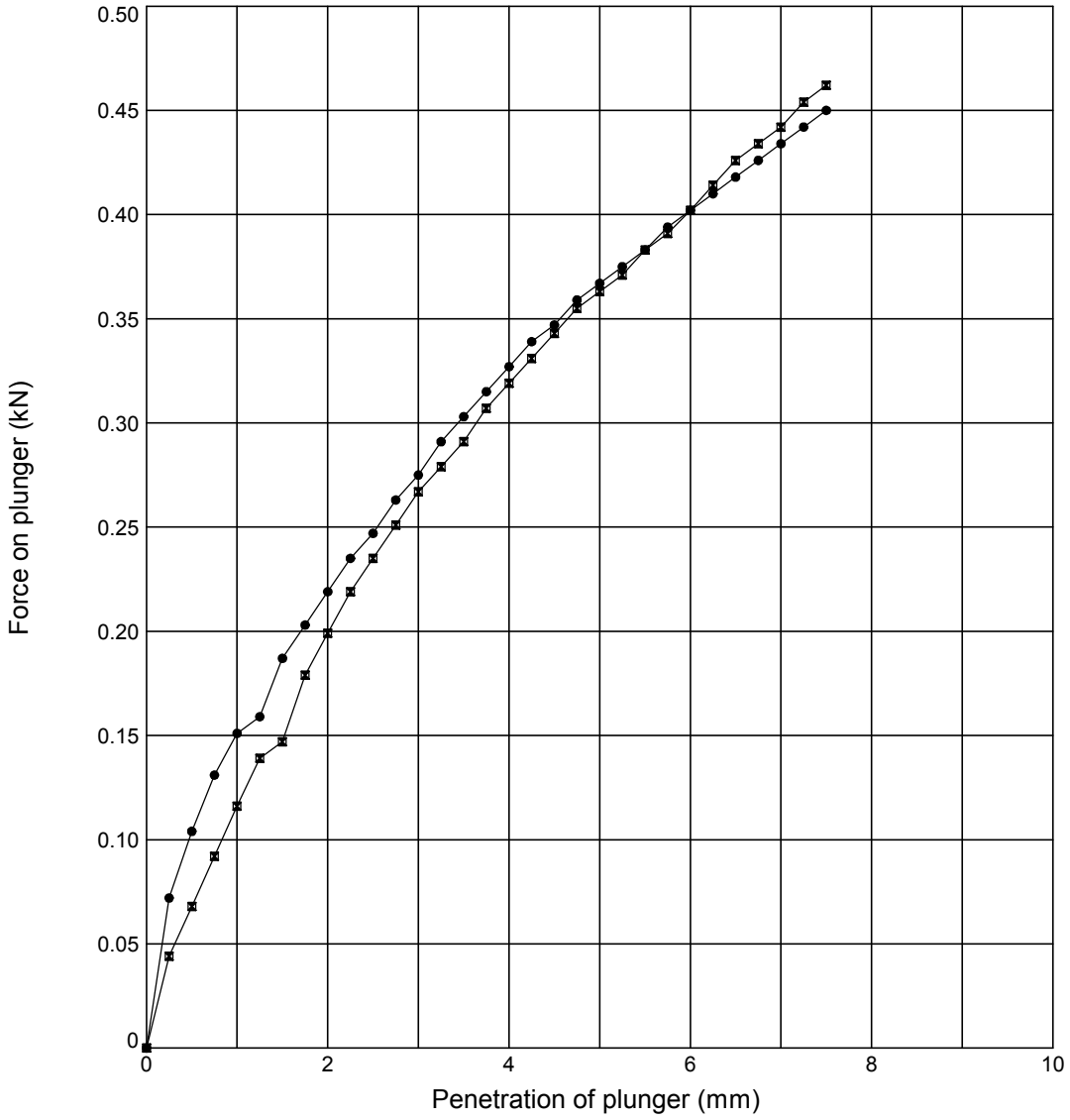
Contr [redacted] **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **1** Sample Type: **B** Depth (m): **0.30**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**17**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.12**	Surcharge (kg)	:	**4.0**	CBR value (%)	**1.9**	**1.8**
Initial Dry Density (Mg/m^3)	:	**1.81**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown very clayey very gravelly SAND	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
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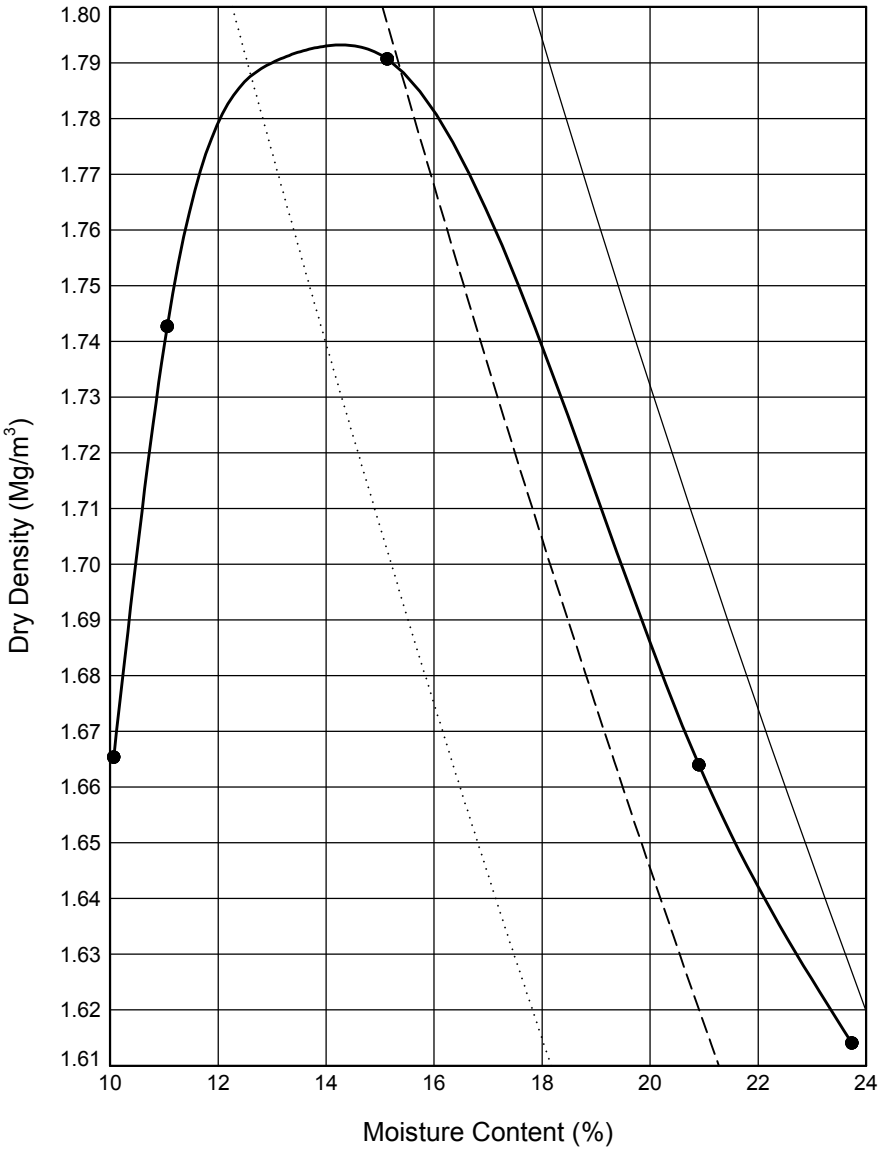
Compiled By	Date
[redacted] **MARK ATHORNE**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.79**
% Retained on 37.5mm BS Sieve	:	**3**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**14**
% Retained on 20.0mm BS Sieve	:	**3**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Dark brown/grey sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
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W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

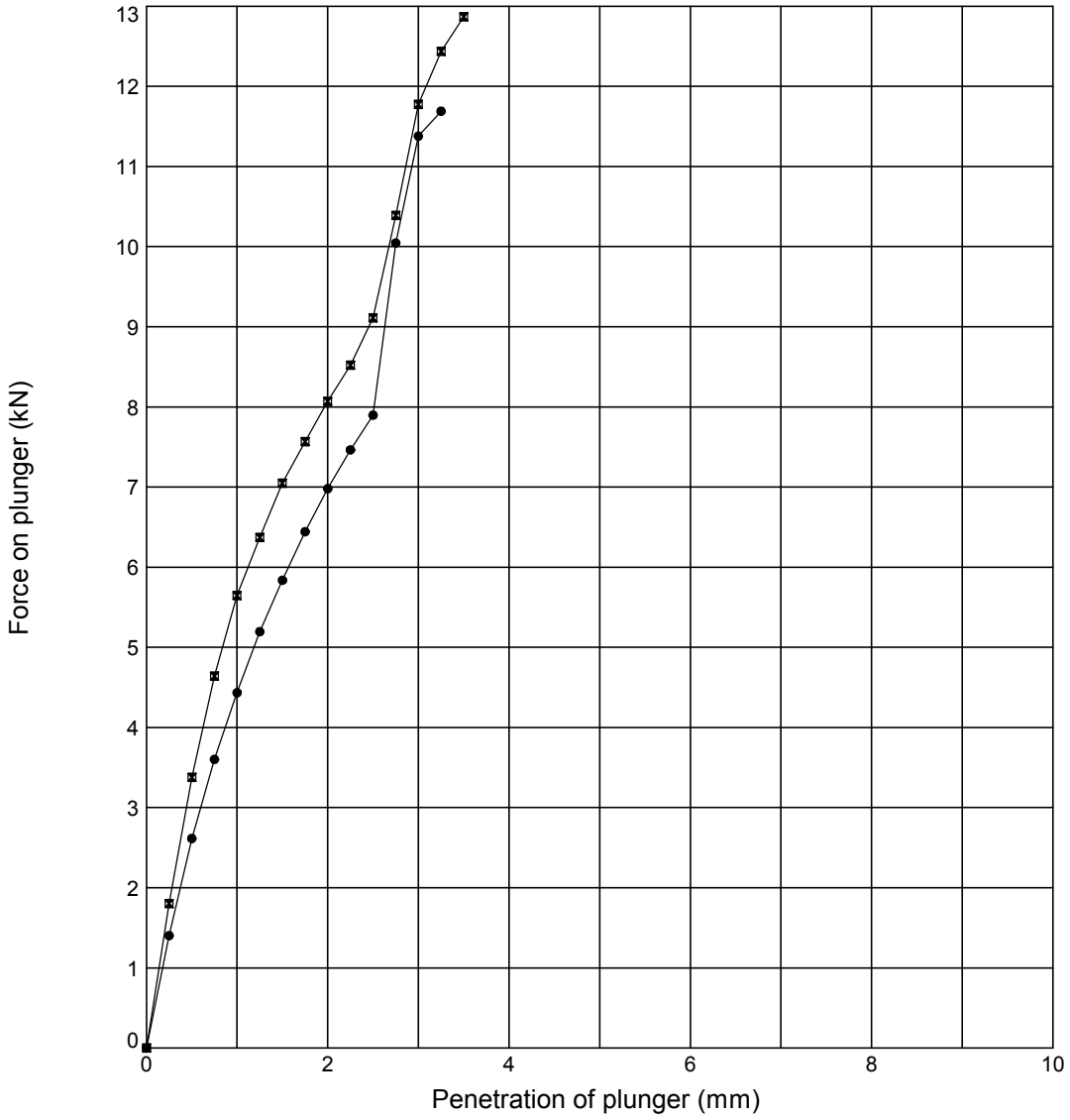
Contract Ref:

782551

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**12**
Initial Bulk Density (Mg/m^3)	:	**1.93**	Surcharge (kg)	:	**4.0**	CBR value (%)	**60**	**69**
Initial Dry Density (Mg/m^3)	:	**1.74**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown/grey sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref: **782551**

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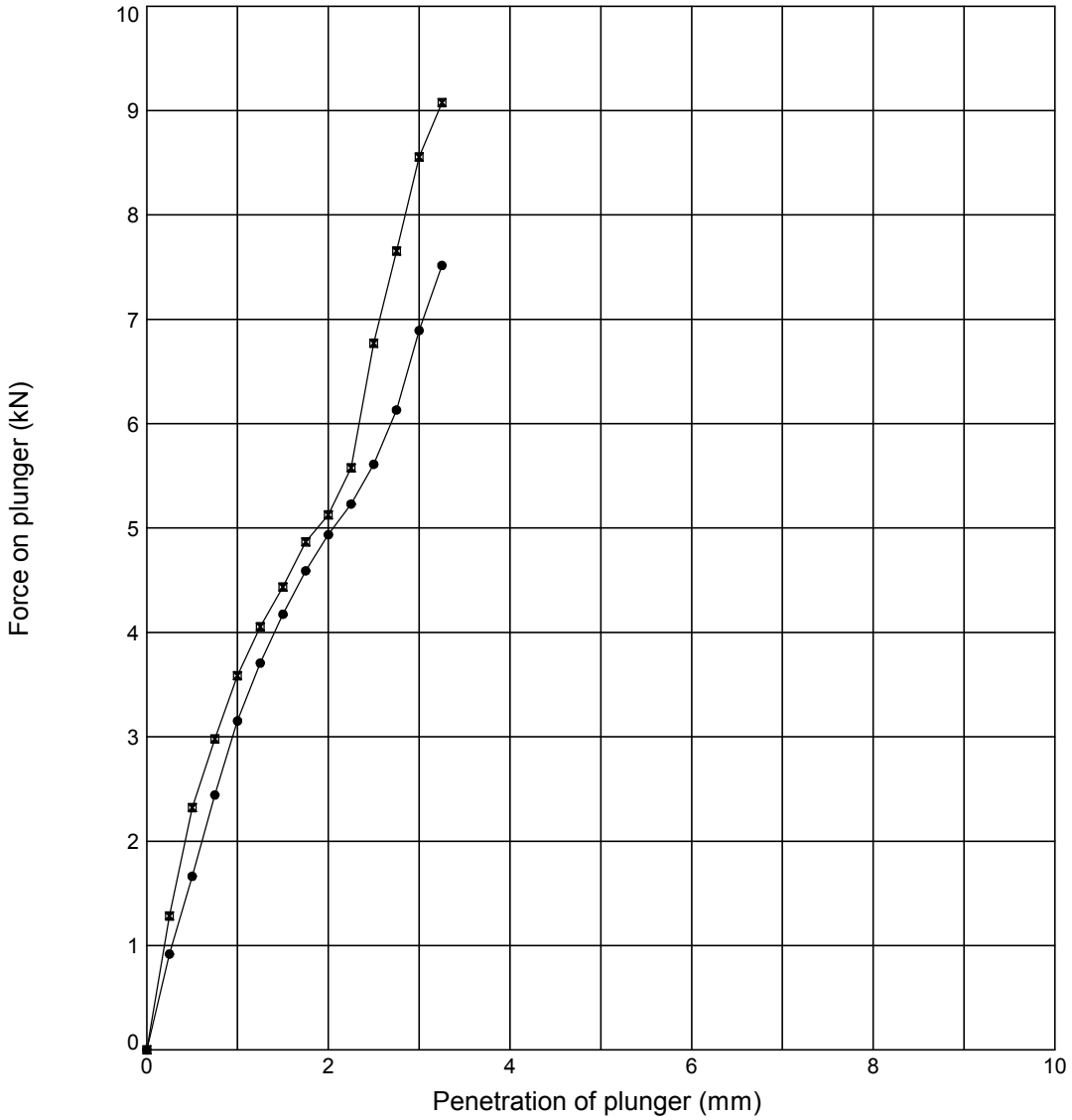
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**15**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**15**
Initial Bulk Density (Mg/m^3)	:	**2.05**	Surcharge (kg)	:	**4.0**	CBR value (%)	**42**	**51**
Initial Dry Density (Mg/m^3)	:	**1.78**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown/grey sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

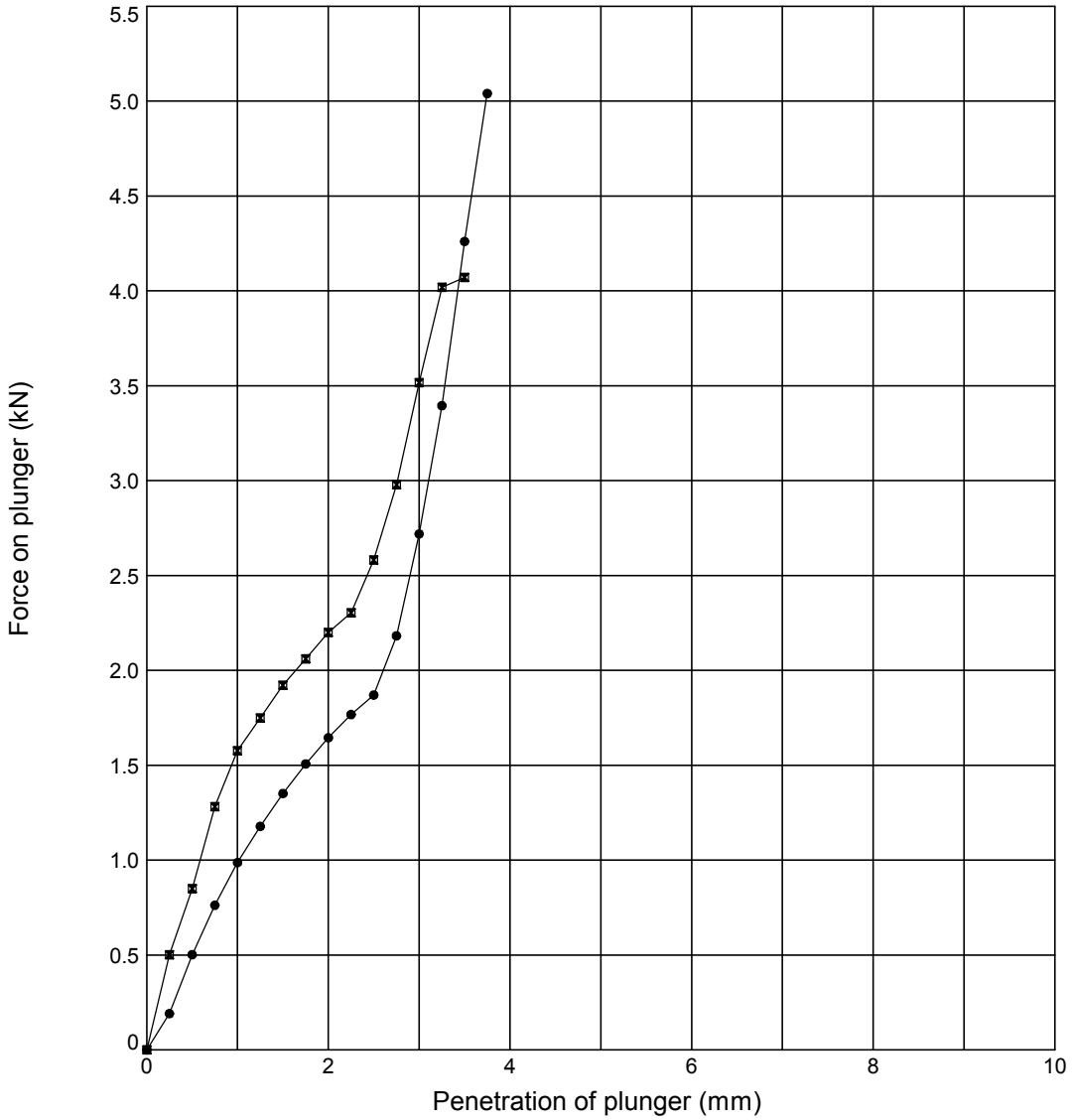
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

	Compiled By	Date
	MARK ATHORNE	**23/05/17**
C [redacted]	Contract Ref: **782551**	
Willen Road		

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**21**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**21**	**21**
Initial Bulk Density (Mg/m^3)	:	**2.00**	Surcharge (kg)	:	**4.0**	CBR value (%)	**14**	**19**
Initial Dry Density (Mg/m^3)	:	**1.65**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown/grey sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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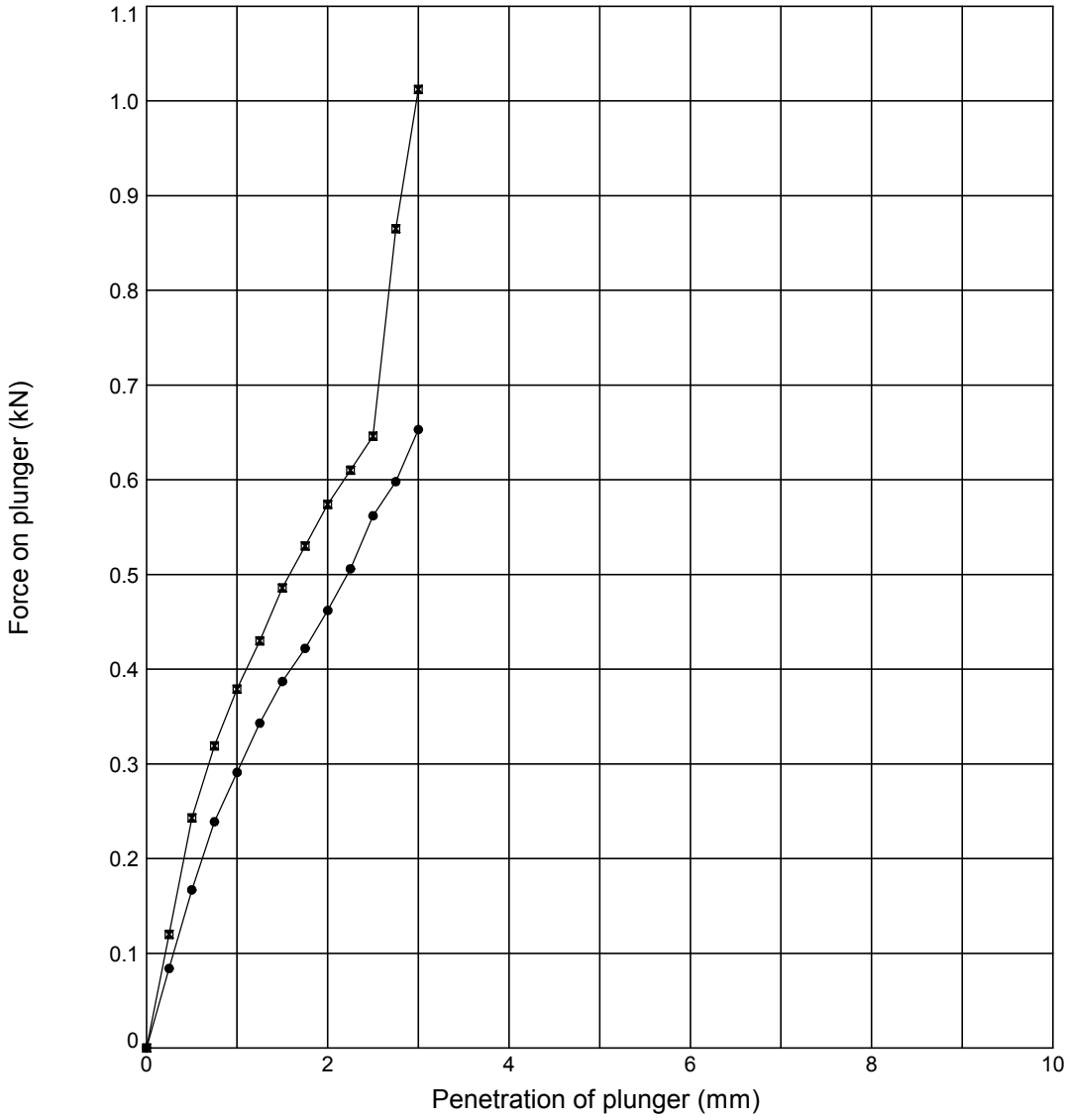
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**24**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**25**	**24**
Initial Bulk Density (Mg/m^3)	:	**1.99**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.2**	**4.9**
Initial Dry Density (Mg/m^3)	:	**1.60**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown/grey sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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Contract Ref: **782551**

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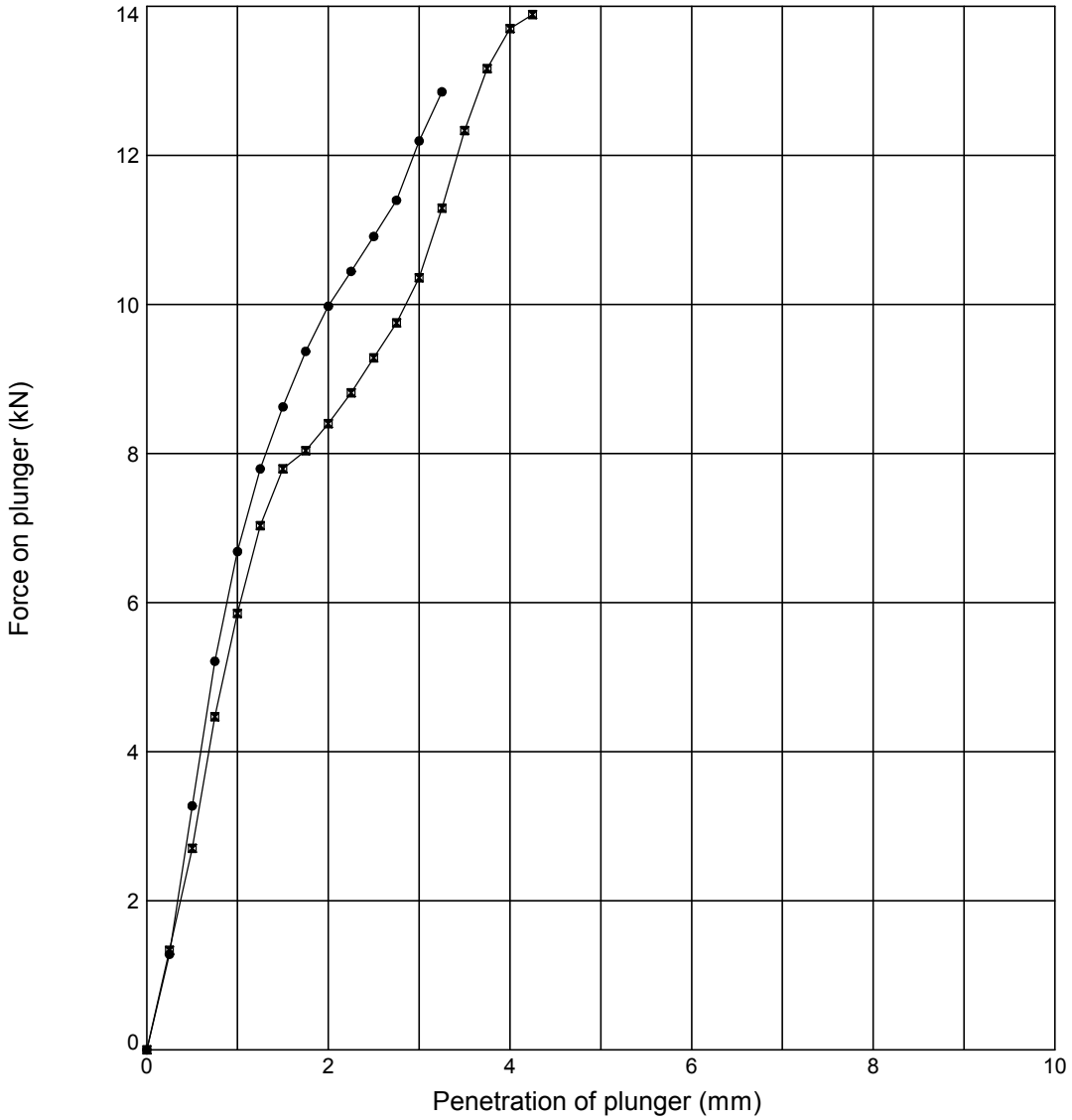
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **2** Sample Type: **B** Depth (m): **1.60**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.9**	**9.5**
Initial Bulk Density (Mg/m^3)	:	**1.82**	Surcharge (kg)	:	**4.0**	CBR value (%)	**82**	**70**
Initial Dry Density (Mg/m^3)	:	**1.66**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown/grey sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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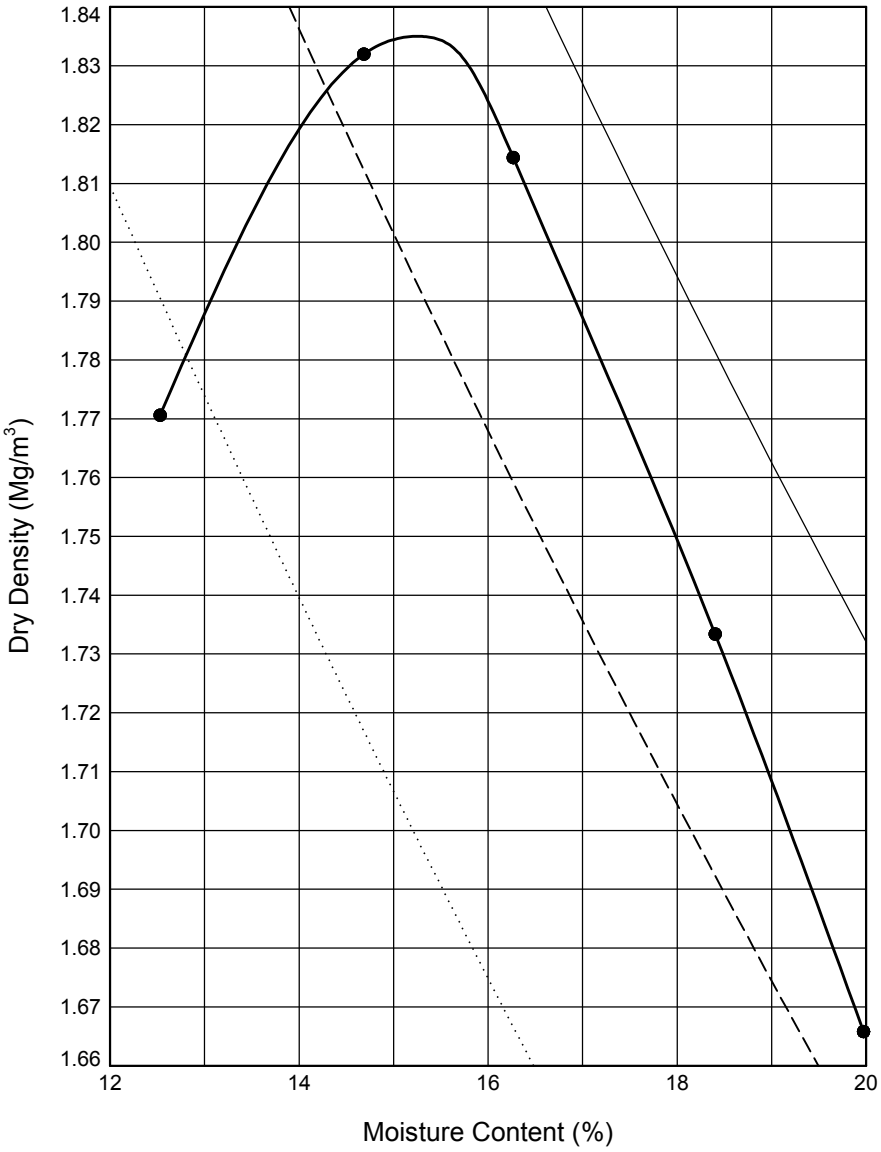
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.83**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**15**
% Retained on 20.0mm BS Sieve	:	**3**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Light brown slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

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Contract Ref: **782551**

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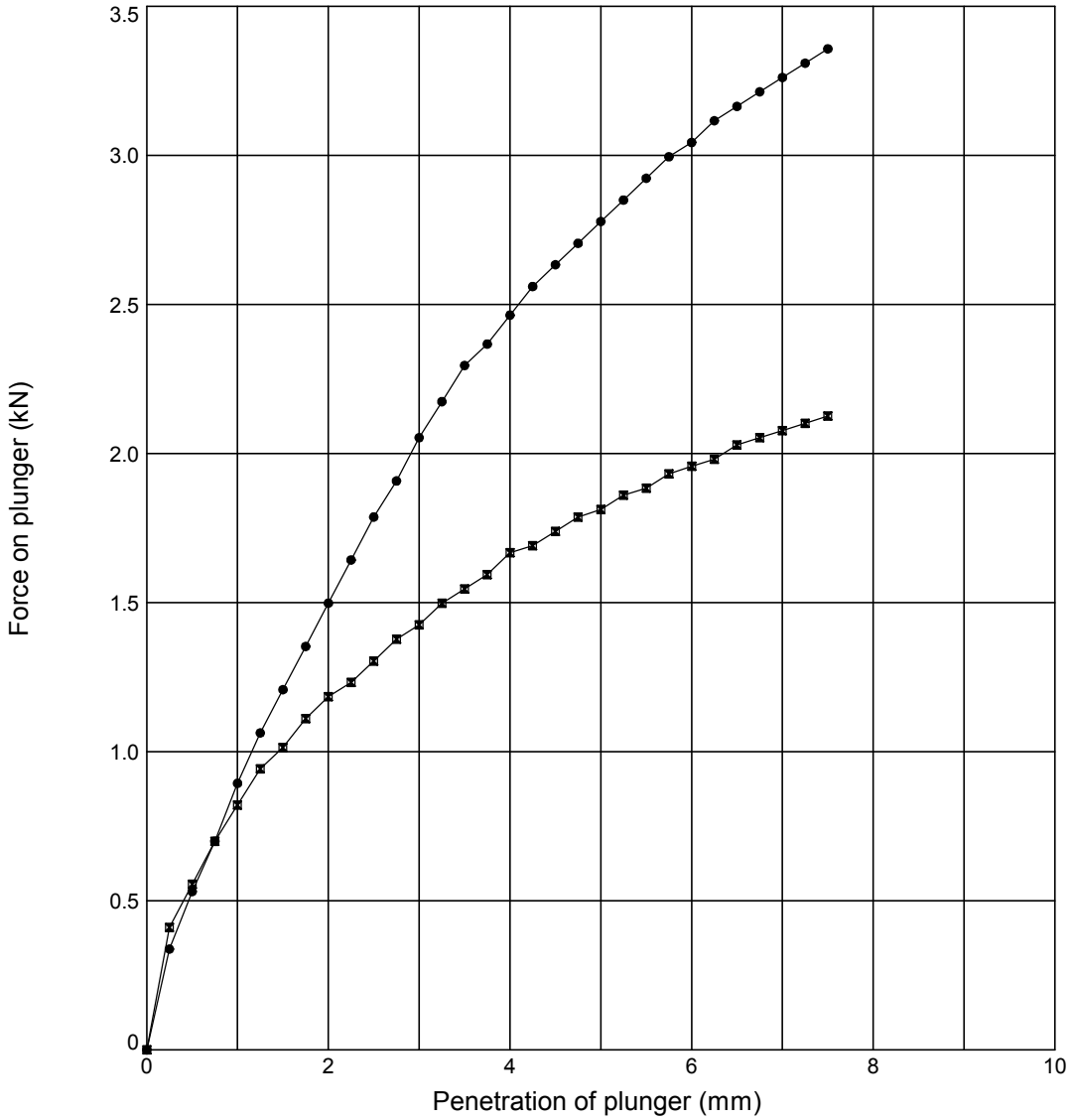
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**18**	**20**
Initial Bulk Density (Mg/m^3)	:	**1.98**	Surcharge (kg)	:	**4.0**	CBR value (%)	**14**	**9.9**
Initial Dry Density (Mg/m^3)	:	**1.76**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
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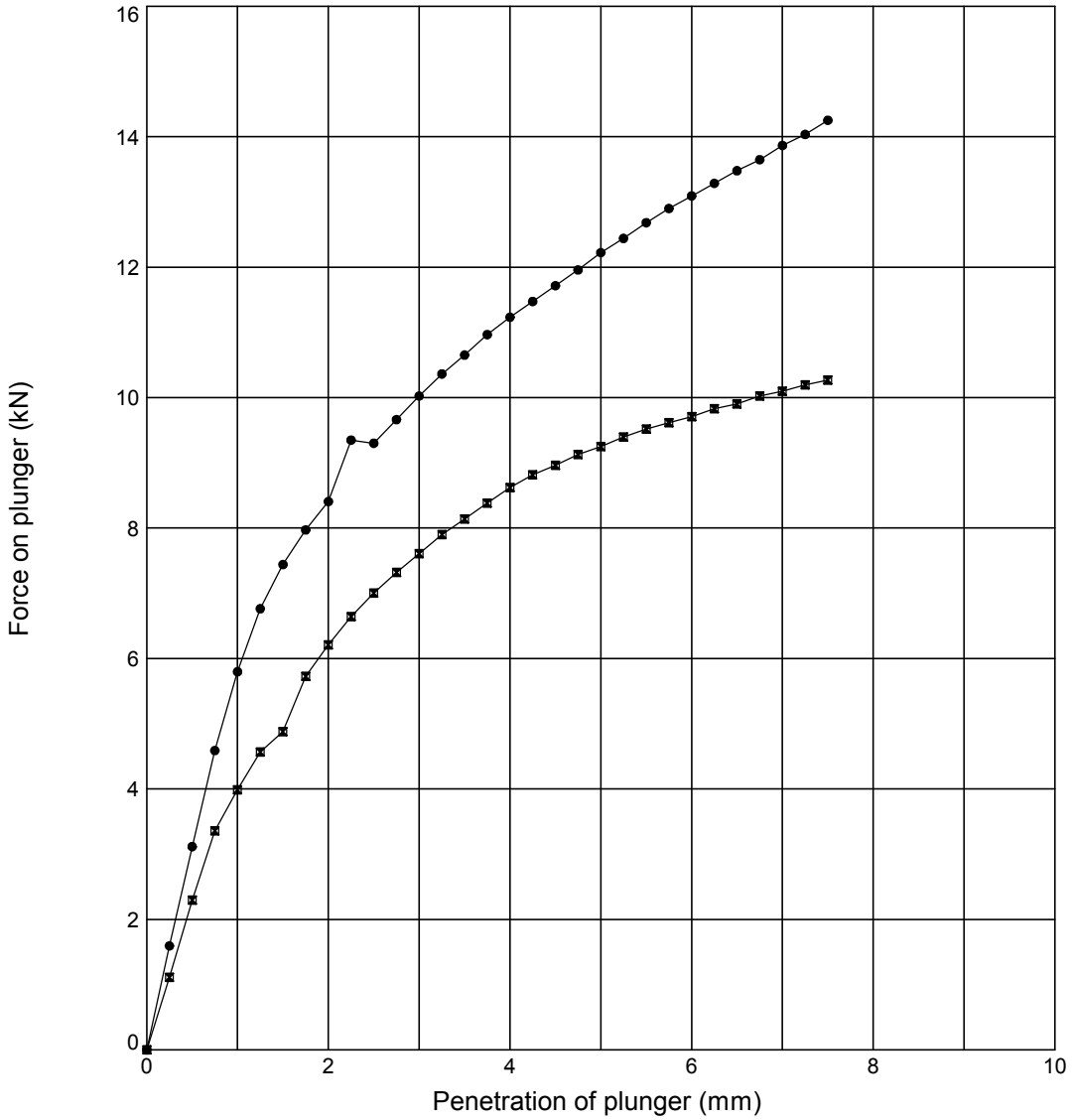
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**20**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**14**
Initial Bulk Density (Mg/m^3)	:	**1.99**	Surcharge (kg)	:	**4.0**	CBR value (%)	**70**	**53**
Initial Dry Density (Mg/m^3)	:	**1.66**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
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Willen Road

Contract Ref: **782551**

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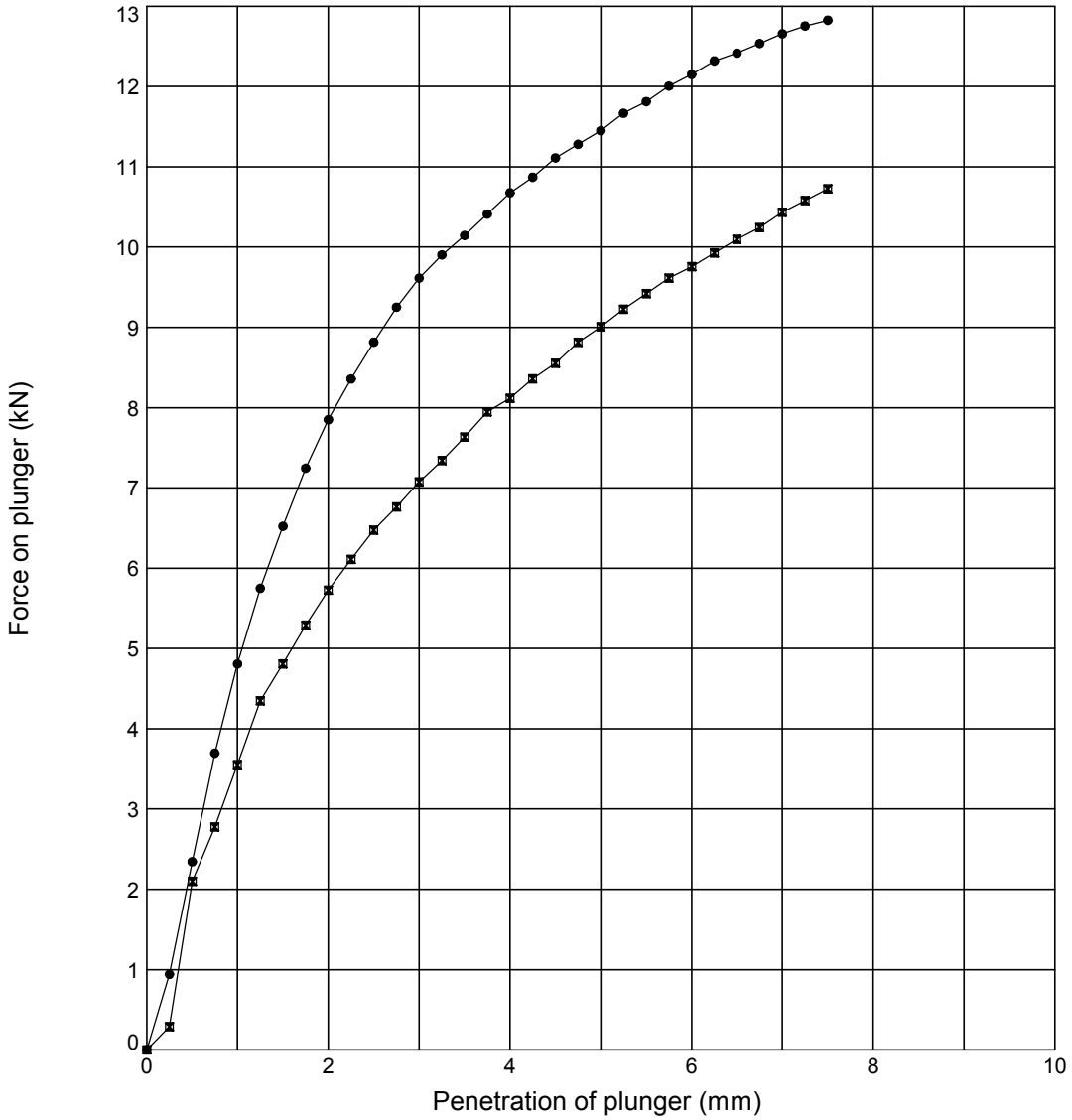
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**18**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.04**	Surcharge (kg)	:	**4.0**	CBR value (%)	**67**	**49**
Initial Dry Density (Mg/m^3)	:	**1.73**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

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Pottery Street
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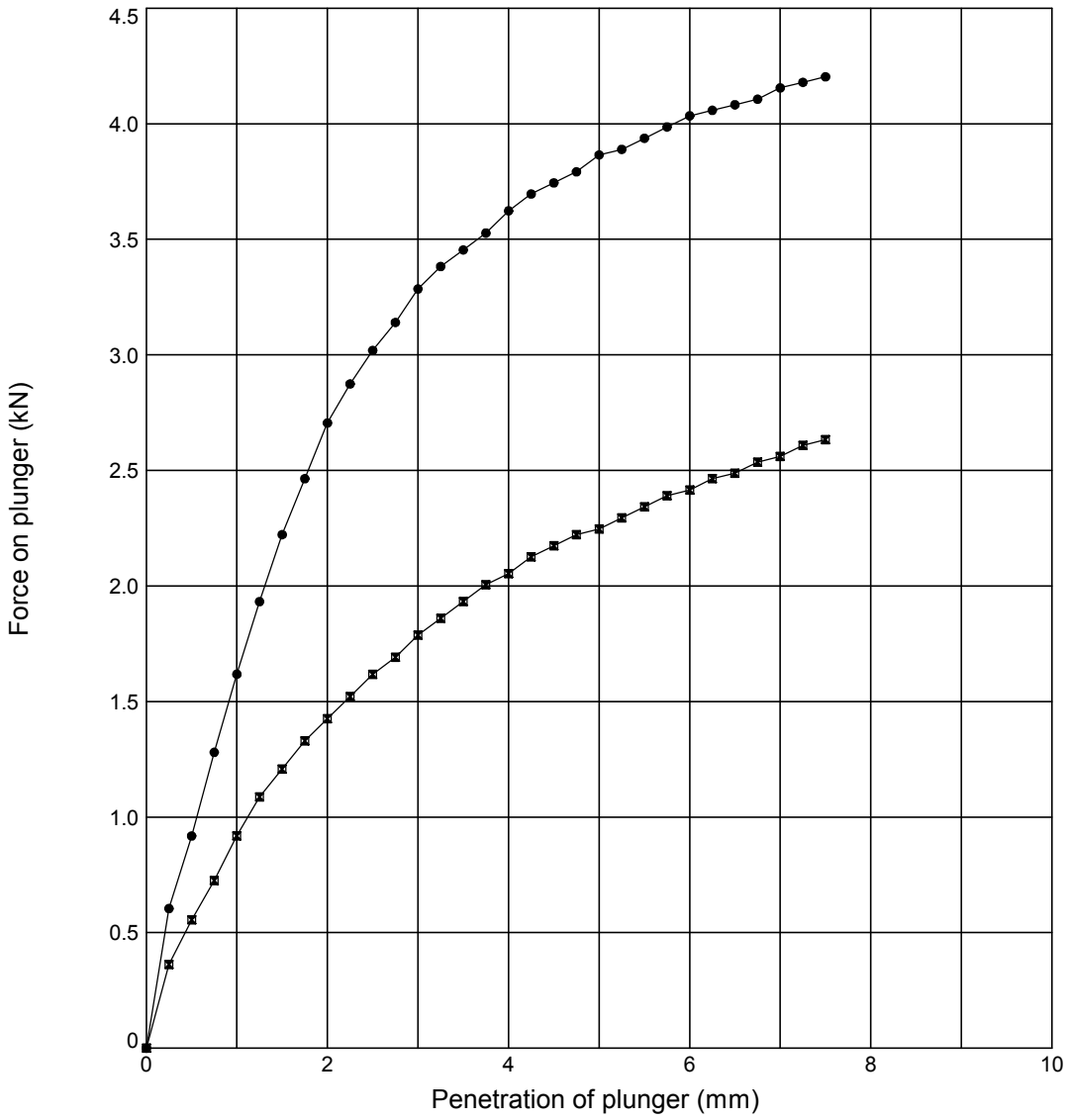
Cont **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**16**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**18**	**19**
Initial Bulk Density (Mg/m^3)	:	**2.10**	Surcharge (kg)	:	**4.0**	CBR value (%)	**23**	**12**
Initial Dry Density (Mg/m^3)	:	**1.81**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

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MARK ATHORNE	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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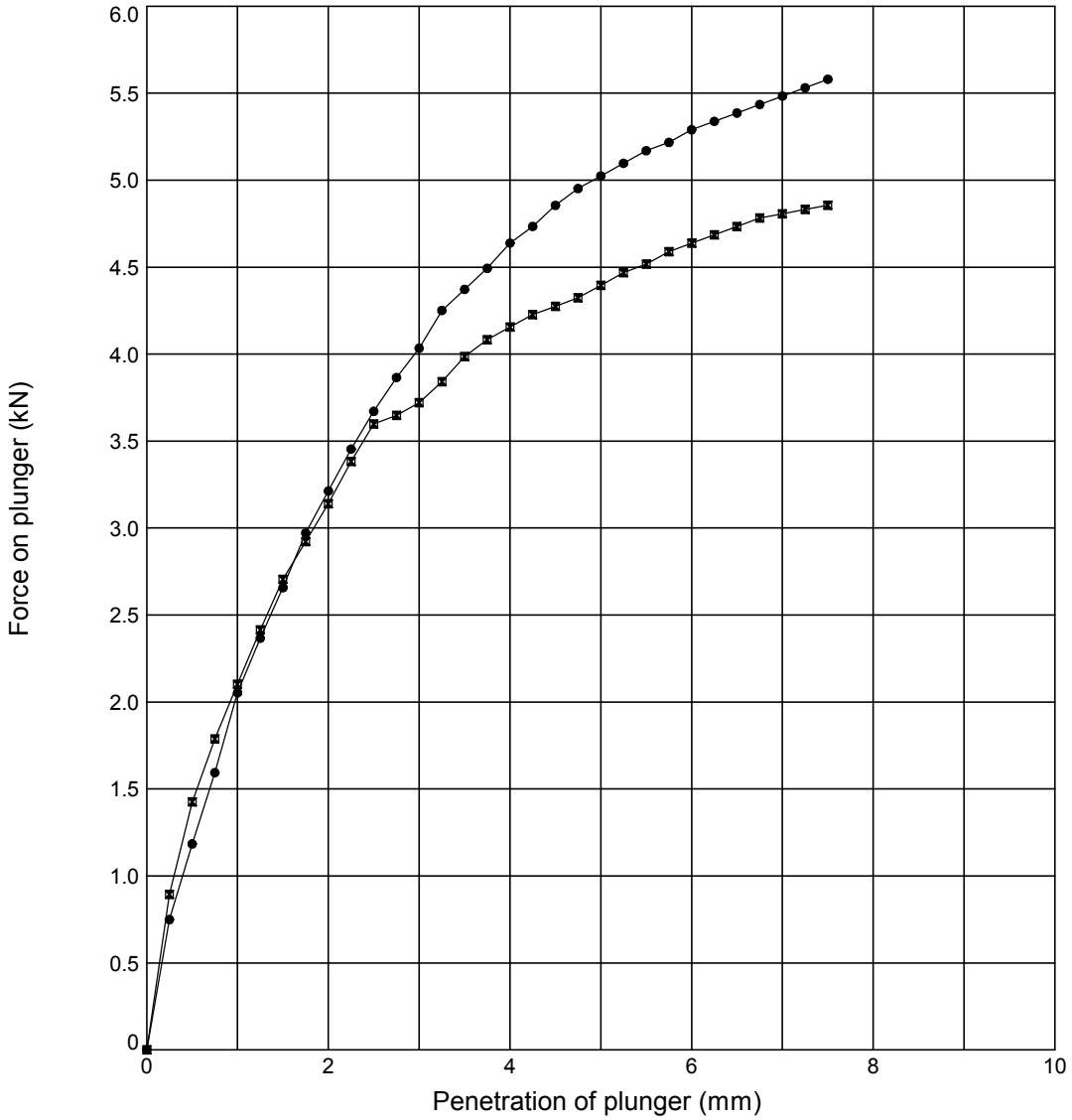
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP119** Sample Ref: **3** Sample Type: **B** Depth (m): **2.80**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**15**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**17**
Initial Bulk Density (Mg/m^3)	:	**1.98**	Surcharge (kg)	:	**4.0**	CBR value (%)	**28**	**27**
Initial Dry Density (Mg/m^3)	:	**1.72**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

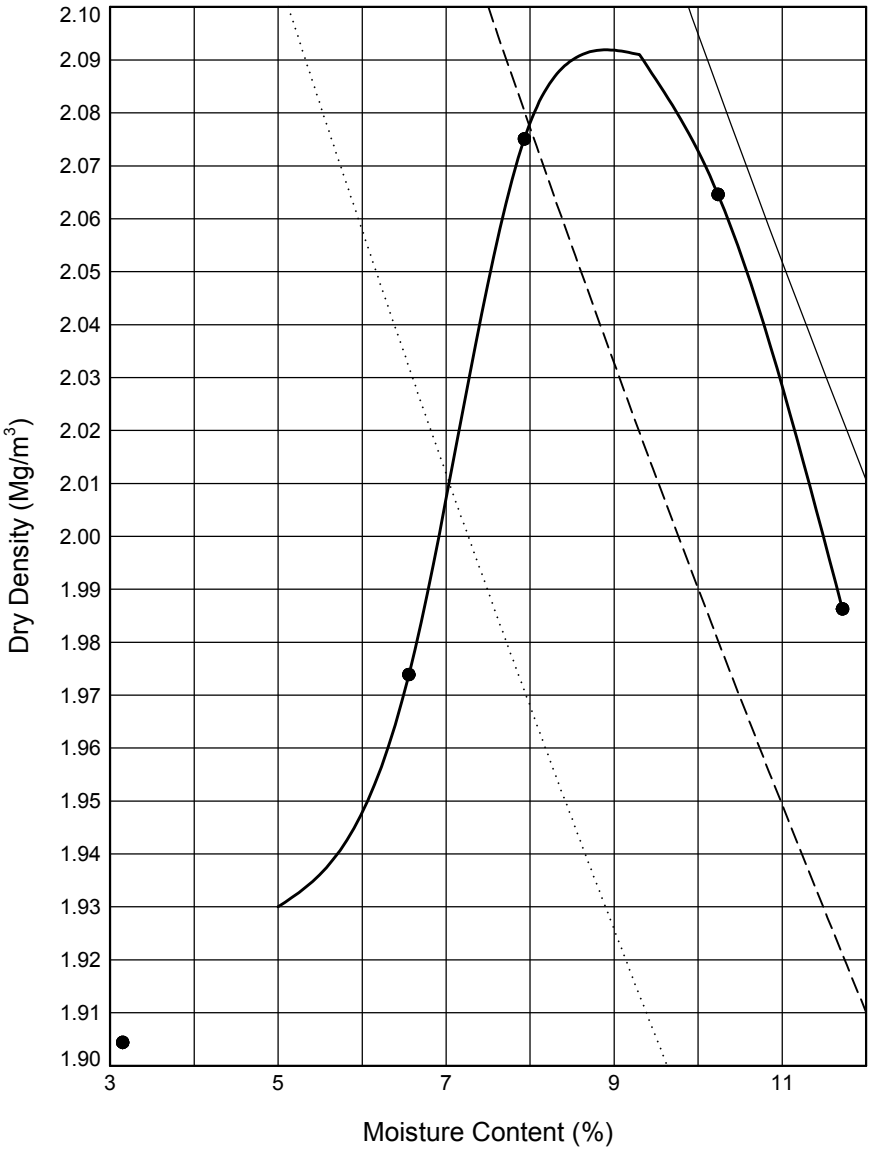
Compiled By	Date
[redacted]	**MARK ATHORNE** **23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**3.1**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.09**
% Retained on 37.5mm BS Sieve	:	**1**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**9**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
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W. Yorkshire WF10 1NJ

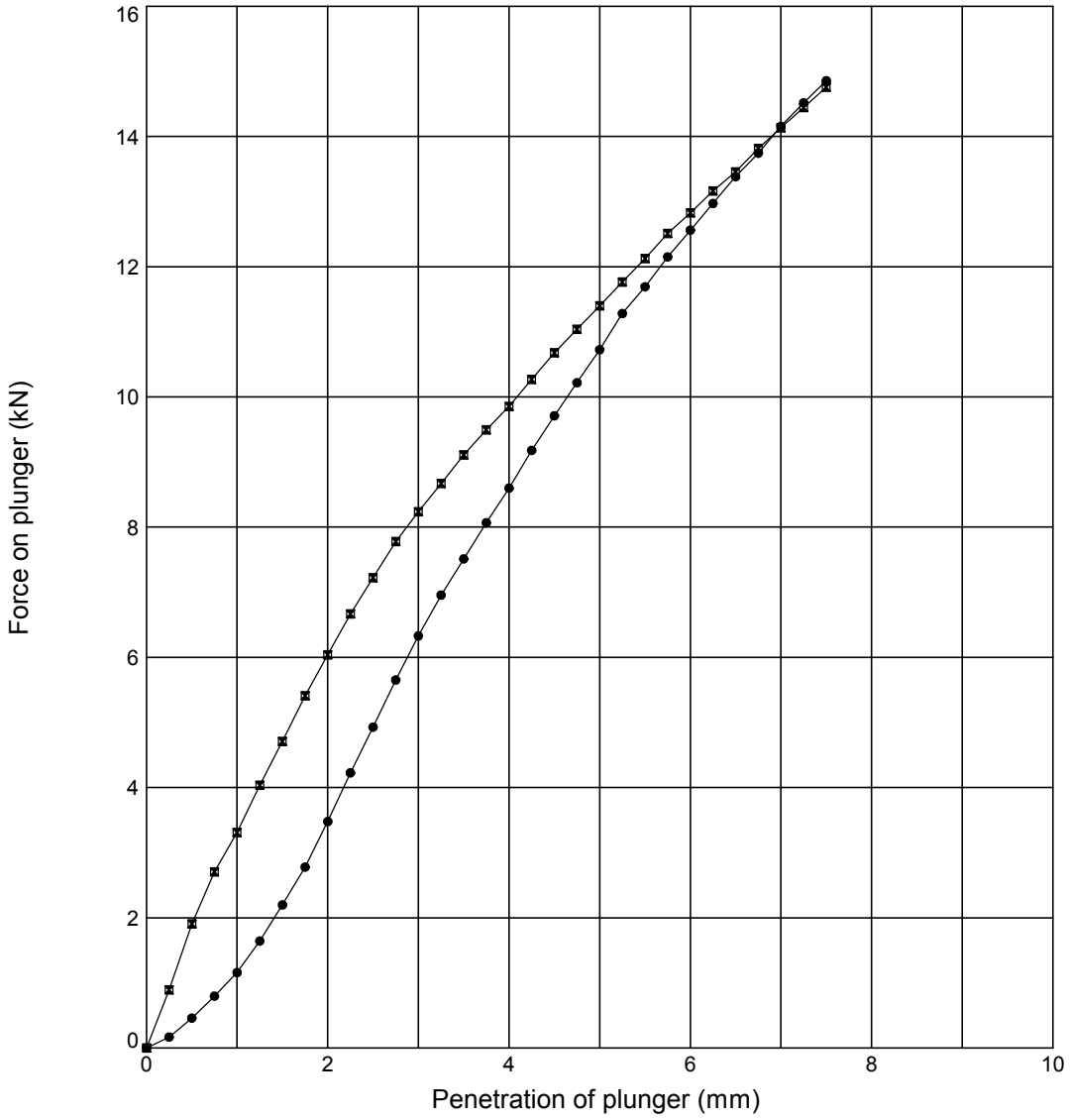
Compiled By	Date
[redacted]	**MARK ATHORNE** **23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**3.1**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**3.0**	**2.5**
Initial Bulk Density (Mg/m^3)	:	**1.96**	Surcharge (kg)	:	**4.0**	CBR value (%)	**54**	**57**
Initial Dry Density (Mg/m^3)	:	**1.90**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
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Contract: **Willen Road**

Contract Ref: **782551**

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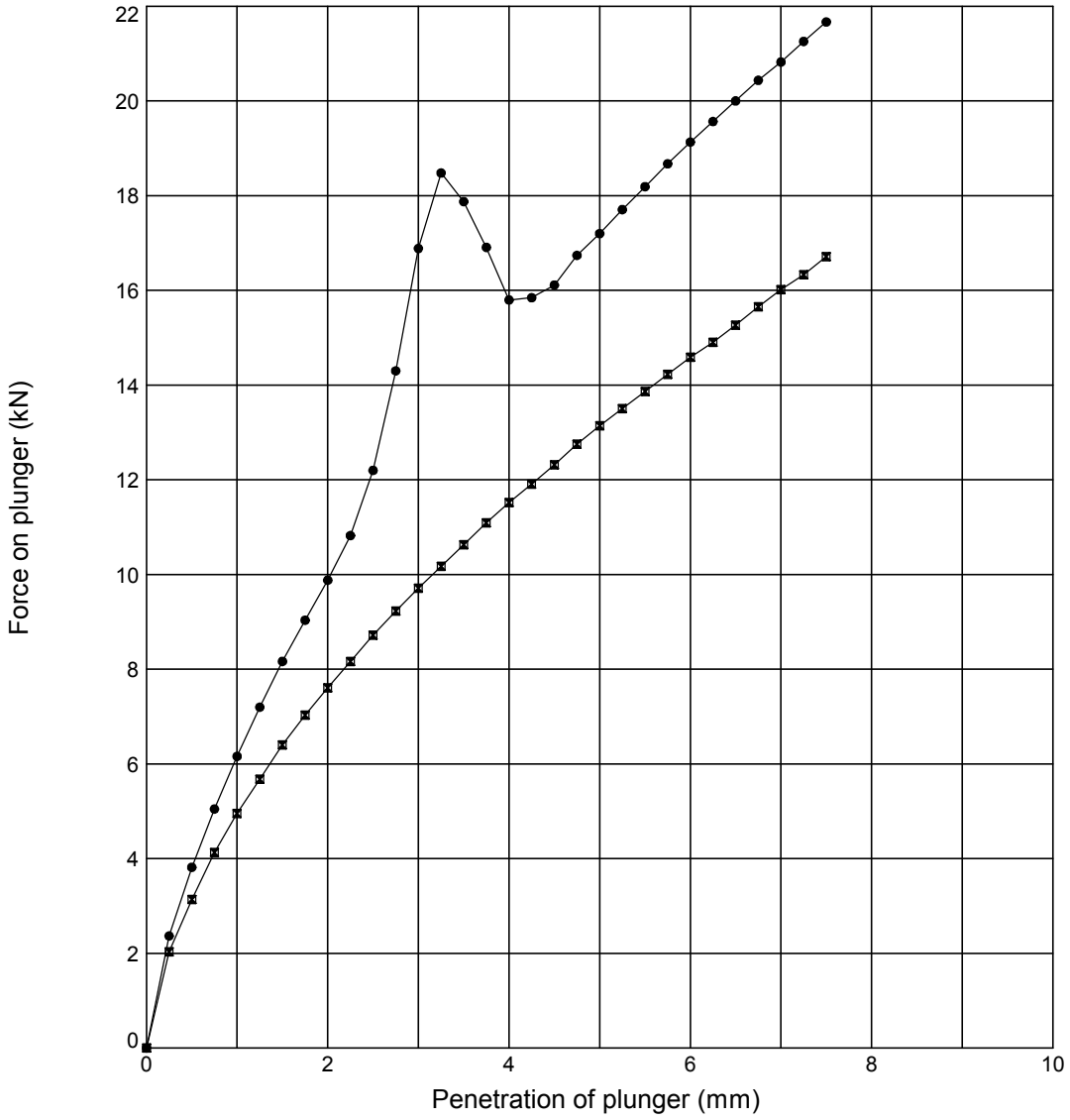
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**6.6**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.6**	**6.8**
Initial Bulk Density (Mg/m^3)	:	**2.09**	Surcharge (kg)	:	**4.0**	CBR value (%)	**92**	**66**
Initial Dry Density (Mg/m^3)	:	**1.96**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

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Contract **Willen Road**

Contract Ref: **782551**

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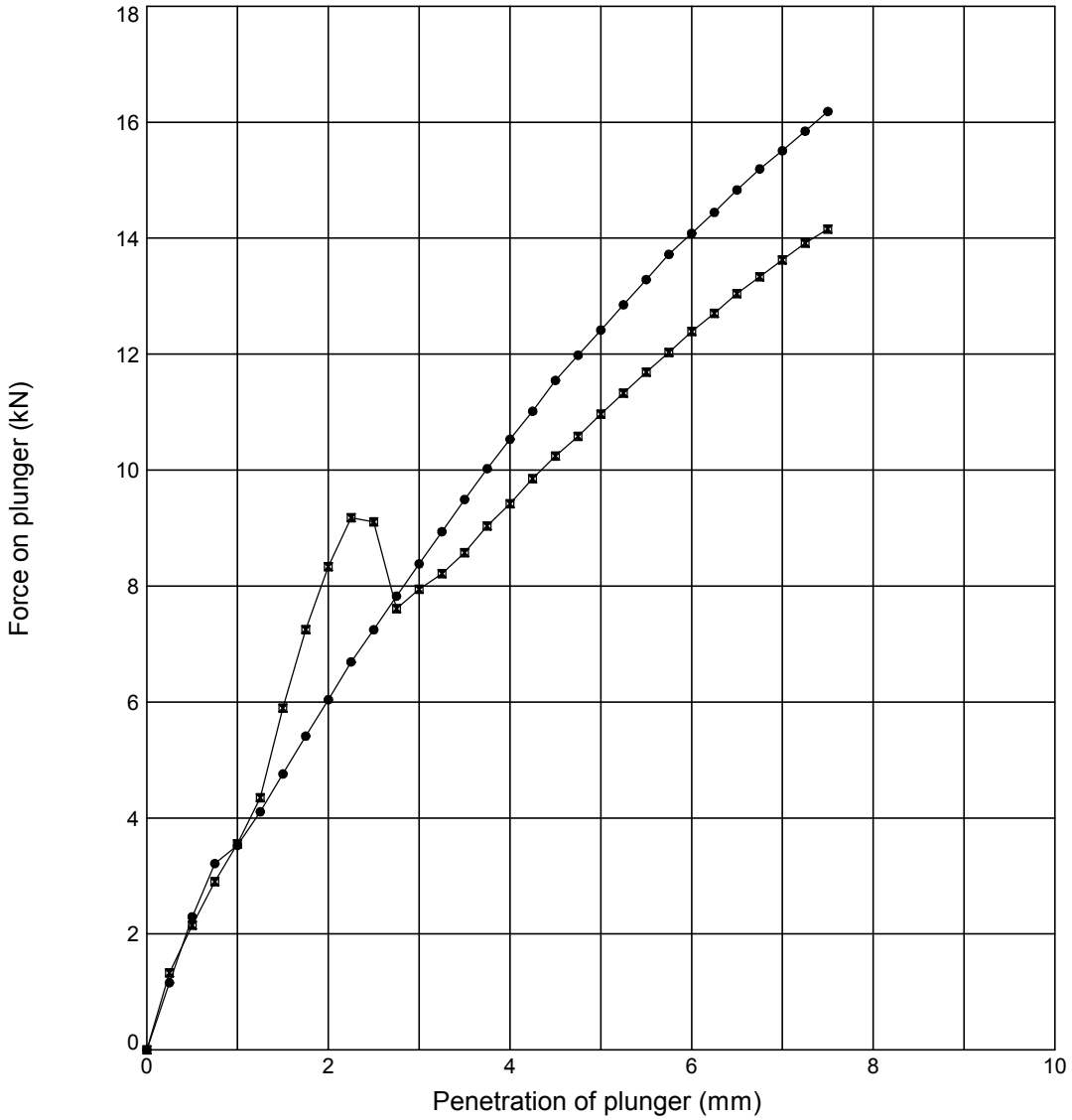
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**69**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**8.1**	**43**
Initial Bulk Density (Mg/m^3)	:	**2.23**	Surcharge (kg)	:	**4.0**	CBR value (%)	**62**	**69**
Initial Dry Density (Mg/m^3)	:	**1.32**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
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Contract Ref:

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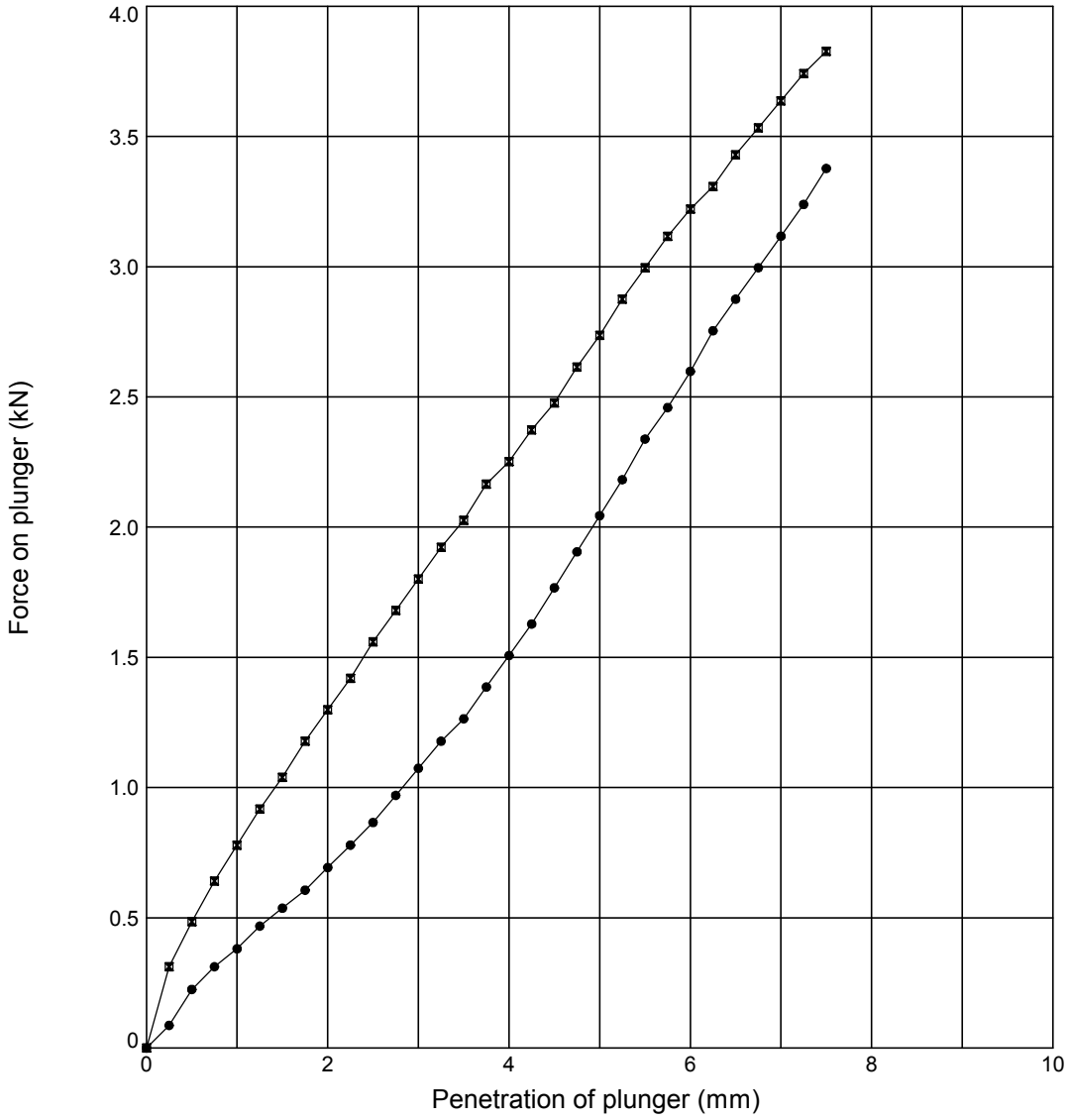
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**9.7**
Initial Bulk Density (Mg/m^3)	:	**2.27**	Surcharge (kg)	:	**4.0**	CBR value (%)	**10**	**14**
Initial Dry Density (Mg/m^3)	:	**2.06**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
MARK ATHORNE	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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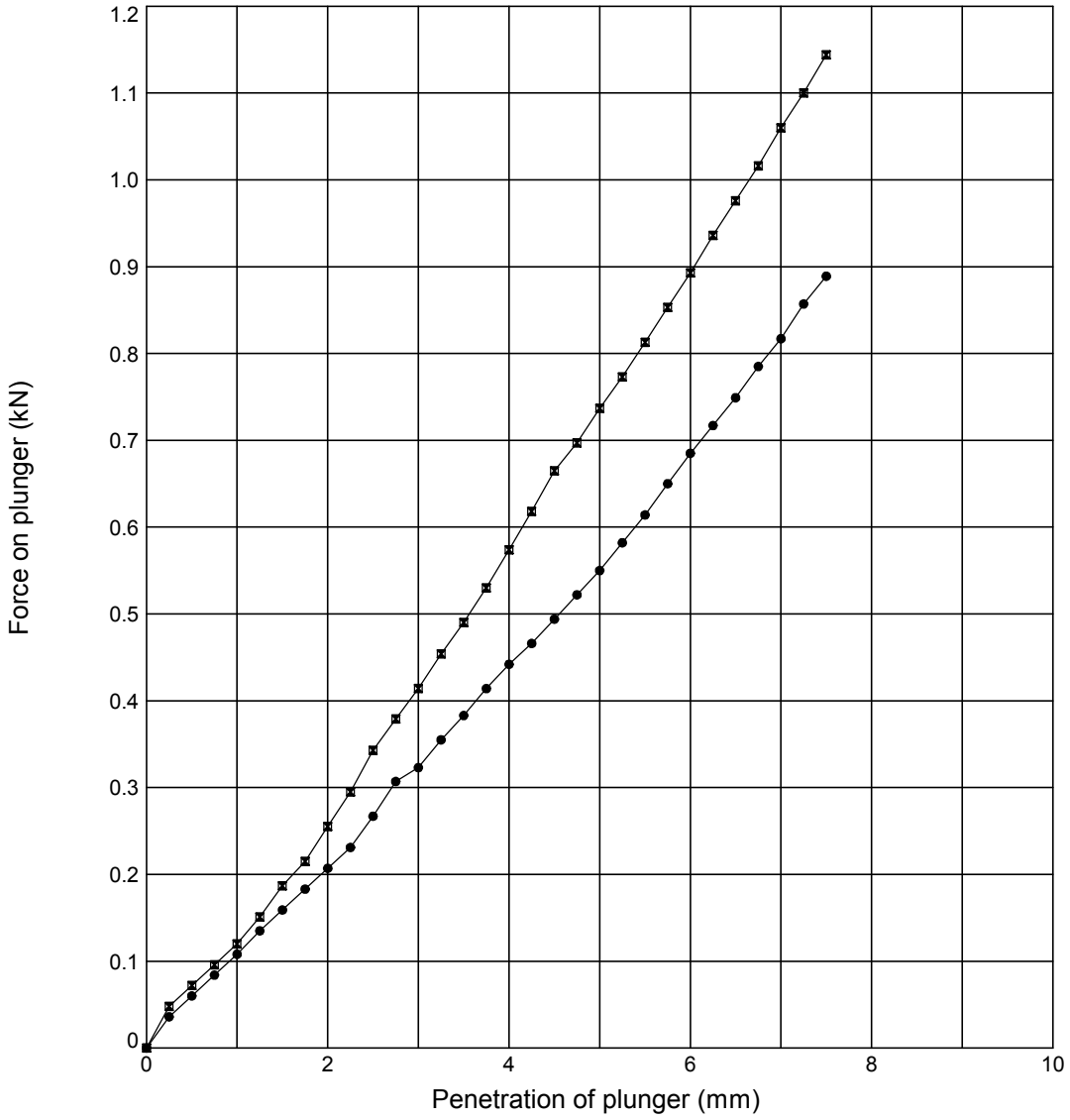
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**2.8**	**3.7**
Initial Dry Density (Mg/m^3)	:	**1.97**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**3**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
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MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

782551

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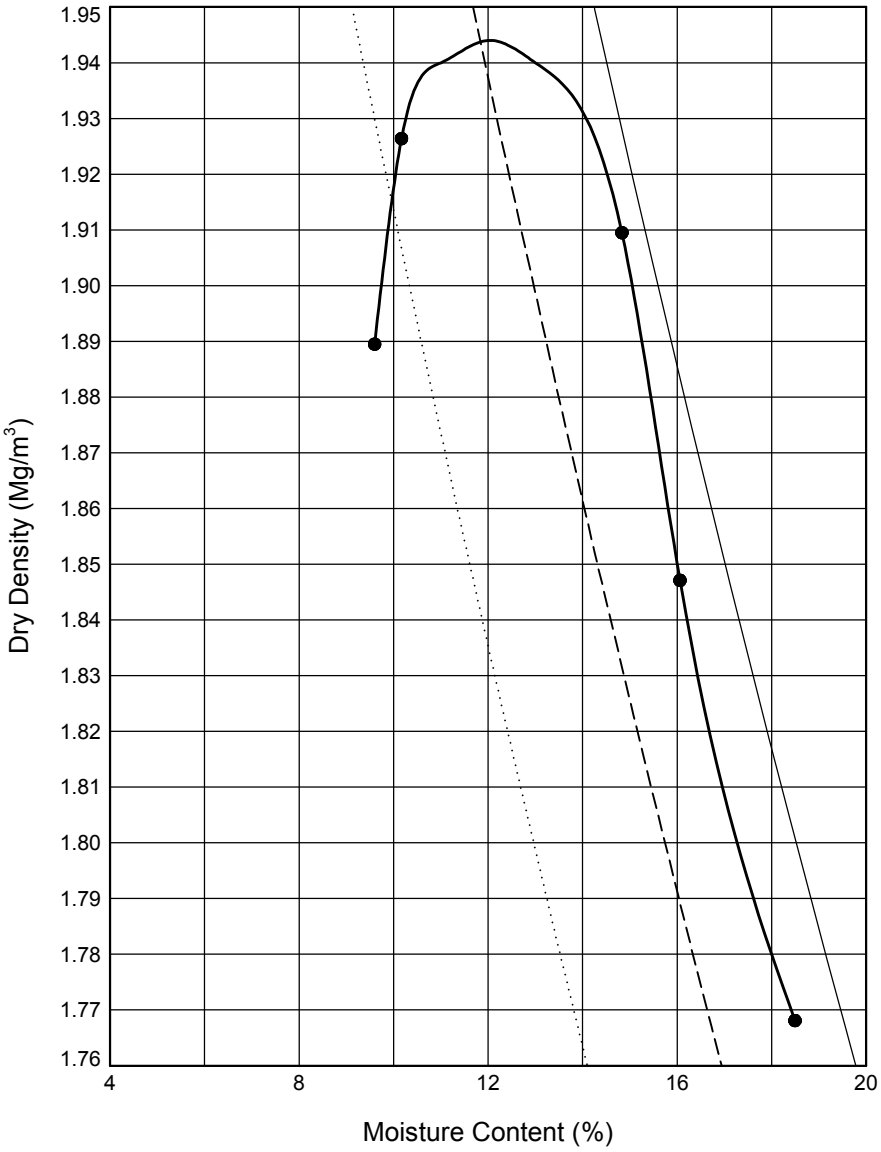
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details		Test Results		
Initial Moisture Content (%)	:	**18**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	:	**1.94**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	:	**13**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.70**			Remarks:		
Size of Soil Pieces	:	**<20**	Separate samples were used.				

Sample Description	Key to Air Voids Lines		
Light brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

Con [redacted]

Willen Road

Contract Ref:

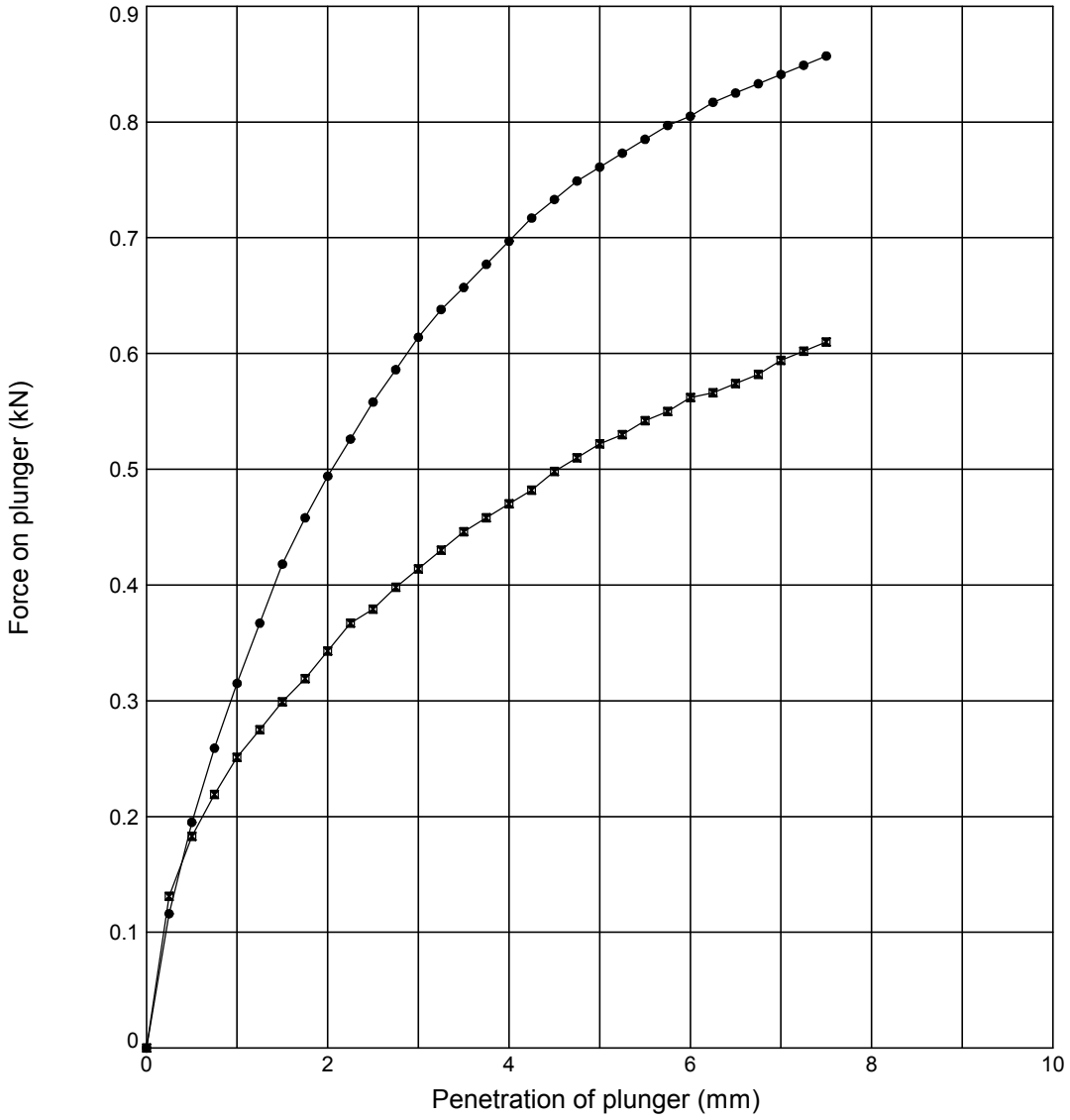
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**18**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**41**	**17**
Initial Bulk Density (Mg/m^3)	:	**2.09**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.2**	**2.9**
Initial Dry Density (Mg/m^3)	:	**1.77**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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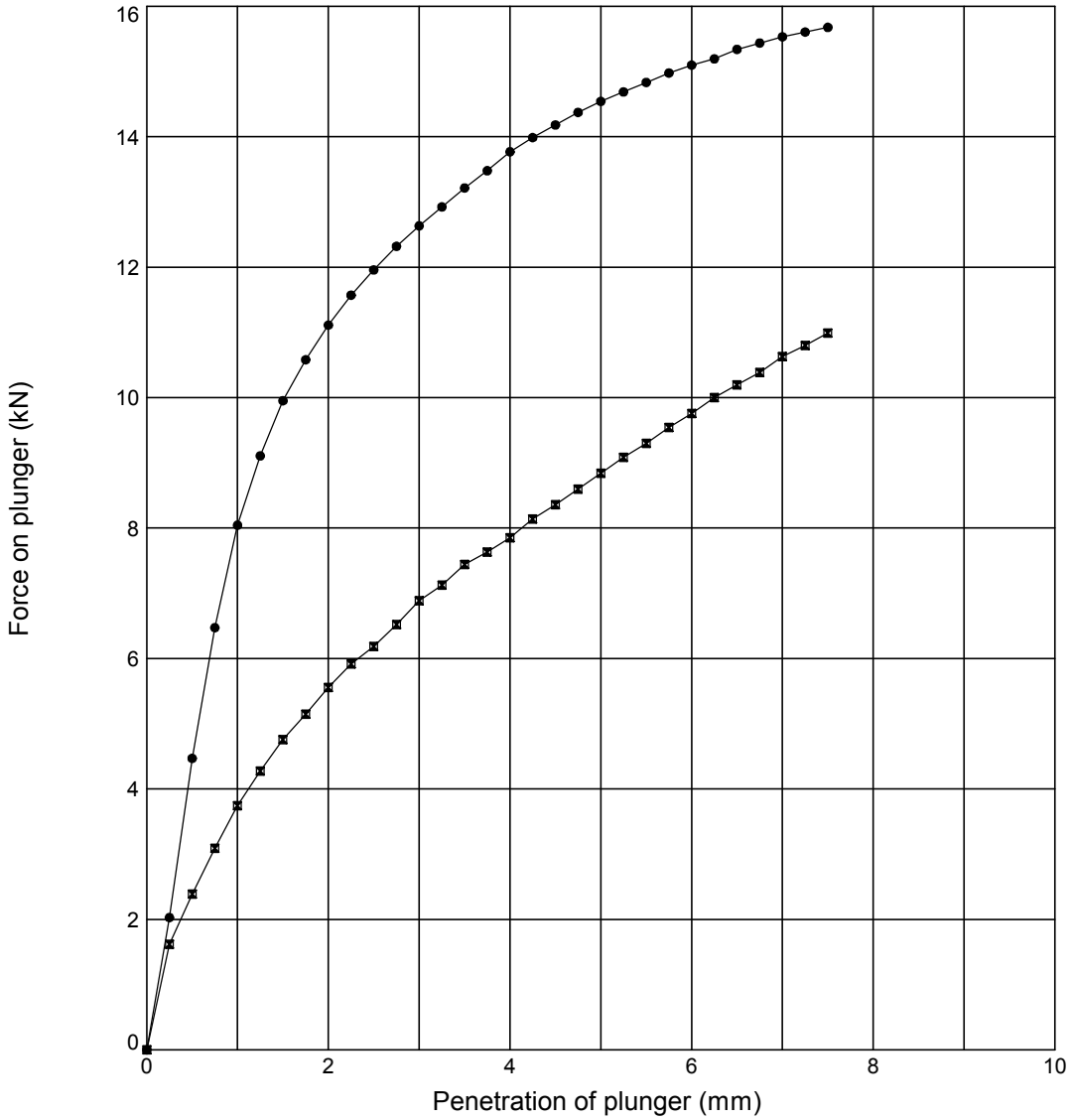
Willen Road	**782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.6**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.4**	**9.1**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**90**	**47**
Initial Dry Density (Mg/m^3)	:	**1.88**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
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Willen Road

Contract Ref: **782551**

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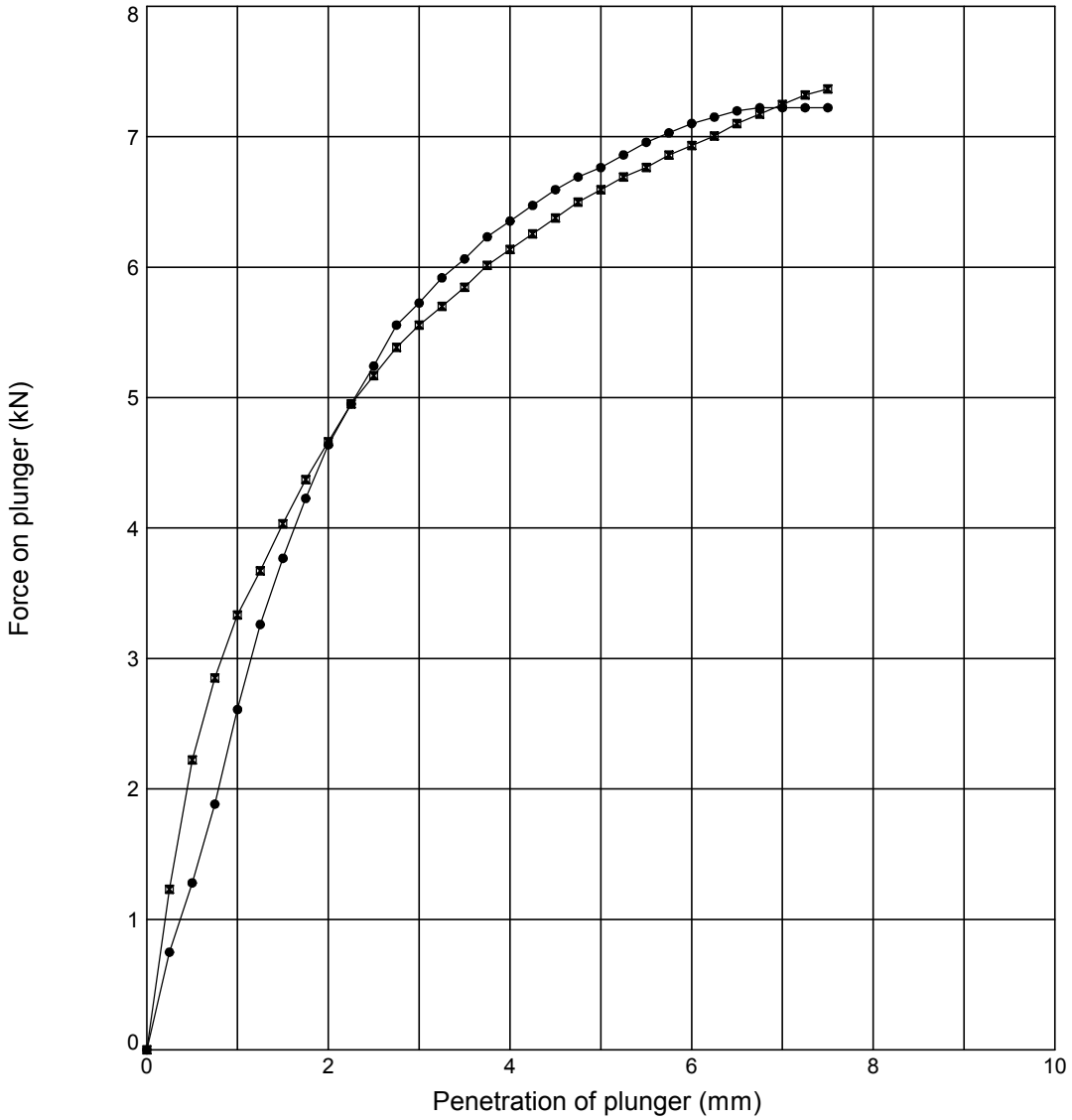
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**11**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.11**	Surcharge (kg)	:	**4.0**	CBR value (%)	**40**	**39**
Initial Dry Density (Mg/m^3)	:	**1.92**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Contract Ref: **782551**

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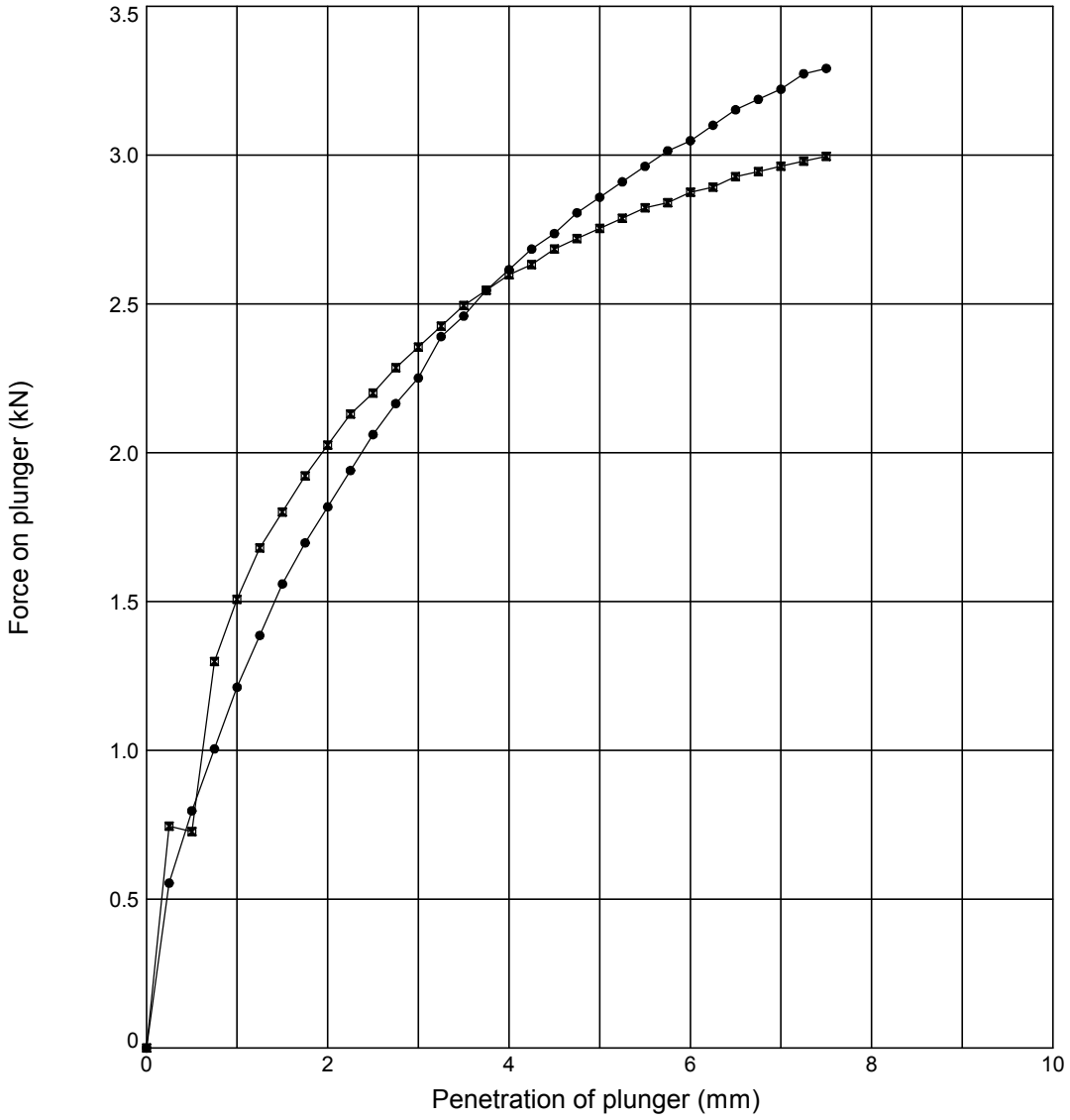
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**15**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**15**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.18**	Surcharge (kg)	:	**4.0**	CBR value (%)	**16**	**17**
Initial Dry Density (Mg/m^3)	:	**1.90**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
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Compiled By: [redacted] **MARK ATHORNE** Date: **23/05/17**

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Contract Ref: **782551**

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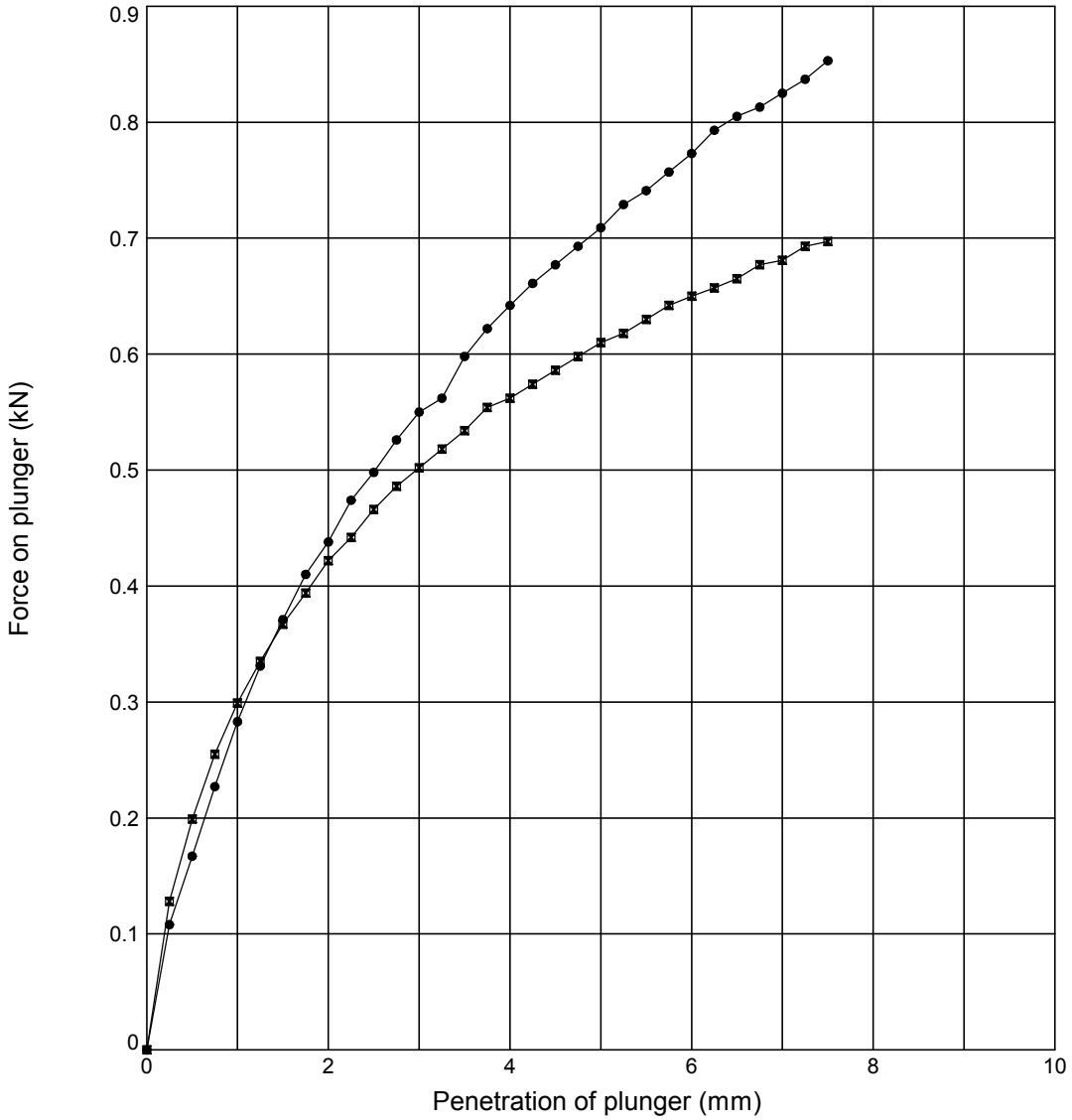
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP127** Sample Ref: **2** Sample Type: **B** Depth (m): **1.50**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**16**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**16**	**17**
Initial Bulk Density (Mg/m^3)	:	**2.13**	Surcharge (kg)	:	**4.0**	CBR value (%)	**3.8**	**3.5**
Initial Dry Density (Mg/m^3)	:	**1.84**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

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Contract Ref:

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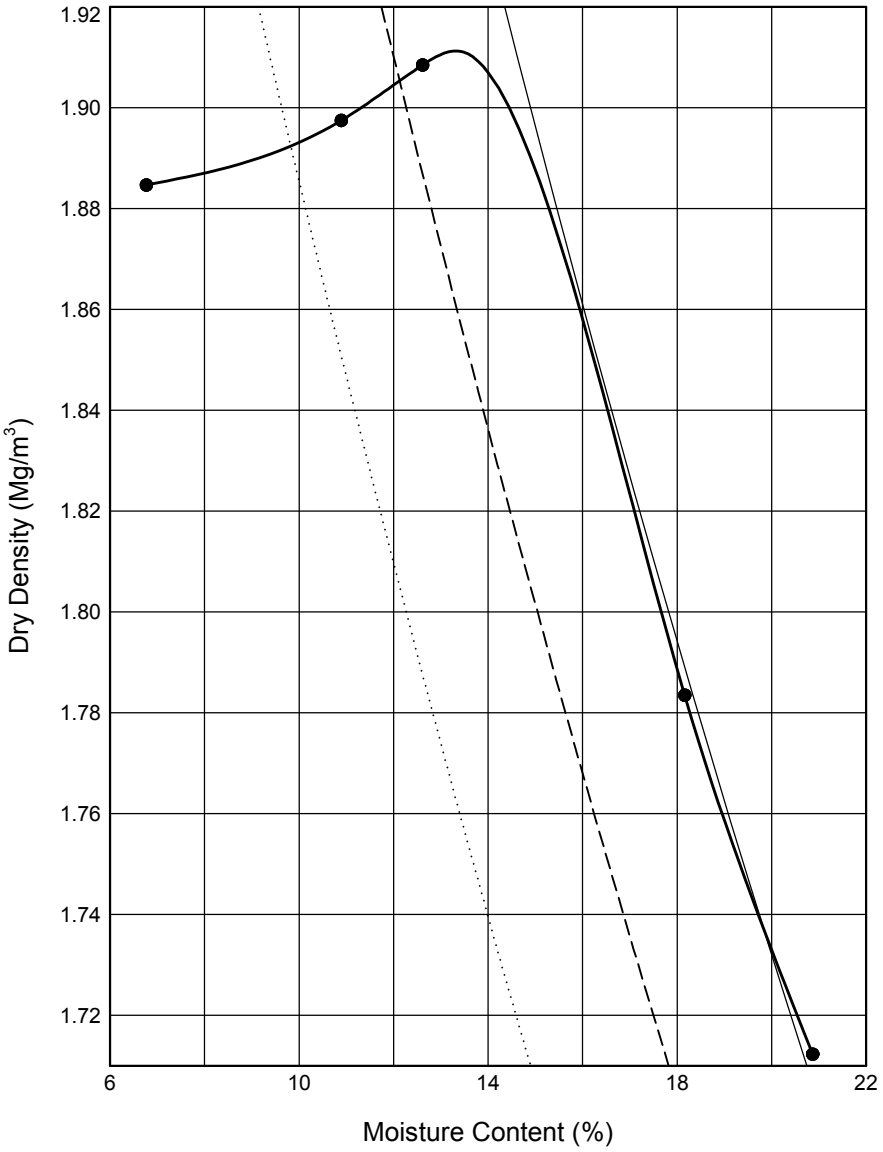
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **11**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	: **1.91**
% Retained on 37.5mm BS Sieve	: **2**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **13**
% Retained on 20.0mm BS Sieve	: **3**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**	
Particle Density - assumed (Mg/m^3)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

Sample Description	Key to Air Voids Lines		
Brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
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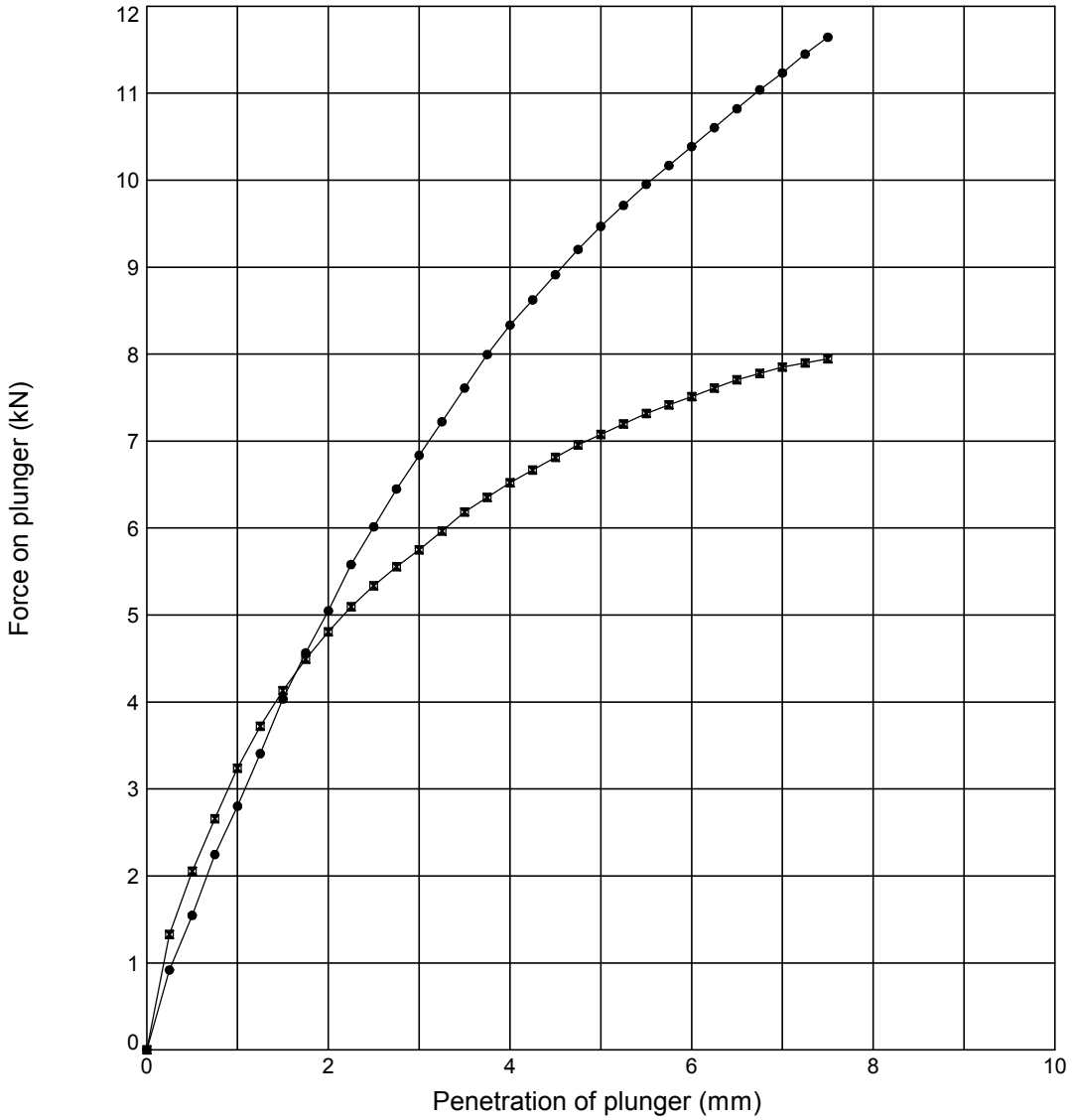
MARK ATHORNE	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.09**	Surcharge (kg)	:	**4.0**	CBR value (%)	**47**	**40**
Initial Dry Density (Mg/m^3)	:	**1.89**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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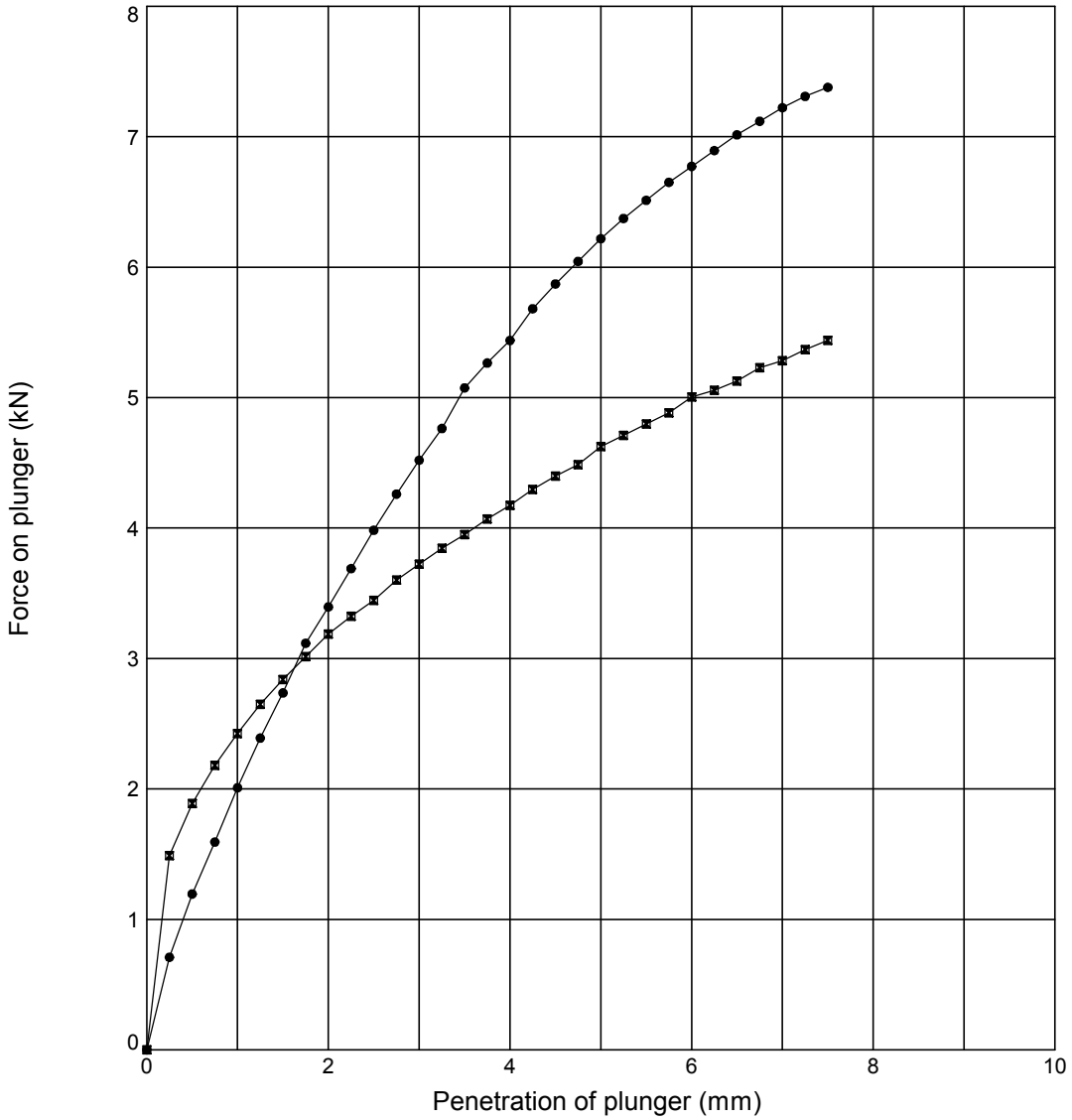
Cont: **Willen Road** | Contract Ref: **782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**31**	**26**
Initial Dry Density (Mg/m^3)	:	**1.89**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By		Date
[redacted]	**MAUREEN FISHER**	**23/05/17**
Contr [redacted]	Contract Ref:	
Willen Road	**782551**	

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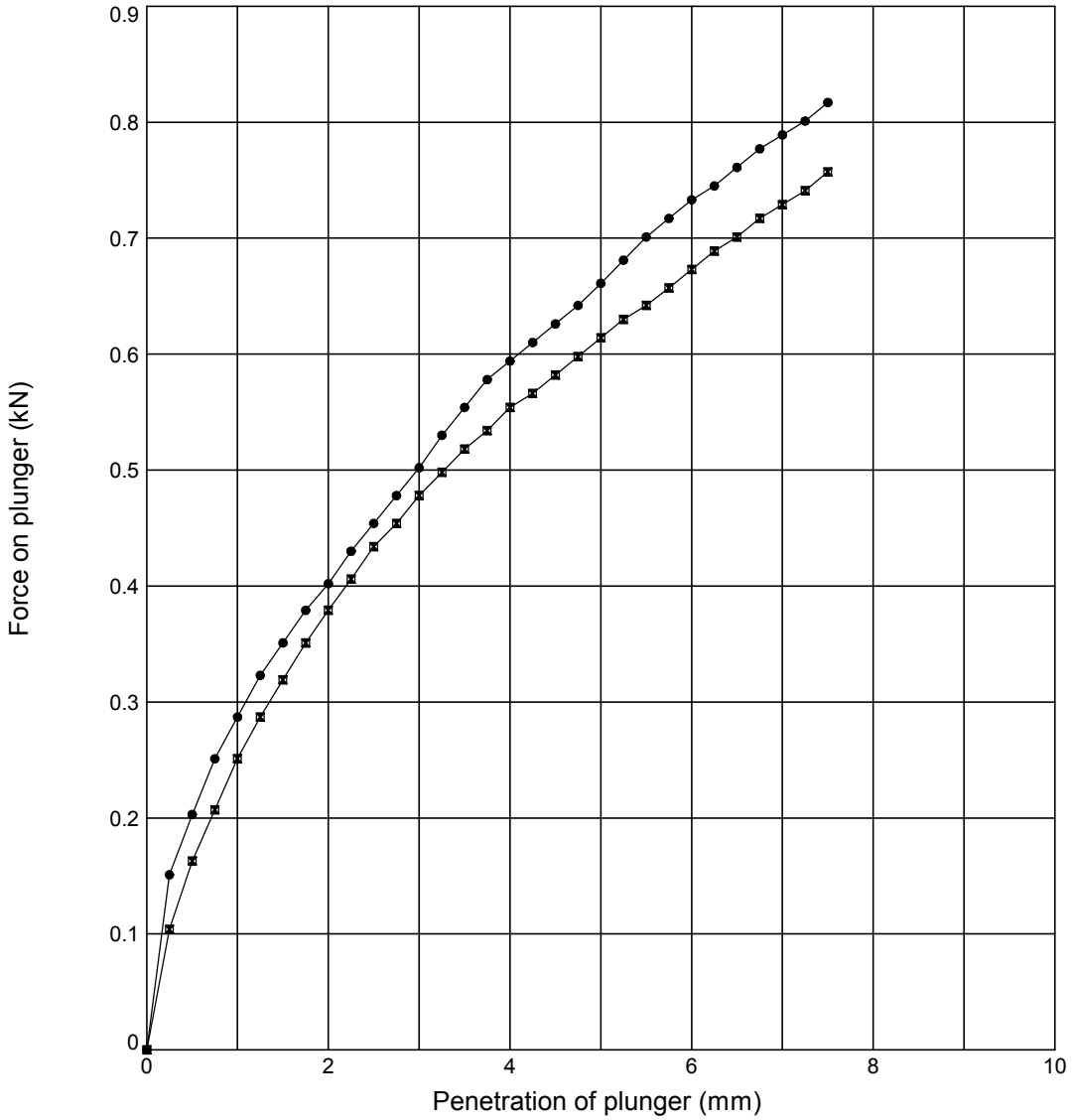
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**18**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**19**	**18**
Initial Bulk Density (Mg/m^3)	:	**2.10**	Surcharge (kg)	:	**4.0**	CBR value (%)	**3.4**	**3.3**
Initial Dry Density (Mg/m^3)	:	**1.78**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

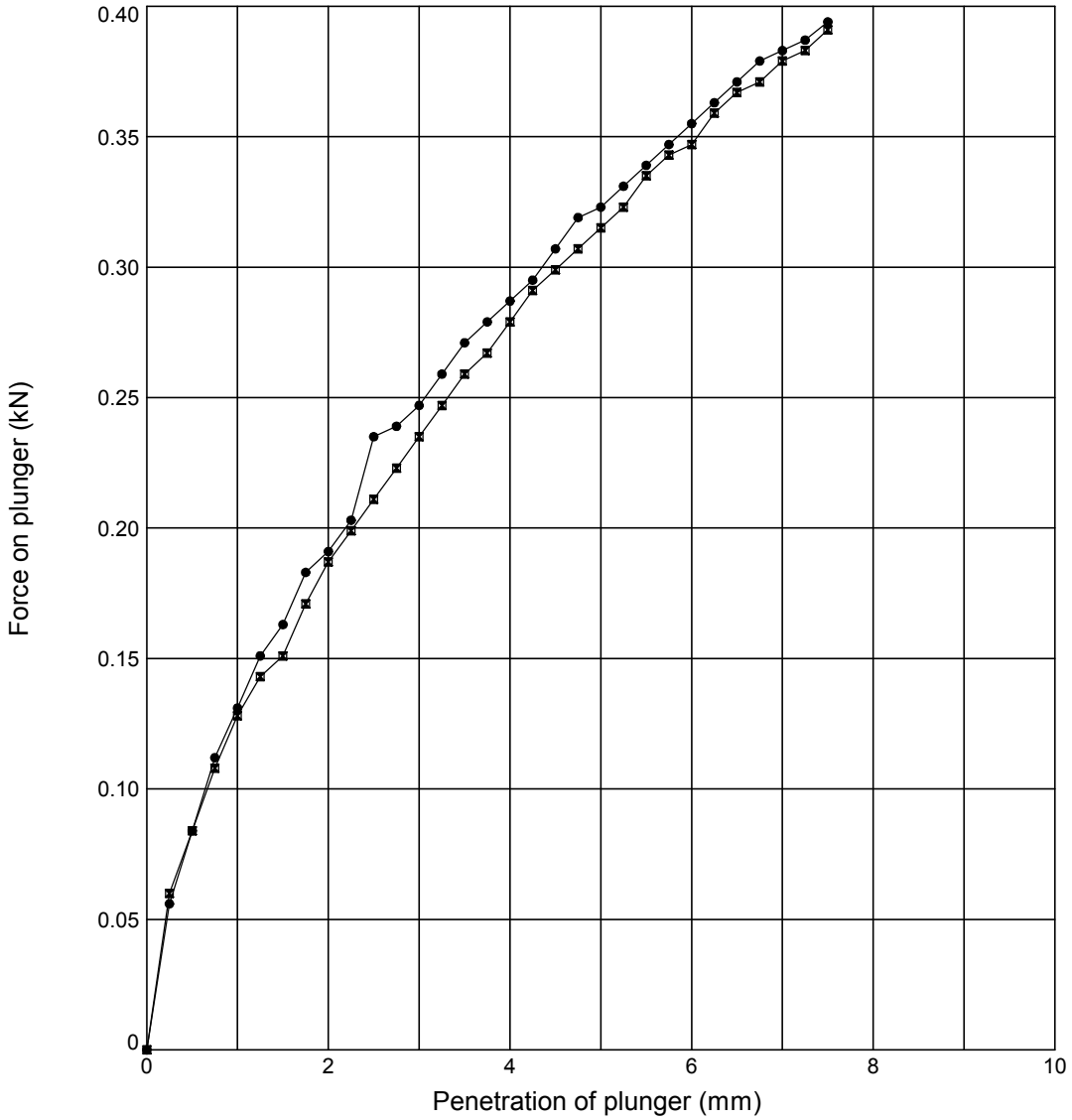
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**23/05/17**
Contra **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**21**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**20**	**21**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**1.8**	**1.6**
Initial Dry Density (Mg/m^3)	:	**1.70**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MAUREEN FISHER**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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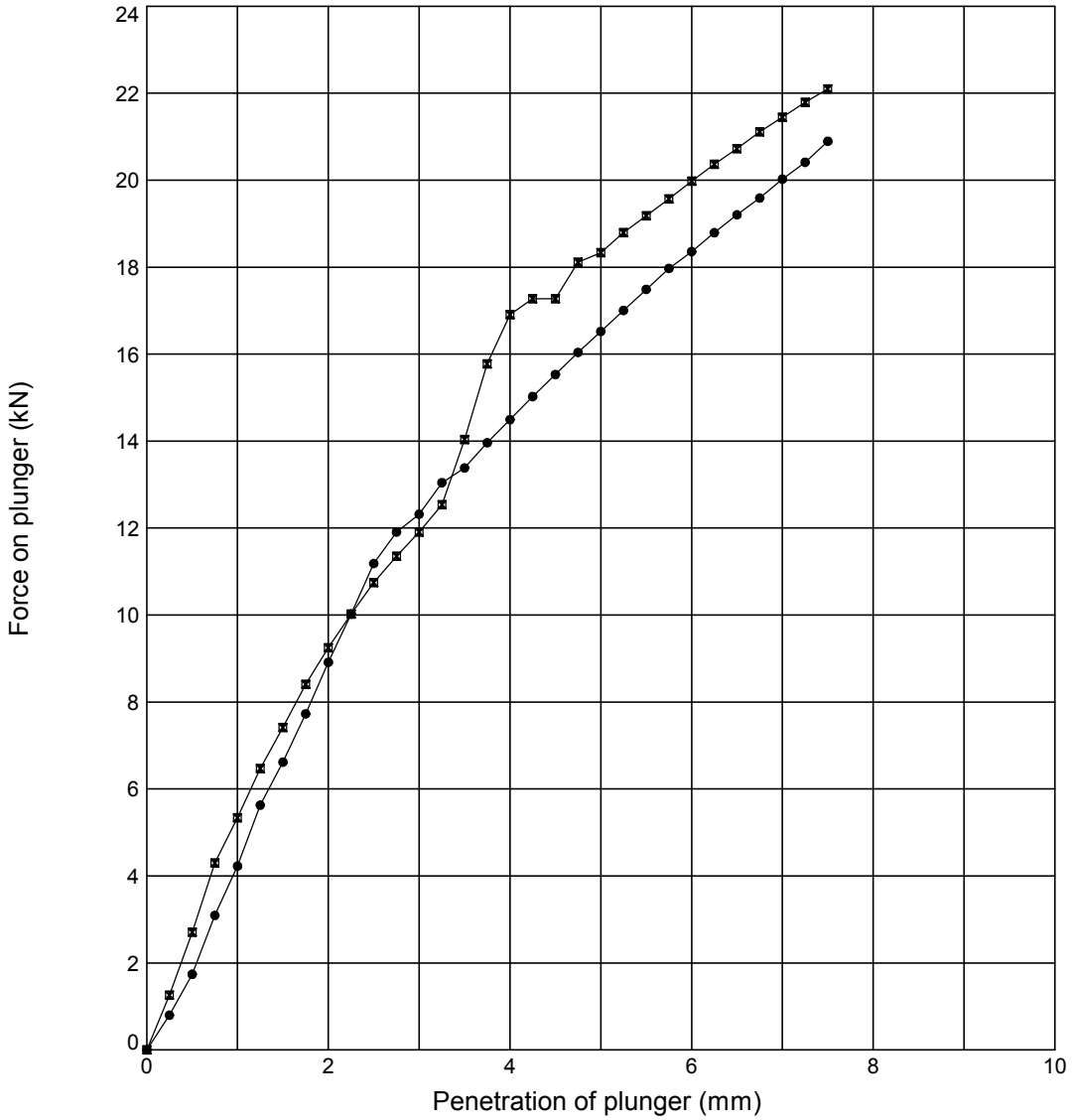
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP128** Sample Ref: **1** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**6.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**7.1**	**7.2**
Initial Bulk Density (Mg/m^3)	:	**2.00**	Surcharge (kg)	:	**4.0**	CBR value (%)	**84**	**92**
Initial Dry Density (Mg/m^3)	:	**1.88**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

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MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

782551

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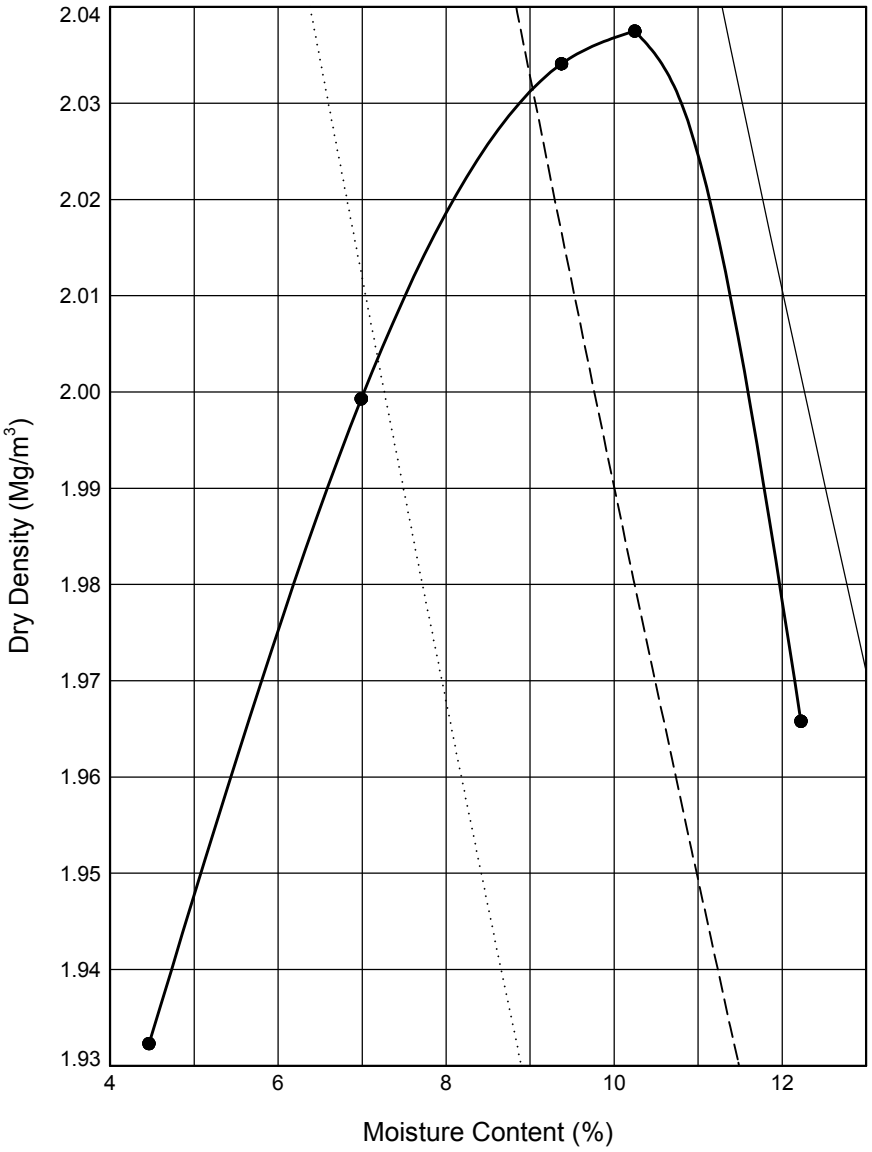
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP TEST

In accordance with clauses 3.3,3.4,3.5,3.6,3.7 of BS1377:Part 4:1990

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**4.5**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.04**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**10**
% Retained on 20.0mm BS Sieve	:	**2**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Dark brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
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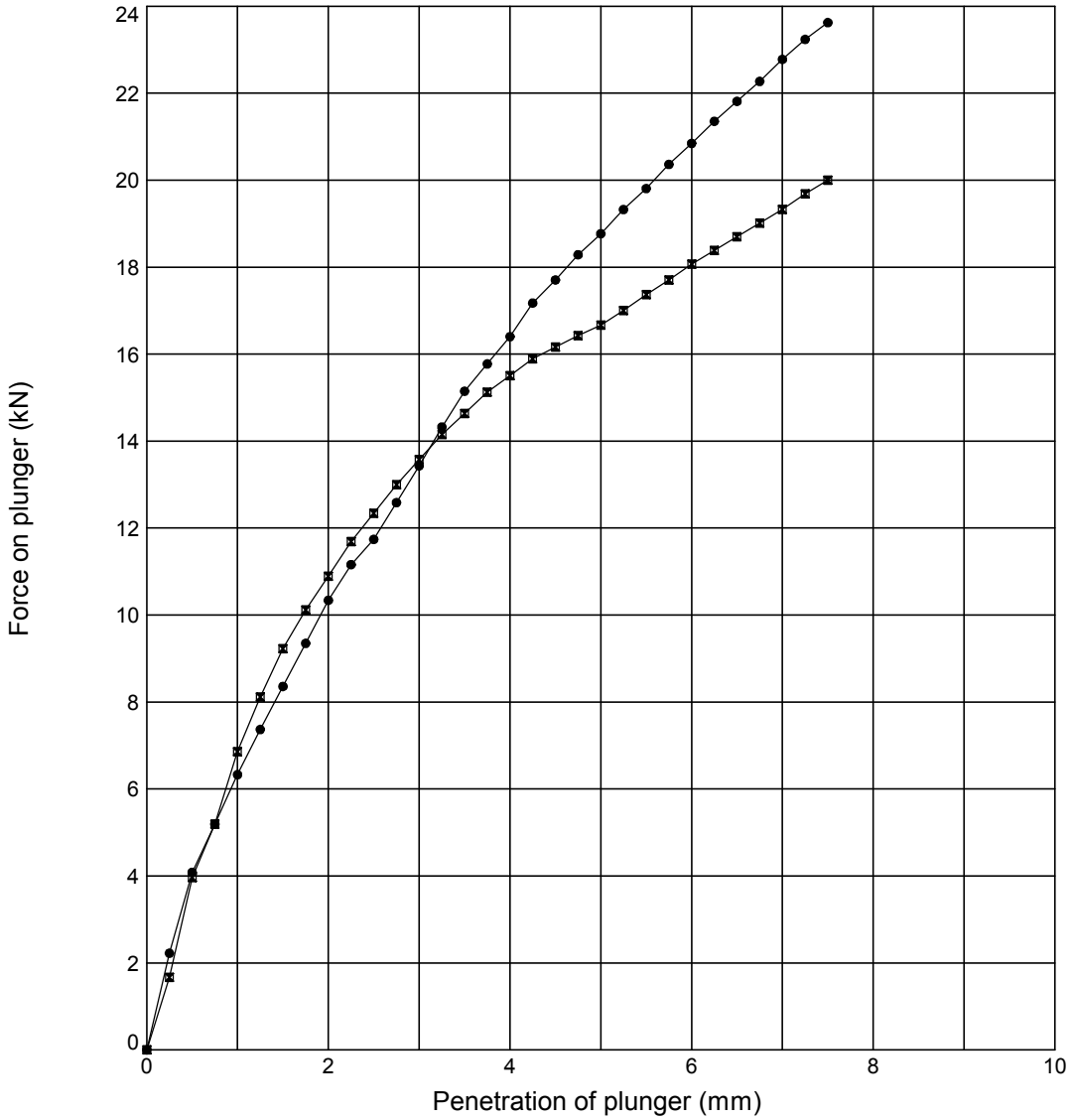
Compiled By	Date
[redacted]	
MARK ATHORNE	**23/05/17**

Con	Contract Ref:
Willen Road	**782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**4.6**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**4.5**	**4.6**
Initial Bulk Density (Mg/m^3)	:	**2.01**	Surcharge (kg)	:	**4.0**	CBR value (%)	**94**	**93**
Initial Dry Density (Mg/m^3)	:	**1.92**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

Contract: [redacted] **Willen Road**

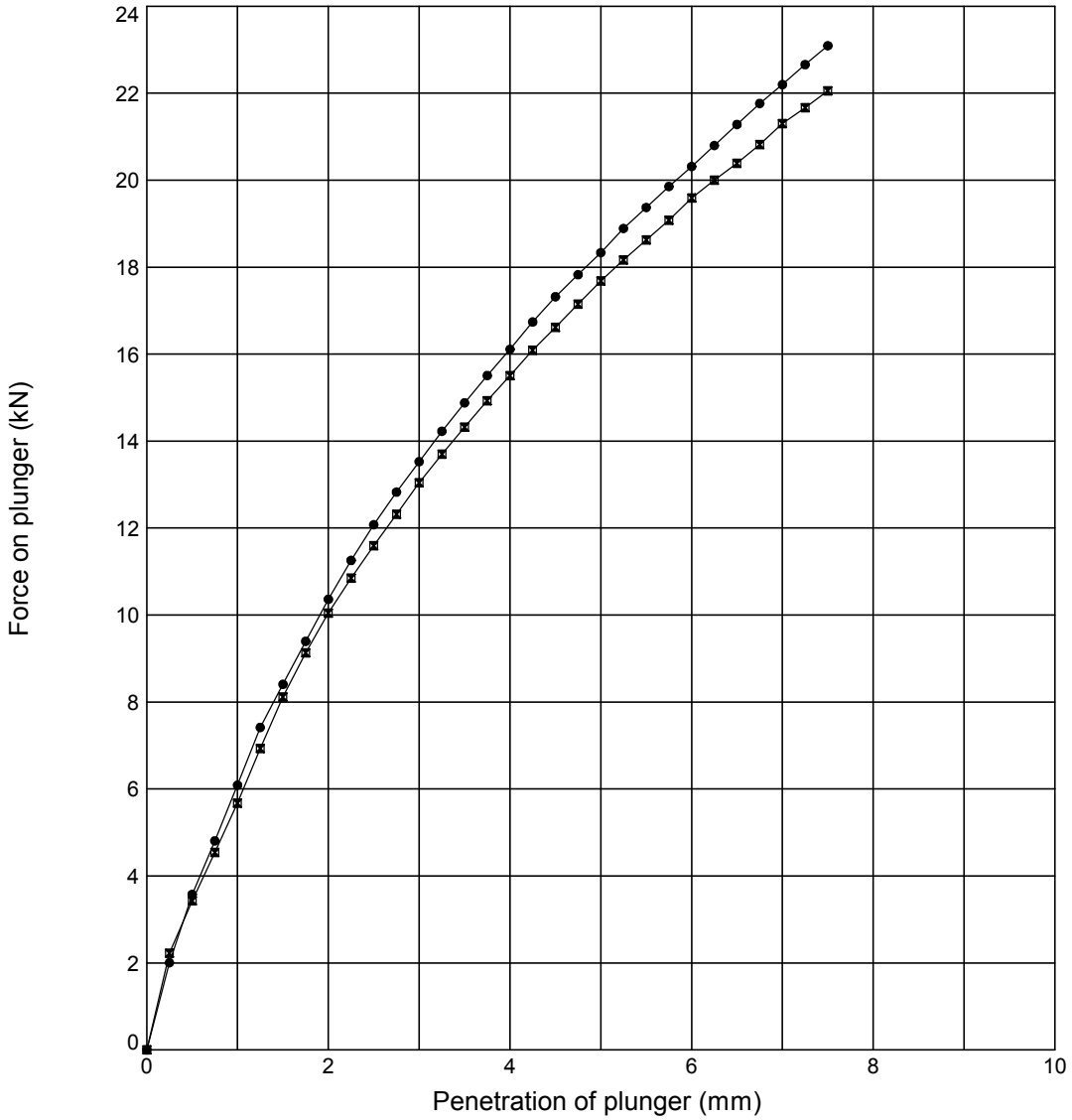
Contract Ref: **782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.0**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.7**	**6.4**
Initial Bulk Density (Mg/m^3)	:	**2.13**	Surcharge (kg)	:	**4.0**	CBR value (%)	**92**	**89**
Initial Dry Density (Mg/m^3)	:	**1.99**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
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Compiled By	Date
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MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

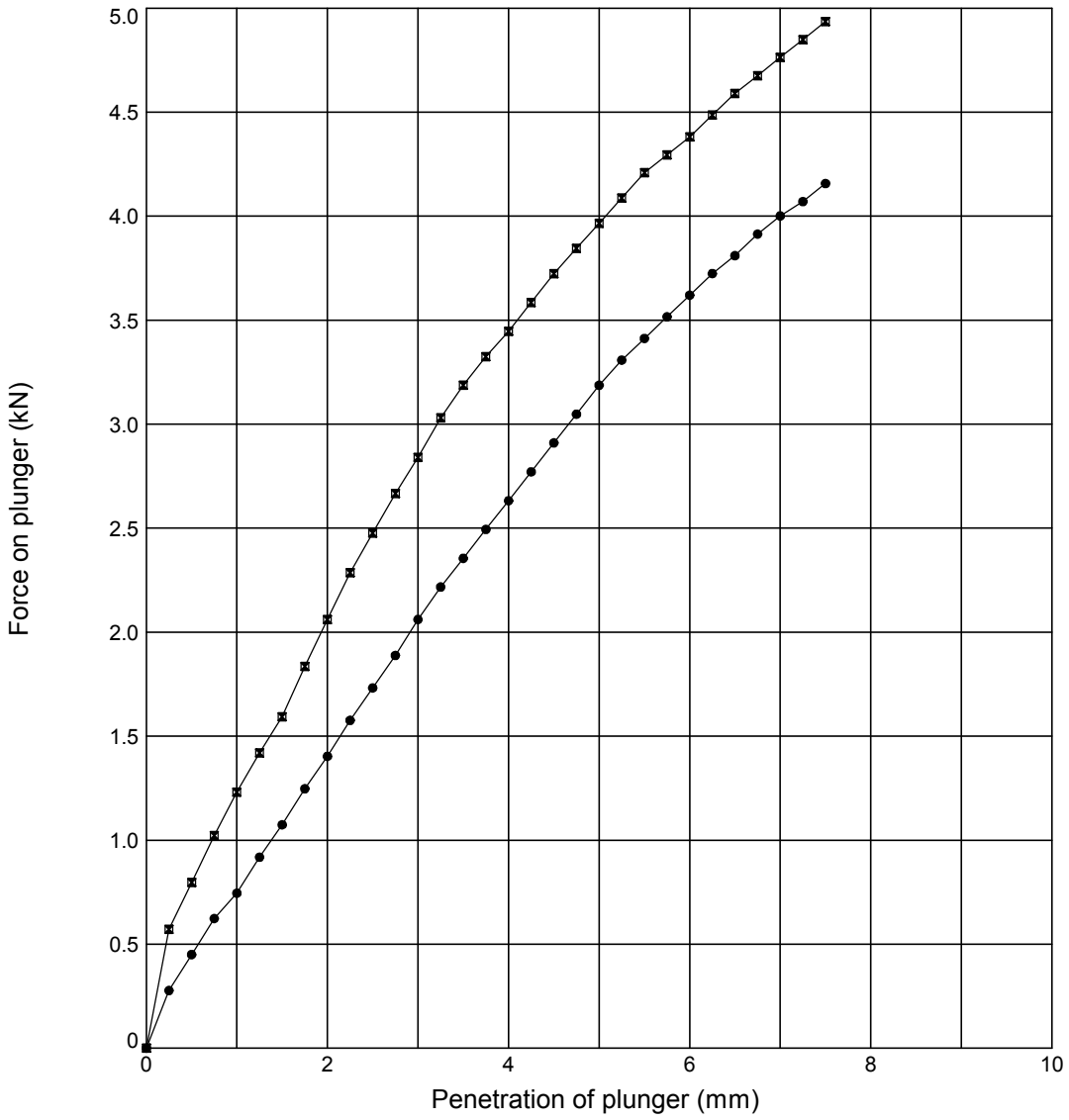
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**10**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**11**	**10**
Initial Bulk Density (Mg/m^3)	:	**2.24**	Surcharge (kg)	:	**4.0**	CBR value (%)	**16**	**20**
Initial Dry Density (Mg/m^3)	:	**2.03**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contrac[redacted]	Contract Ref:	
Willen Road	**782551**	

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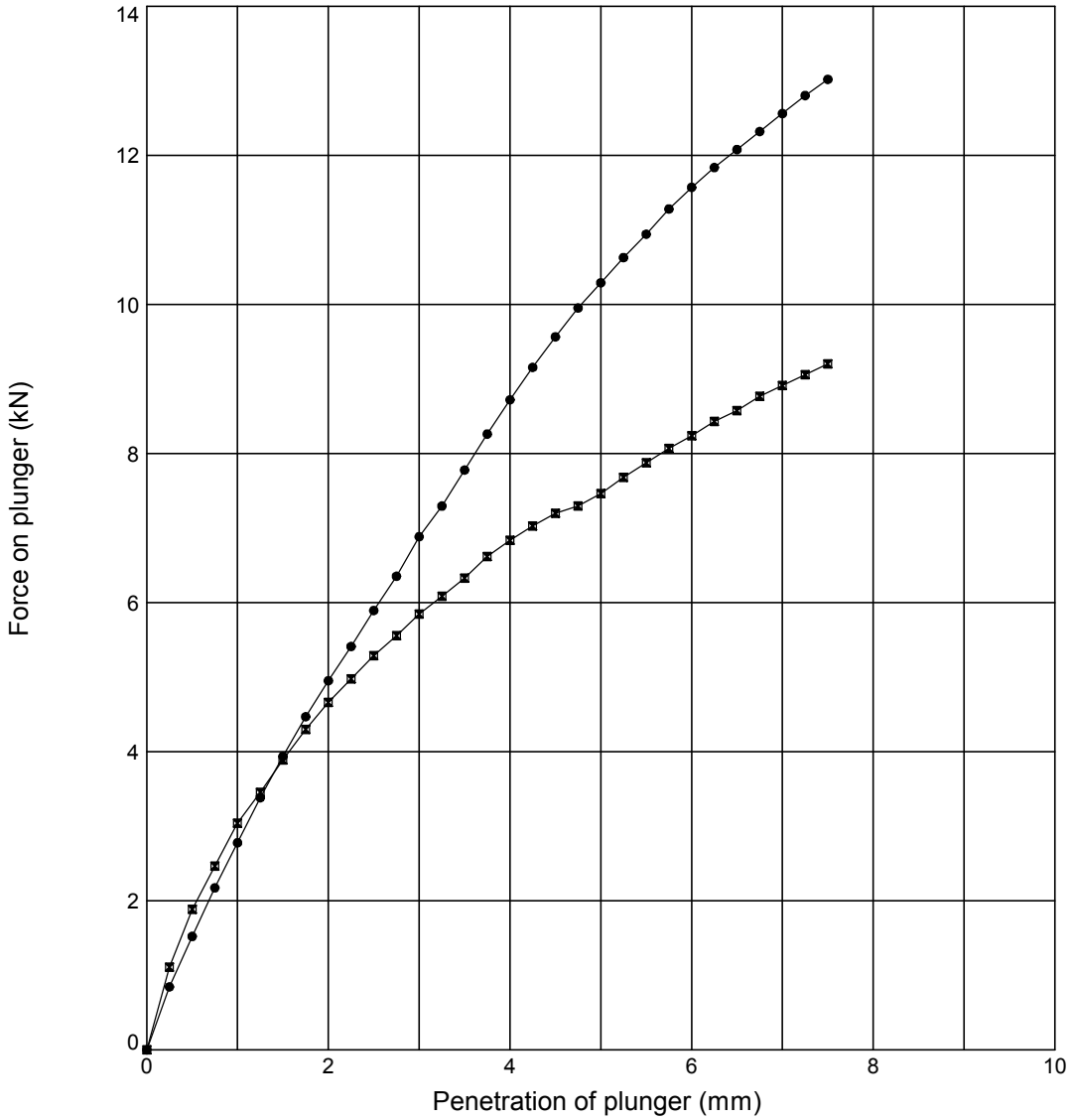
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.4**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**9.4**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**52**	**40**
Initial Dry Density (Mg/m^3)	:	**2.02**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

Contr [redacted]

Willen Road

Contract Ref:

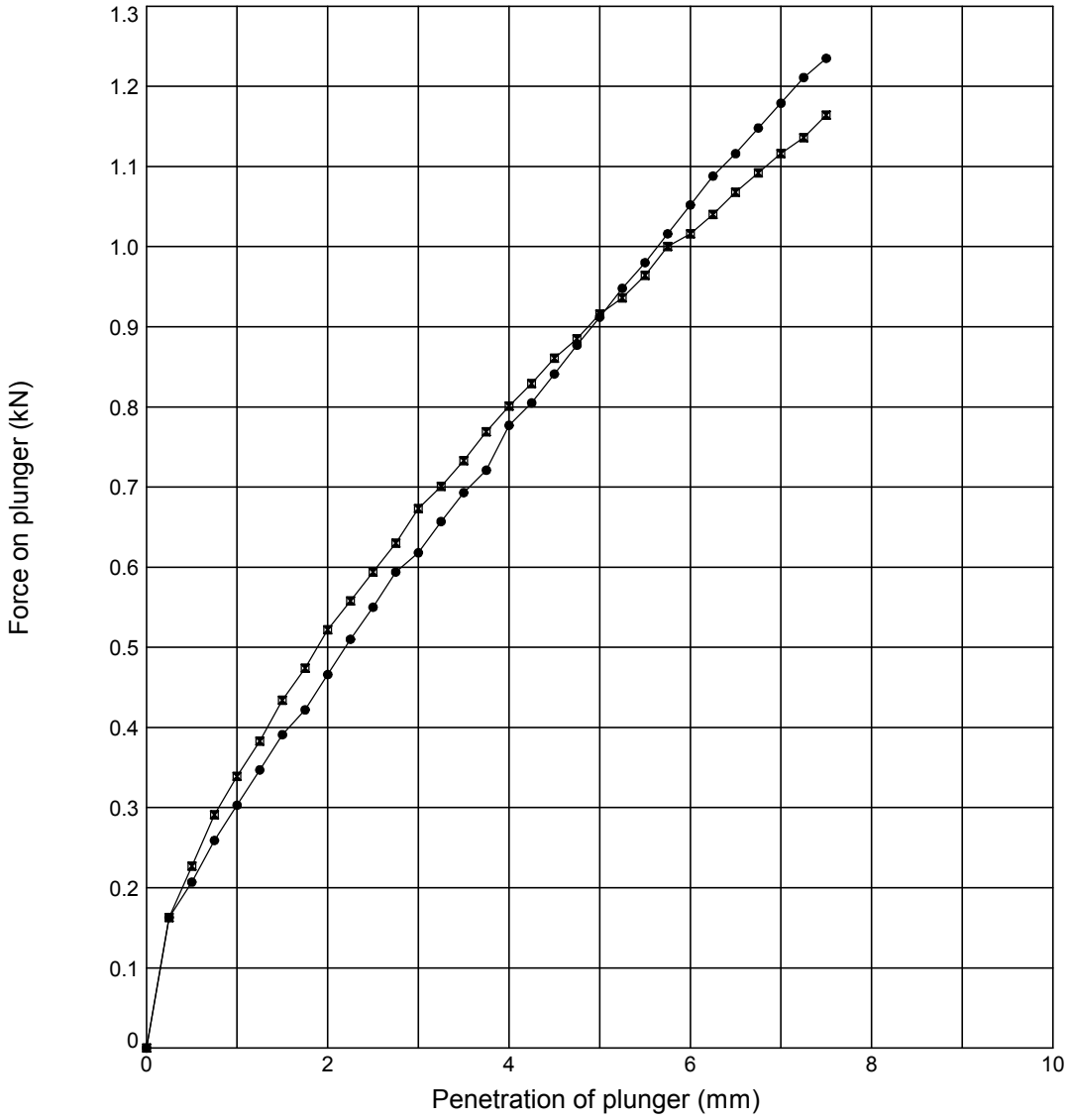
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **1** Sample Type: **B** Depth (m): **0.20**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**12**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**12**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.20**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.6**	**4.6**
Initial Dry Density (Mg/m^3)	:	**1.96**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Dark brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

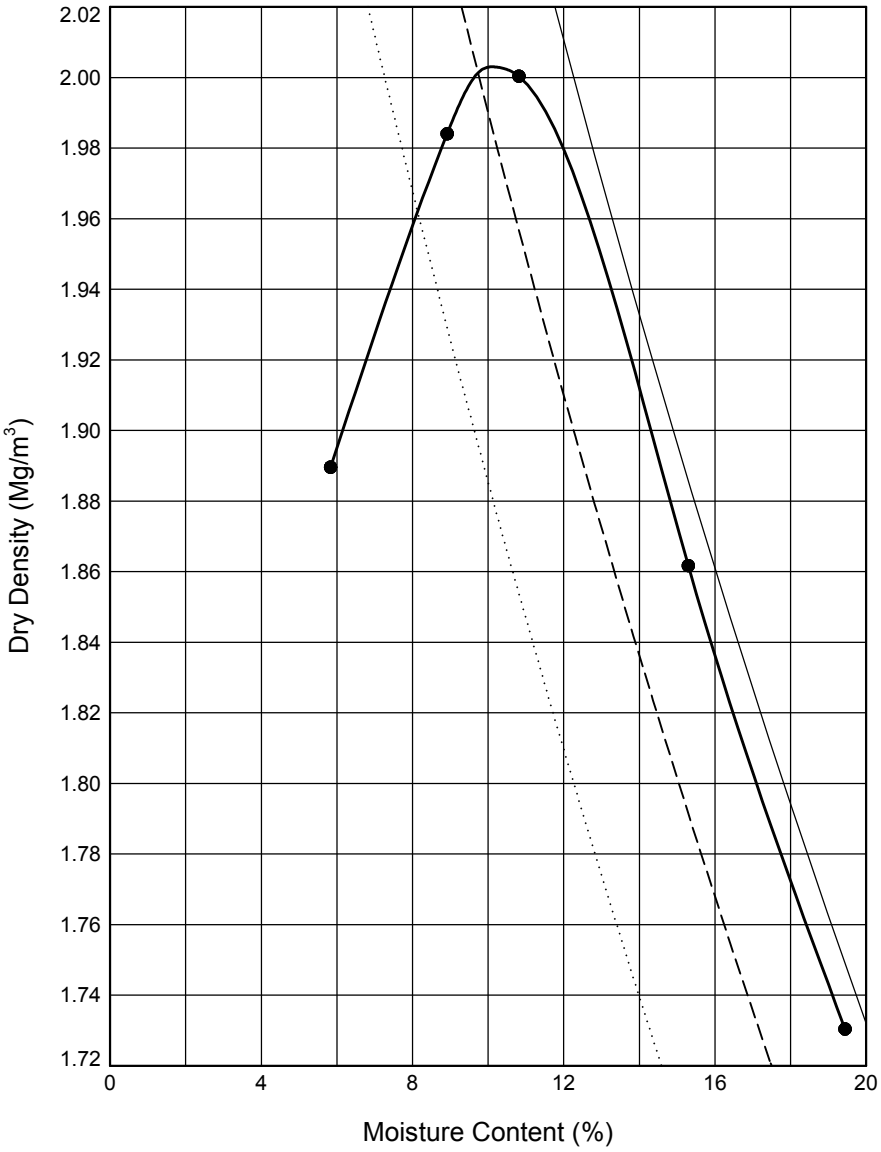
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Cont	Contract Ref:	
Willen Road	**782551**	

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: **TP129** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions		Test Details		Test Results	
Initial Moisture Content (%)	: **8.9**	Compaction Type	: **Heavy**	Maximum Dry Density (Mg/m^3)	: **2.00**
% Retained on 37.5mm BS Sieve	: **1**	Mass of Rammer (kg):	**4.5**	Optimum Moisture Content (%)	: **10**
% Retained on 20.0mm BS Sieve	: **3**	Type of Mould	: **CBR**	Method Used: **Clause 3.6**	
Particle Density - assumed (Mg/m^3)	: **2.65**			Remarks:	
Size of Soil Pieces	: **<20mm**	Separate samples were used.			

Sample Description	Key to Air Voids Lines		
Brown slightly sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

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The Potteries
Pottery Street
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Compiled By	Date
MAUREEN FISHER	**01/06/17**

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Willen Road

Contract Ref:

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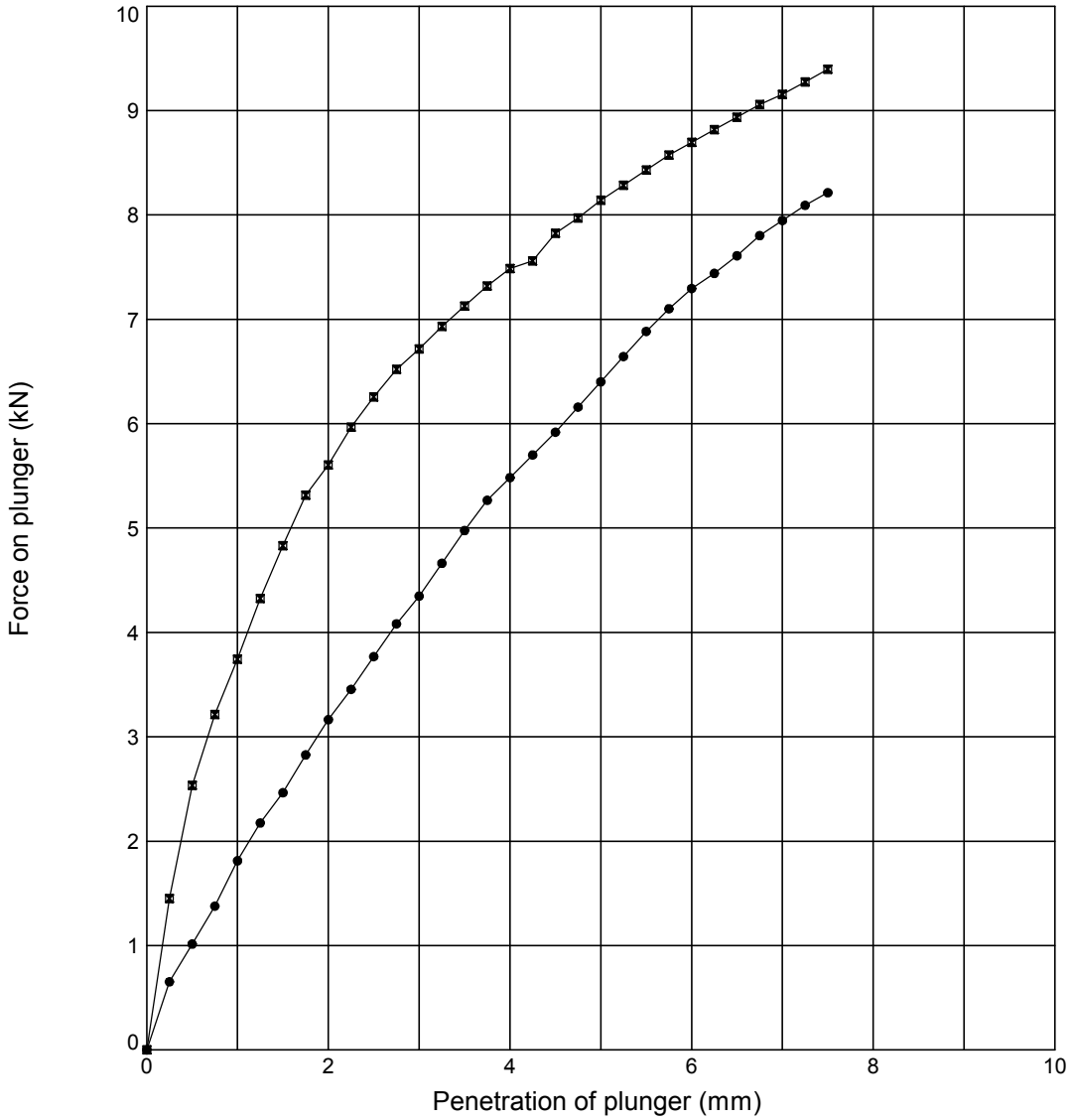
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**8.9**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**11**	**10**
Initial Bulk Density (Mg/m^3)	:	**2.15**	Surcharge (kg)	:	**4.0**	CBR value (%)	**32**	**47**
Initial Dry Density (Mg/m^3)	:	**1.98**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
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Compiled By	Date
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Willen Road

Contract Ref:

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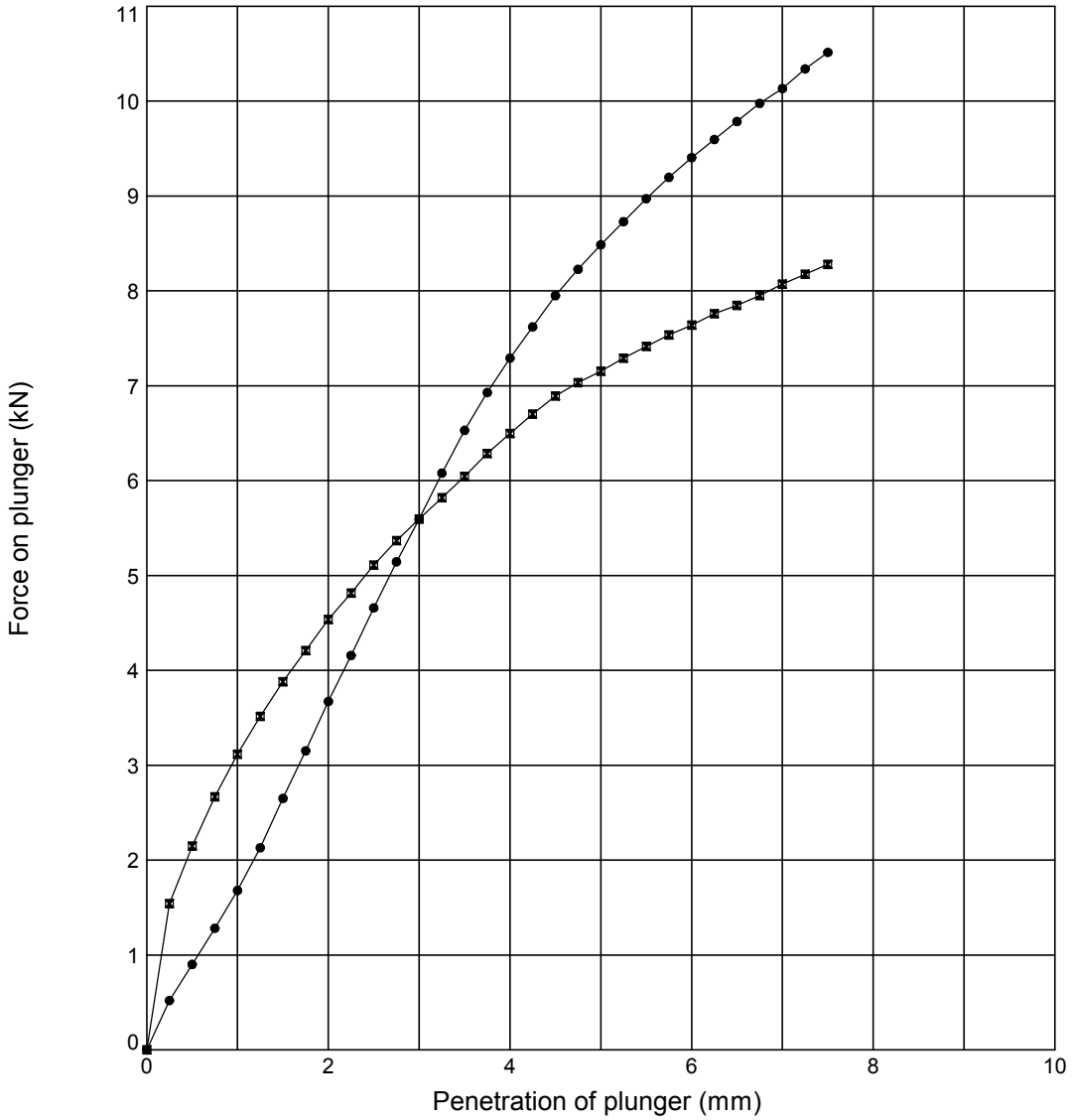
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.5**	**9.3**
Initial Bulk Density (Mg/m^3)	:	**2.21**	Surcharge (kg)	:	**4.0**	CBR value (%)	**43**	**39**
Initial Dry Density (Mg/m^3)	:	**1.99**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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Pottery Street
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Compiled By	Date
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Willen Road

Contract Ref:

782551

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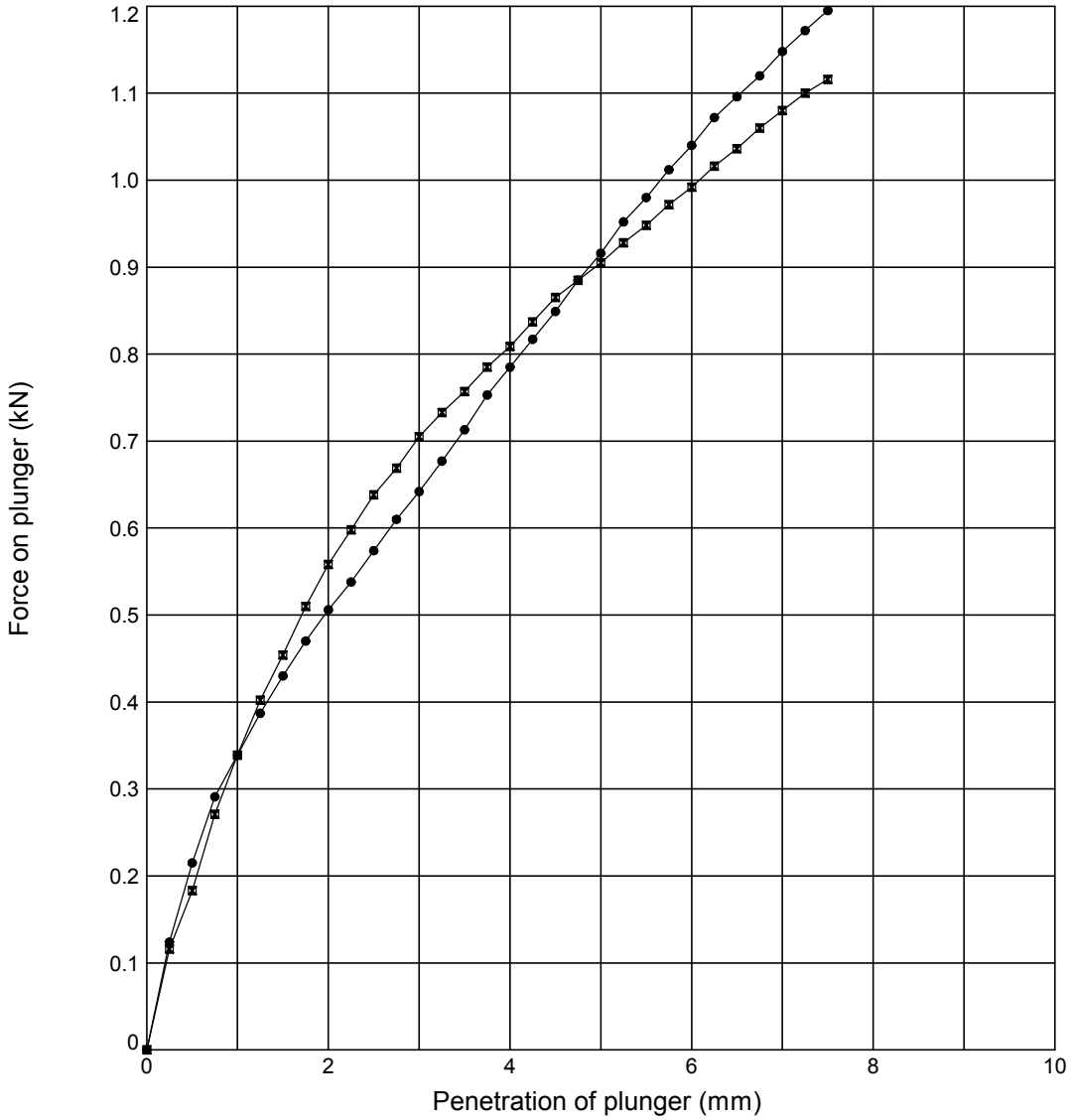
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** 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 (%)	**14**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.14**	Surcharge (kg)	:	**4.0**	CBR value (%)	**4.6**	**4.8**
Initial Dry Density (Mg/m^3)	:	**1.86**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
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Contract: **Willen Road**

Contract Ref: **782551**

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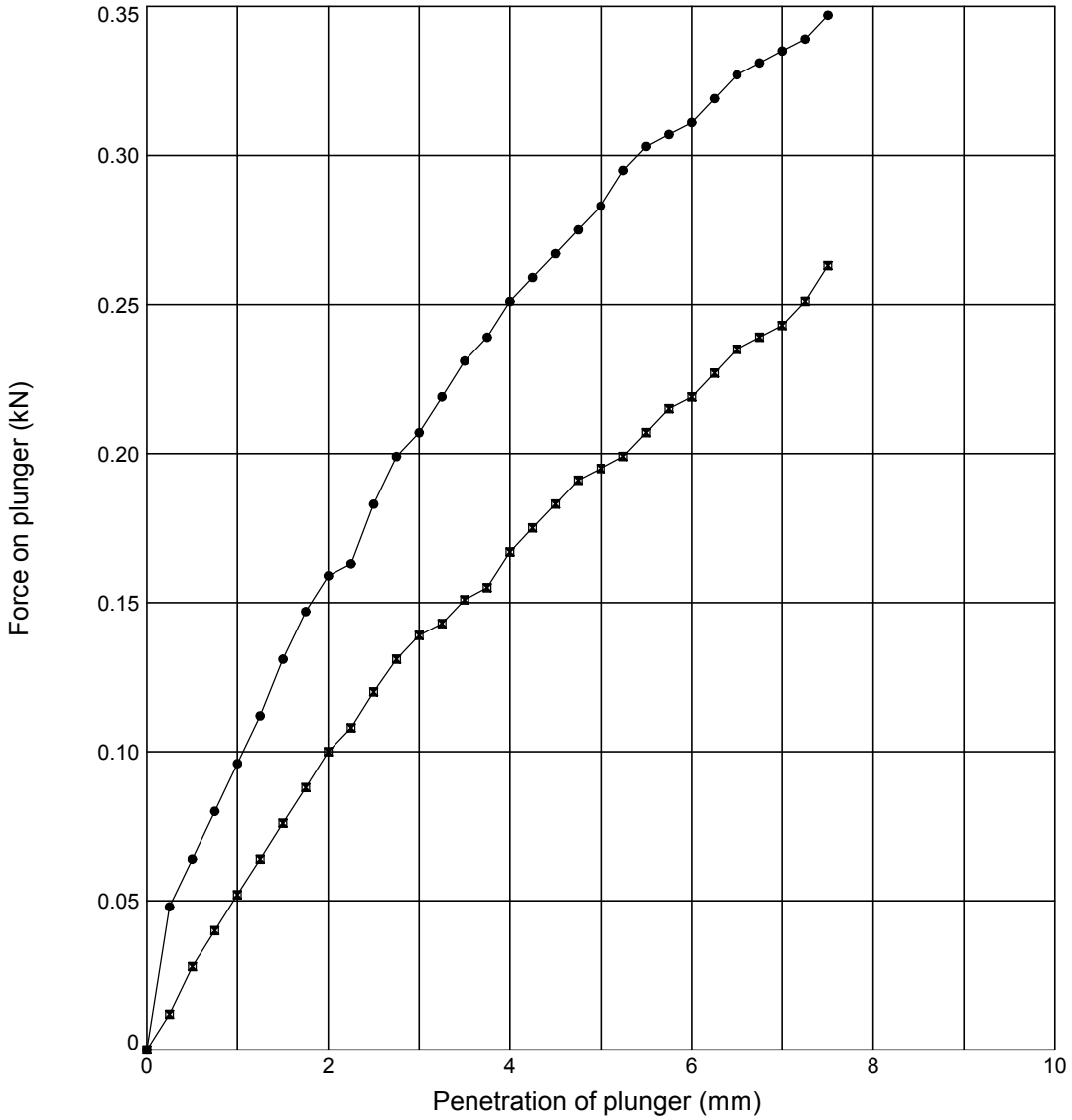
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**19**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**18**	**18**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**1.4**	**1.00**
Initial Dry Density (Mg/m^3)	:	**1.73**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
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Willen Road

Contract Ref:

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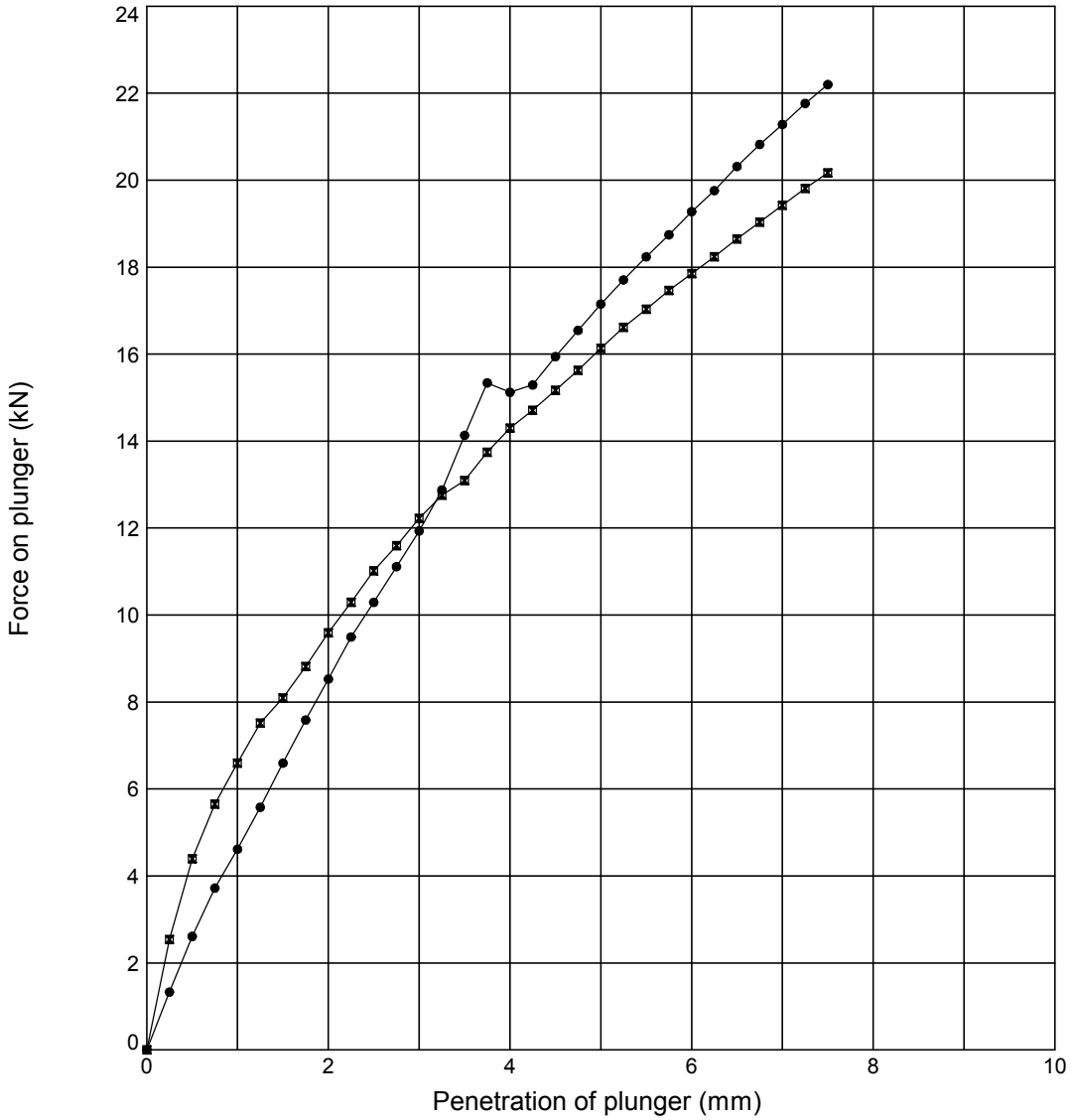
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP129** Sample Ref: **2** Sample Type: **B** Depth (m): **1.00**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**5.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**5.6**	**6.0**
Initial Bulk Density (Mg/m^3)	:	**1.99**	Surcharge (kg)	:	**4.0**	CBR value (%)	**86**	**83**
Initial Dry Density (Mg/m^3)	:	**1.88**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**4**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown slightly sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

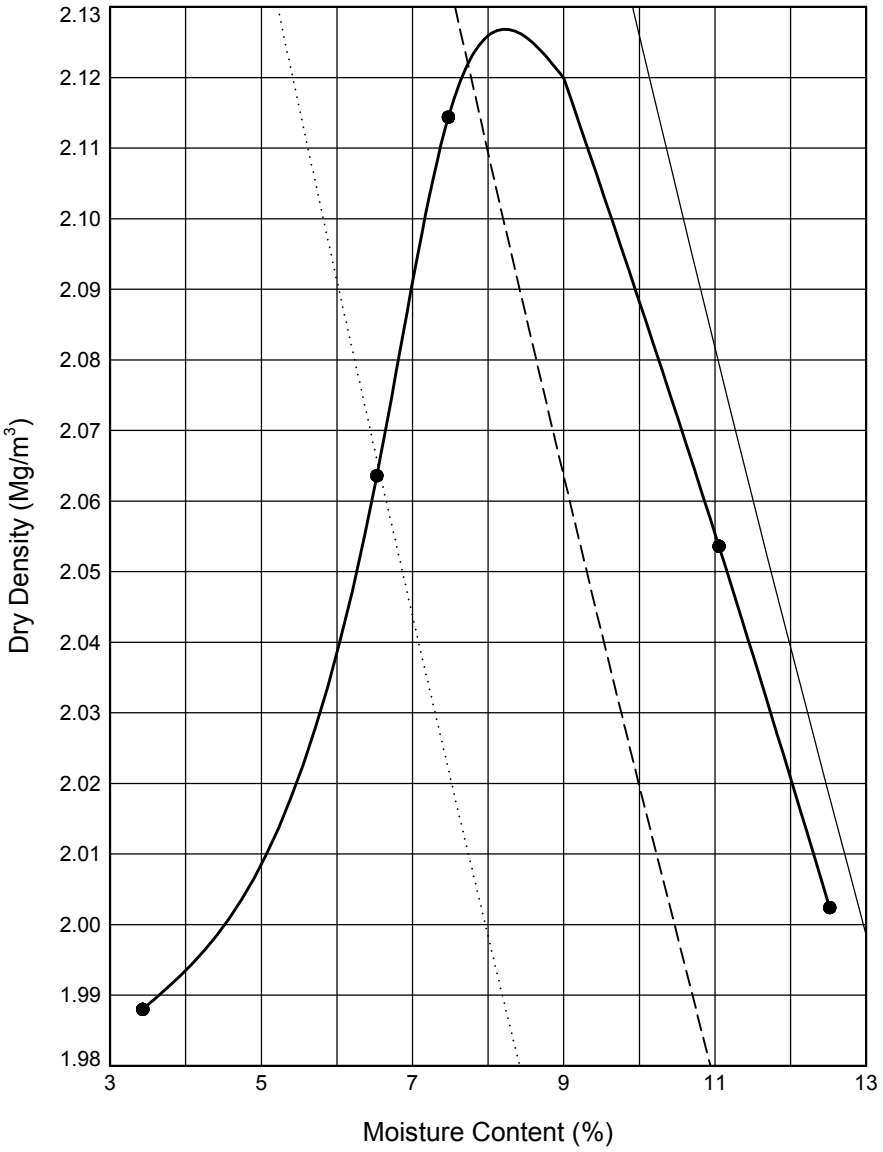
782551

AGS

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: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m³)	:	**2.13**
% Retained on 37.5mm BS Sieve	:	**0**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**8**
% Retained on 20.0mm BS Sieve	:	**3**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m³)	:	**2.70**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Light brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted]	
MARK ATHORNE	**23/05/17**

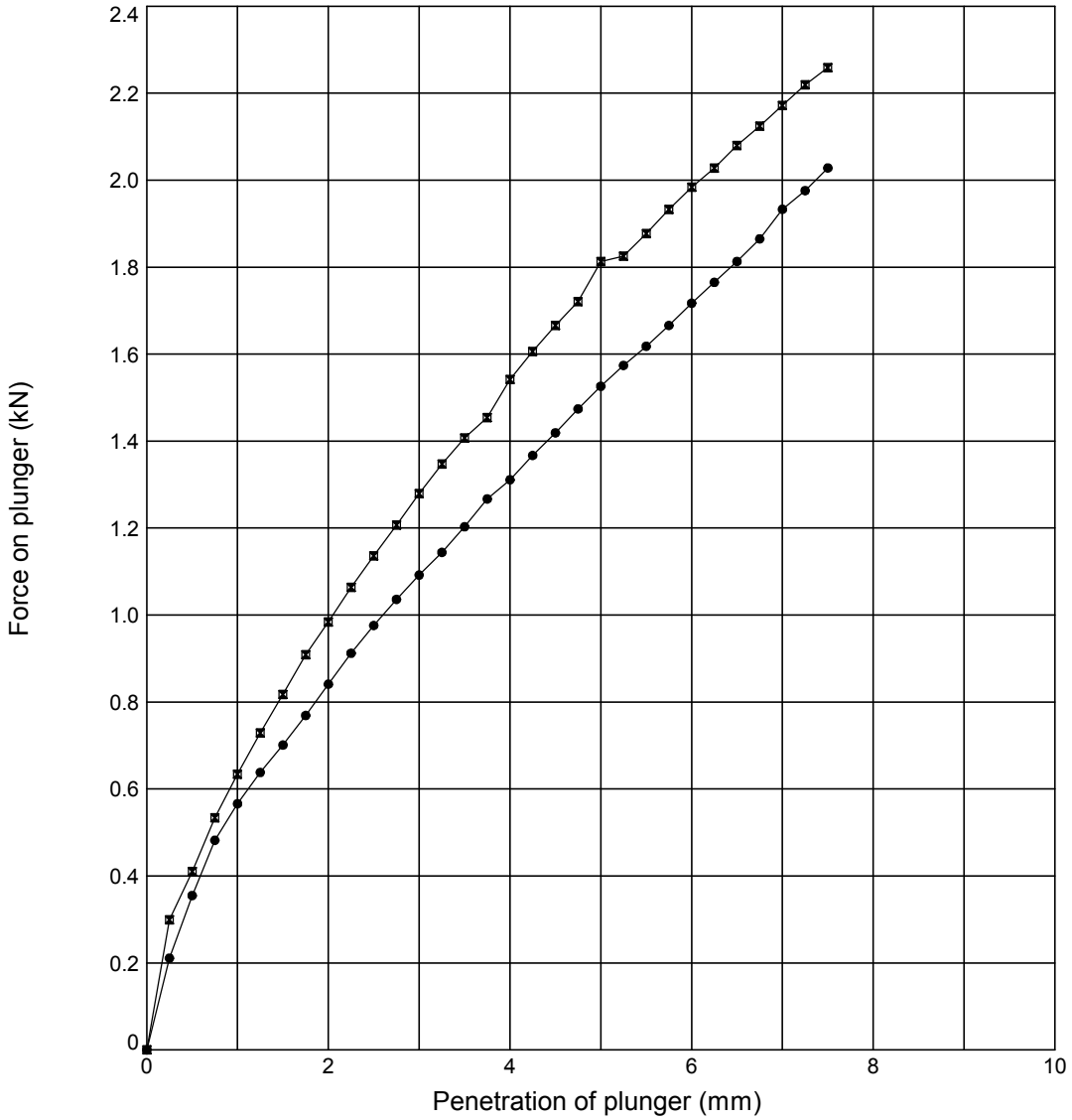
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.05**	Surcharge (kg)	:	**4.0**	CBR value (%)	**7.6**	**9.1**
Initial Dry Density (Mg/m^3)	:	**1.81**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

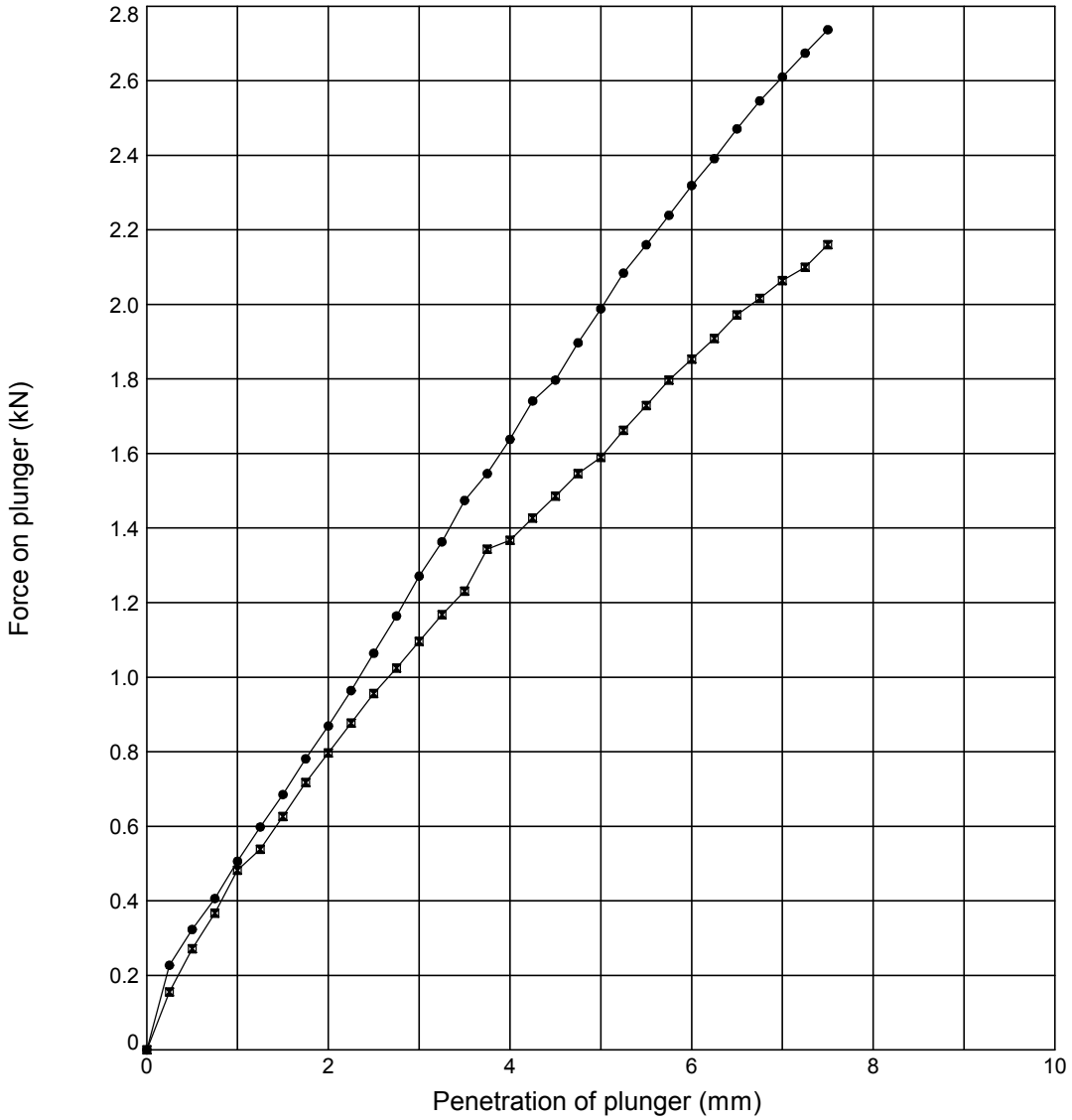
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contract: **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**11**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**10**	**11**
Initial Bulk Density (Mg/m^3)	:	**2.19**	Surcharge (kg)	:	**4.0**	CBR value (%)	**10.0**	**8.0**
Initial Dry Density (Mg/m^3)	:	**1.97**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

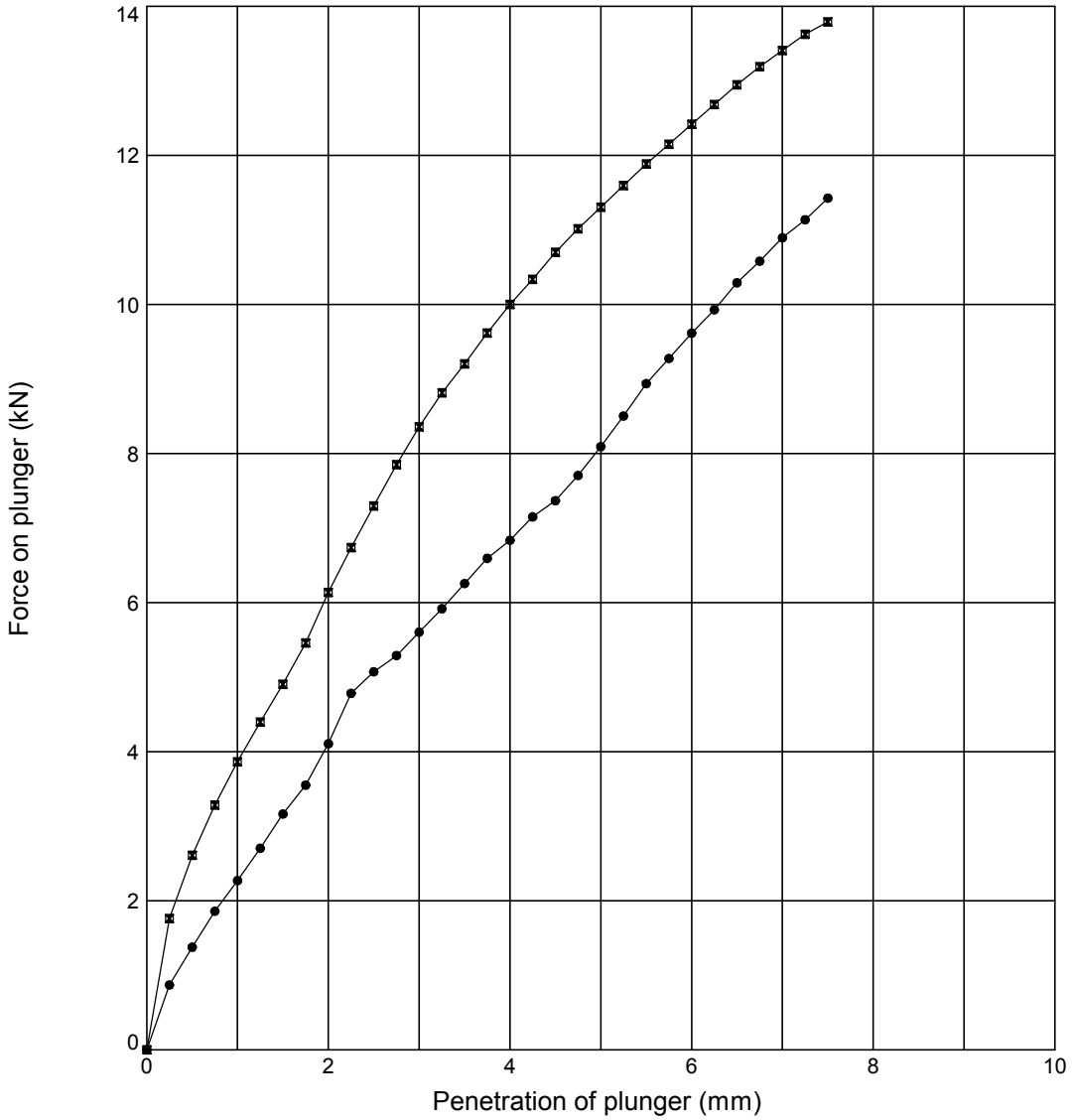
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**
Contr **Willen Road**	Contract Ref: **782551**	

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.5**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**7.7**	**7.7**
Initial Bulk Density (Mg/m^3)	:	**2.26**	Surcharge (kg)	:	**4.0**	CBR value (%)	**41**	**57**
Initial Dry Density (Mg/m^3)	:	**2.11**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
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Compiled By	Date
[redacted] **MARK ATHORNE**	**23/05/17**

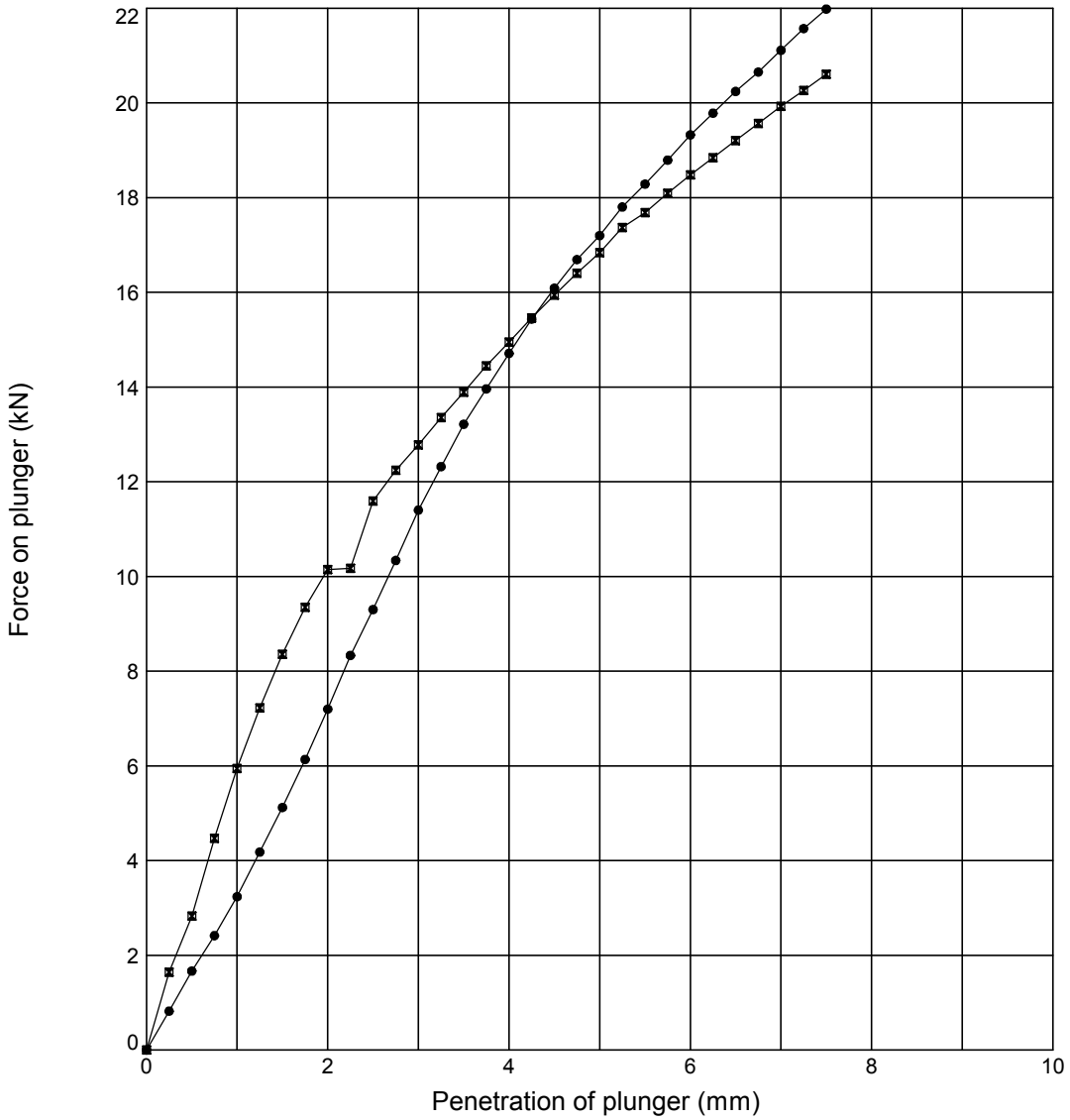
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**6.5**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**6.8**	**6.7**
Initial Bulk Density (Mg/m^3)	:	**2.27**	Surcharge (kg)	:	**4.0**	CBR value (%)	**86**	**88**
Initial Dry Density (Mg/m^3)	:	**2.13**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

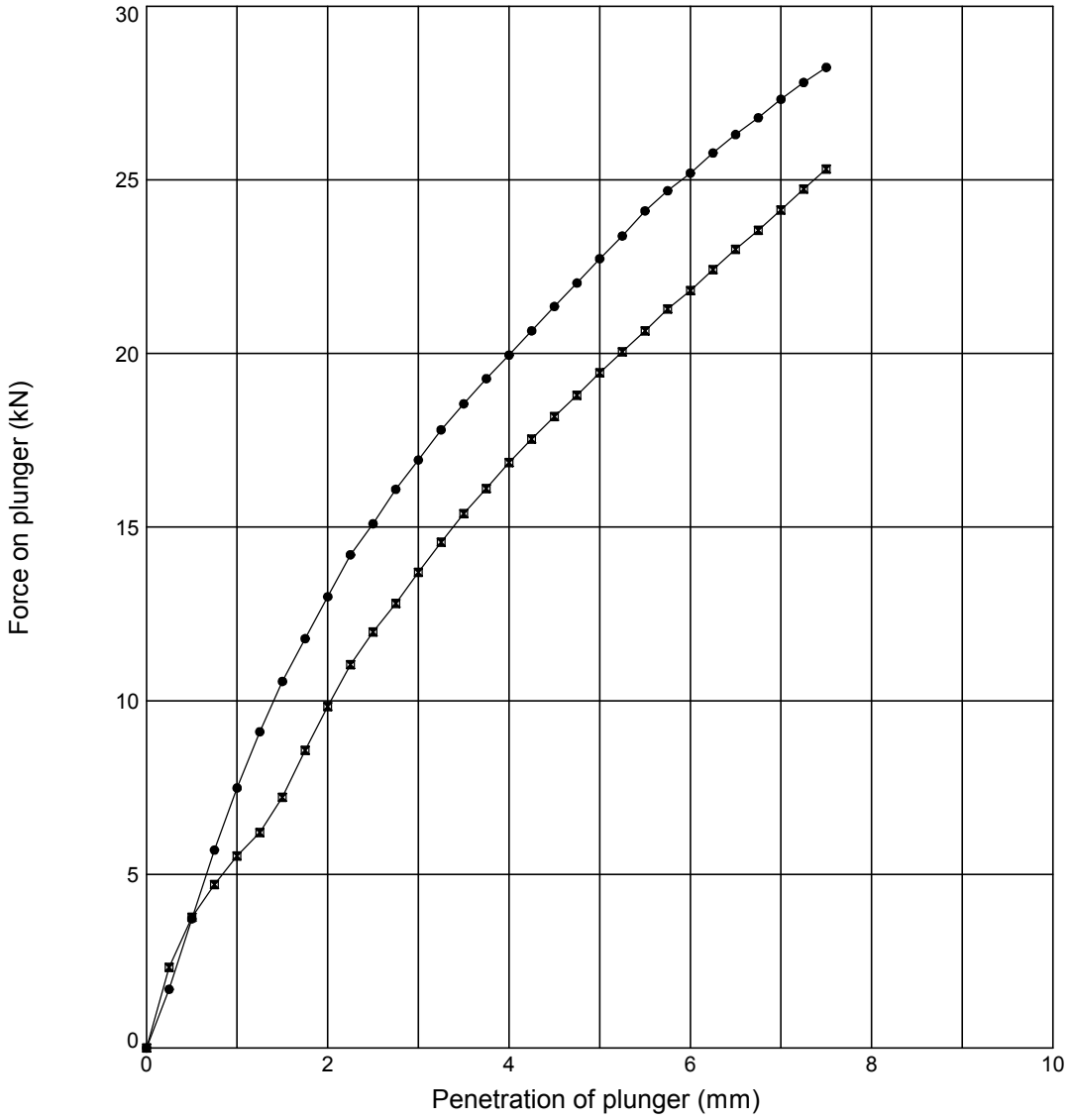
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP130** Sample Ref: **1** Sample Type: **B** Depth (m): **0.70**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**3.4**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**3.5**	**3.5**
Initial Bulk Density (Mg/m^3)	:	**2.25**	Surcharge (kg)	:	**4.0**	CBR value (%)	**114**	**97**
Initial Dry Density (Mg/m^3)	:	**2.17**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**2**	Swelling (mm)	:	**-**			

Sample Description	Key
Light brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted]	**MARK ATHORNE** **23/05/17**

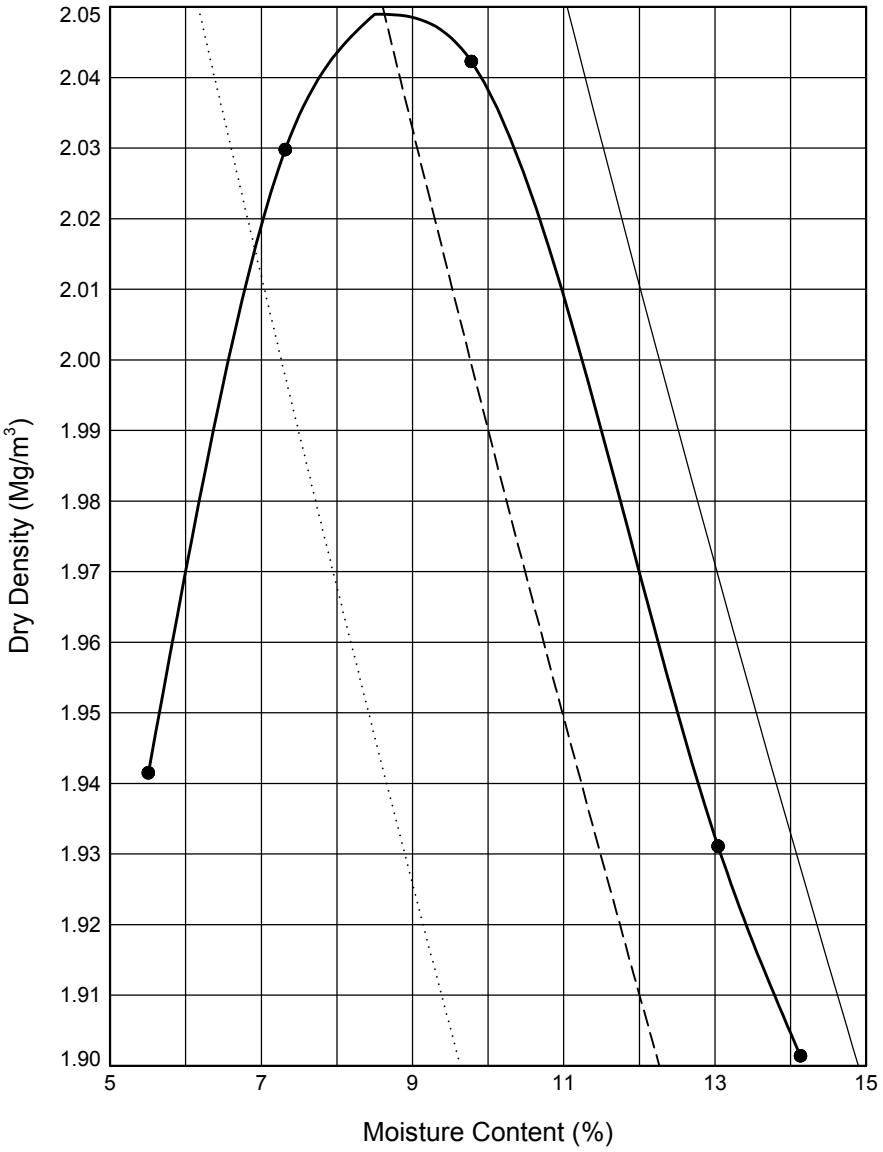
Contract	Contract Ref:
Willen Road	**782551**

AGS

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: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results		
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**Heavy**	Maximum Dry Density (Mg/m^3)	:	**2.05**
% Retained on 37.5mm BS Sieve	:	**1**	Mass of Rammer (kg):		**4.5**	Optimum Moisture Content (%)	:	**9**
% Retained on 20.0mm BS Sieve	:	**5**	Type of Mould	:	**CBR**	Method Used: **Clause 3.6**		
Particle Density - assumed (Mg/m^3)	:	**2.65**				Remarks:		
Size of Soil Pieces	:	**<20mm**	Separate samples were used.					

Sample Description	Key to Air Voids Lines		
Brown sandy slightly gravelly CLAY	——— 0%	– – – – 5%	····· 10%

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By	Date
MARK ATHORNE	**23/05/17**

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Willen Road

Contract Ref:

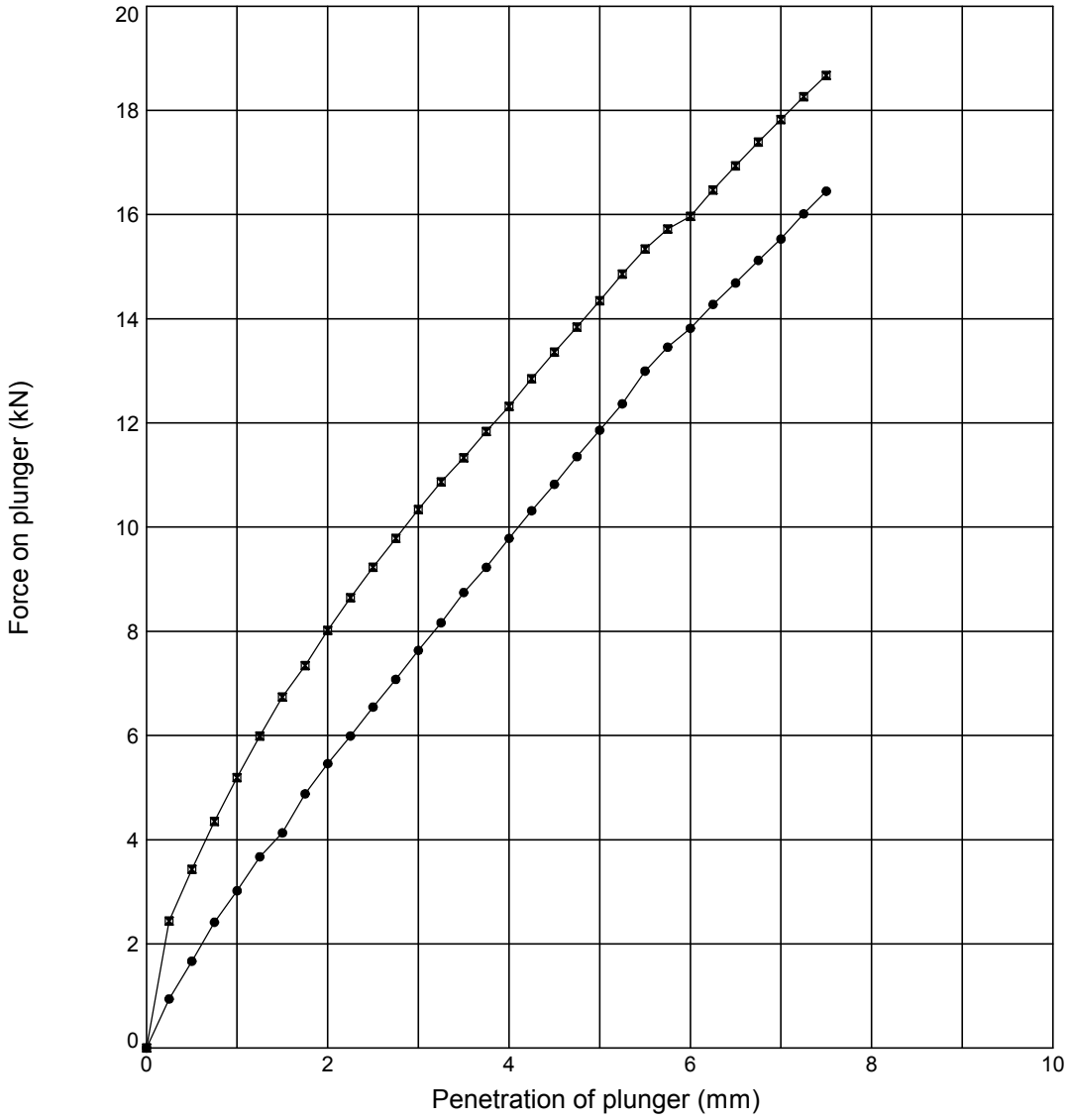
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**5.5**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**5.6**	**5.0**
Initial Bulk Density (Mg/m^3)	:	**2.06**	Surcharge (kg)	:	**4.0**	CBR value (%)	**59**	**72**
Initial Dry Density (Mg/m^3)	:	**1.95**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
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Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**

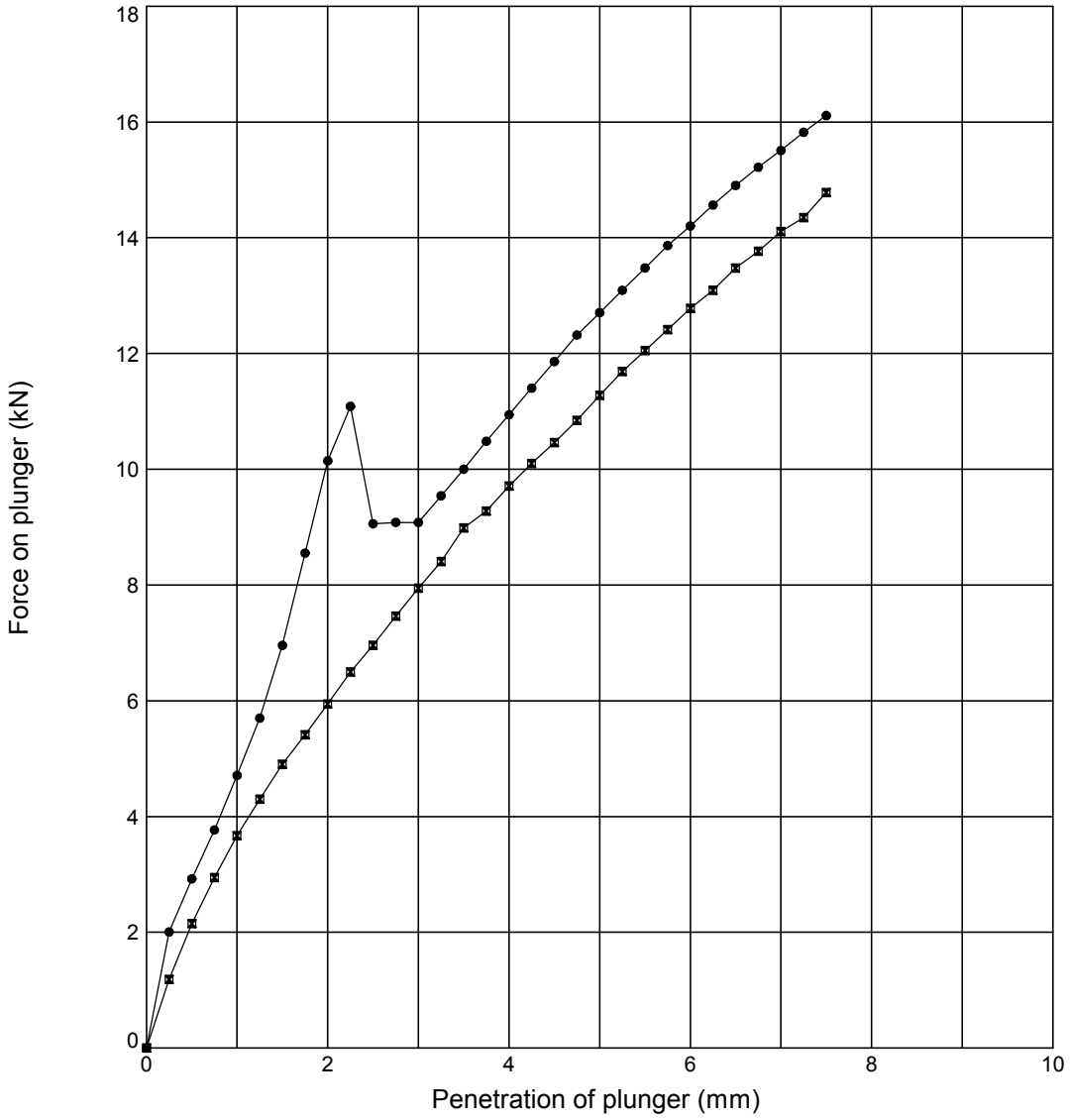
Contract	Contract Ref:
Willen Road	**782551**

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**7.3**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**7.6**	**6.6**
Initial Bulk Density (Mg/m^3)	:	**2.19**	Surcharge (kg)	:	**4.0**	CBR value (%)	**68**	**57**
Initial Dry Density (Mg/m^3)	:	**2.04**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⊠ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

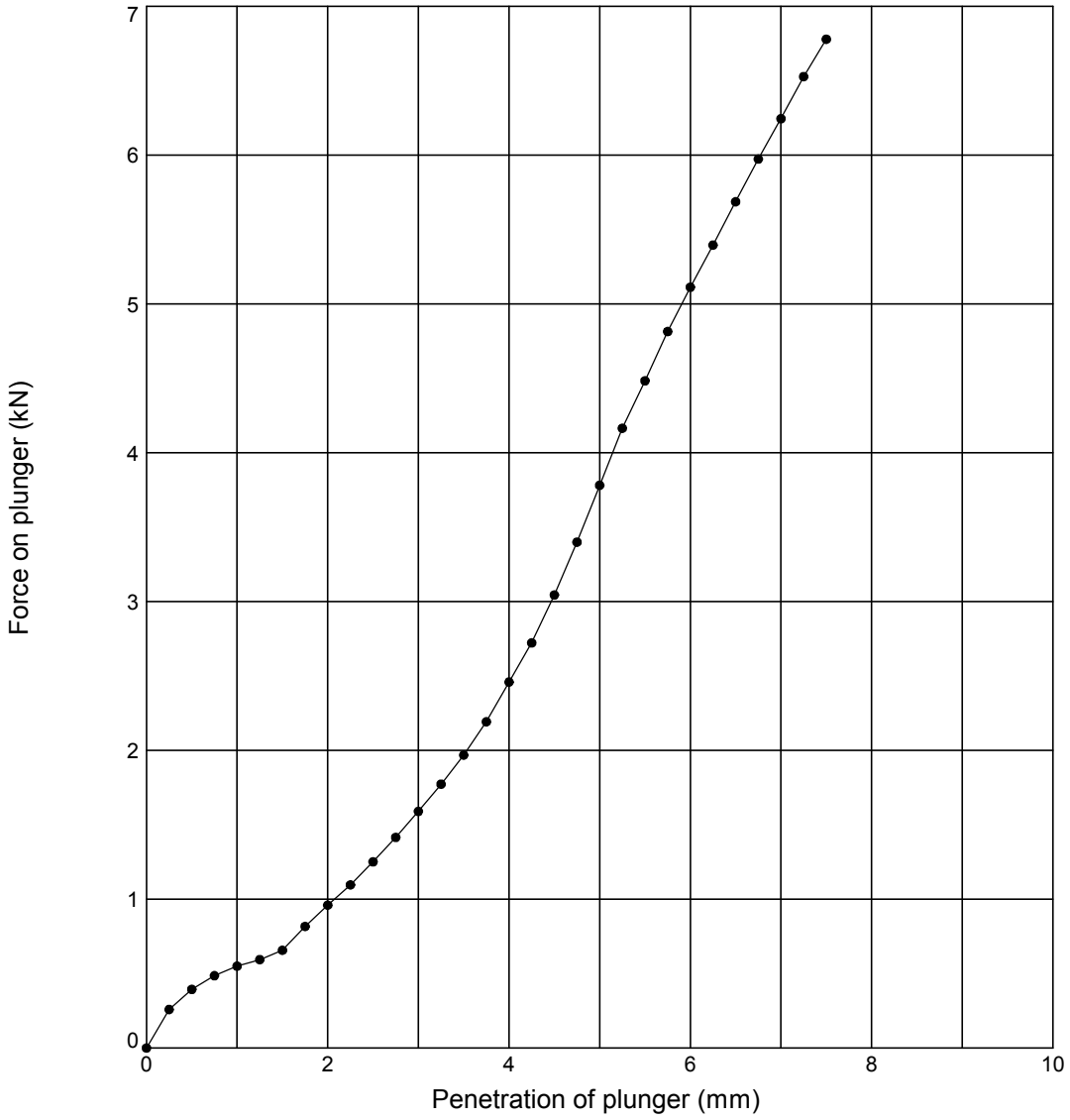
Compiled By	Date
[redacted] **MARK ATHORNE**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.5**	**8.4**
Initial Bulk Density (Mg/m^3)	:	**2.26**	Surcharge (kg)	:	**4.0**	CBR value (%)	**19**	**0.00**
Initial Dry Density (Mg/m^3)	:	**2.05**	Soaking Time (hrs)	:	**-**	Remarks: **Test on top of sample**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**23/05/17**

Contra[redacted]

Willen Road

Contract Ref:

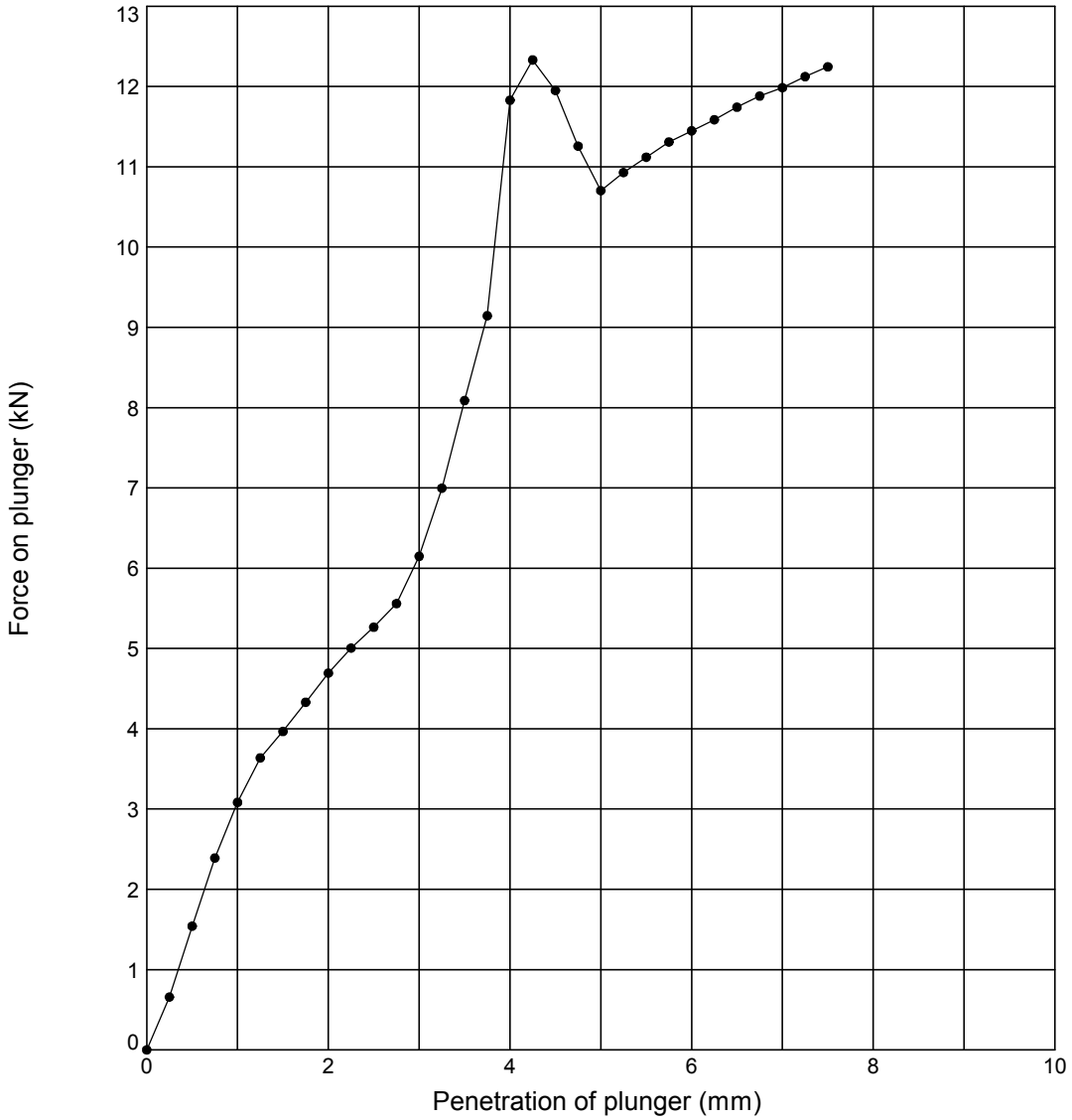
782551

AGS

LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**9.8**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**9.5**	**8.4**
Initial Bulk Density (Mg/m^3)	:	**2.26**	Surcharge (kg)	:	**4.0**	CBR value (%)	**54**	**0.00**
Initial Dry Density (Mg/m^3)	:	**2.05**	Soaking Time (hrs)	:	**-**	Remarks: **Test on base of sample**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
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Compiled By		Date
[redacted]	**MARK ATHORNE**	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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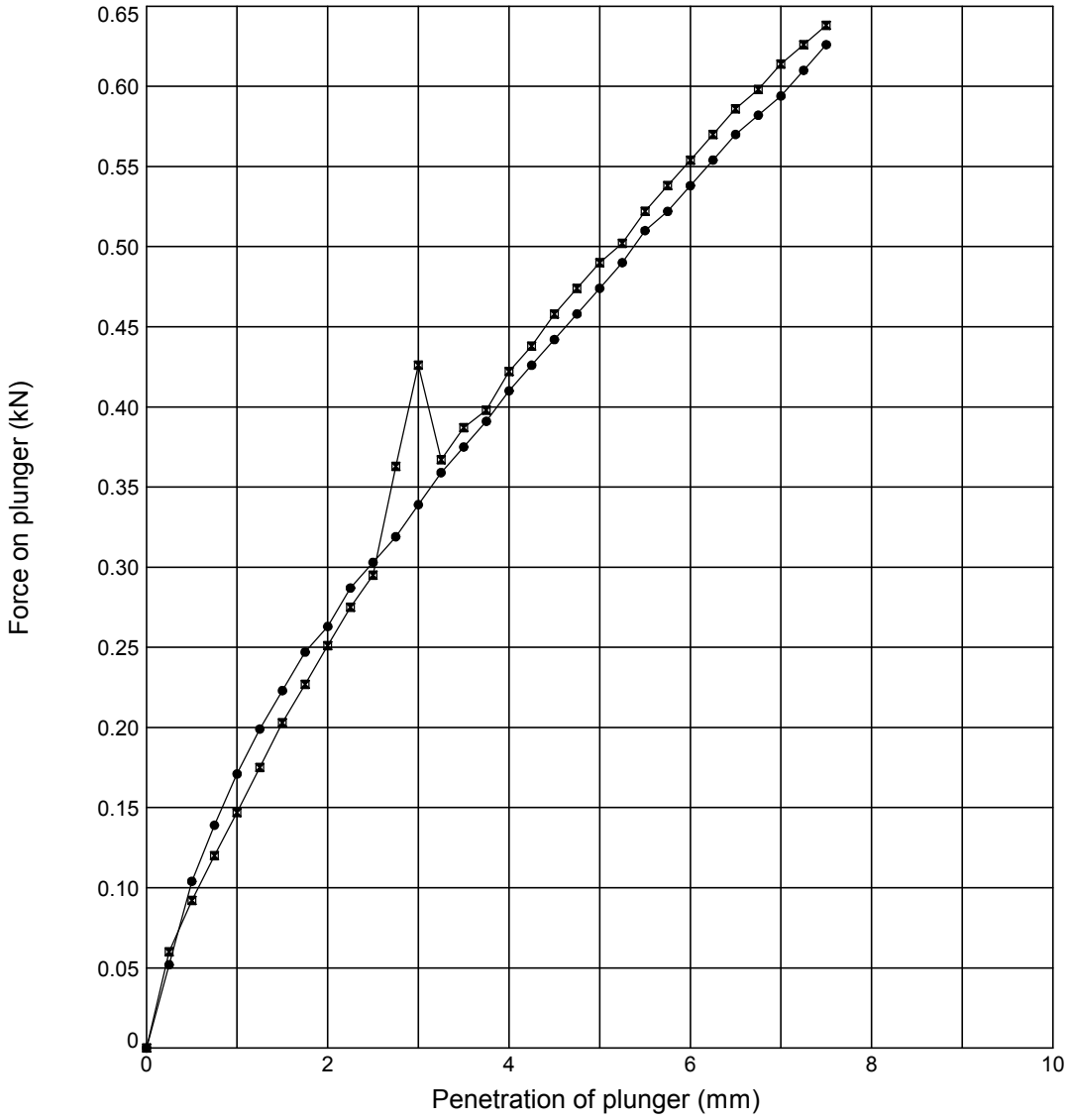
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**14**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**14**	**14**
Initial Bulk Density (Mg/m^3)	:	**2.18**	Surcharge (kg)	:	**4.0**	CBR value (%)	**2.4**	**2.5**
Initial Dry Density (Mg/m^3)	:	**1.92**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MAUREEN FISHER	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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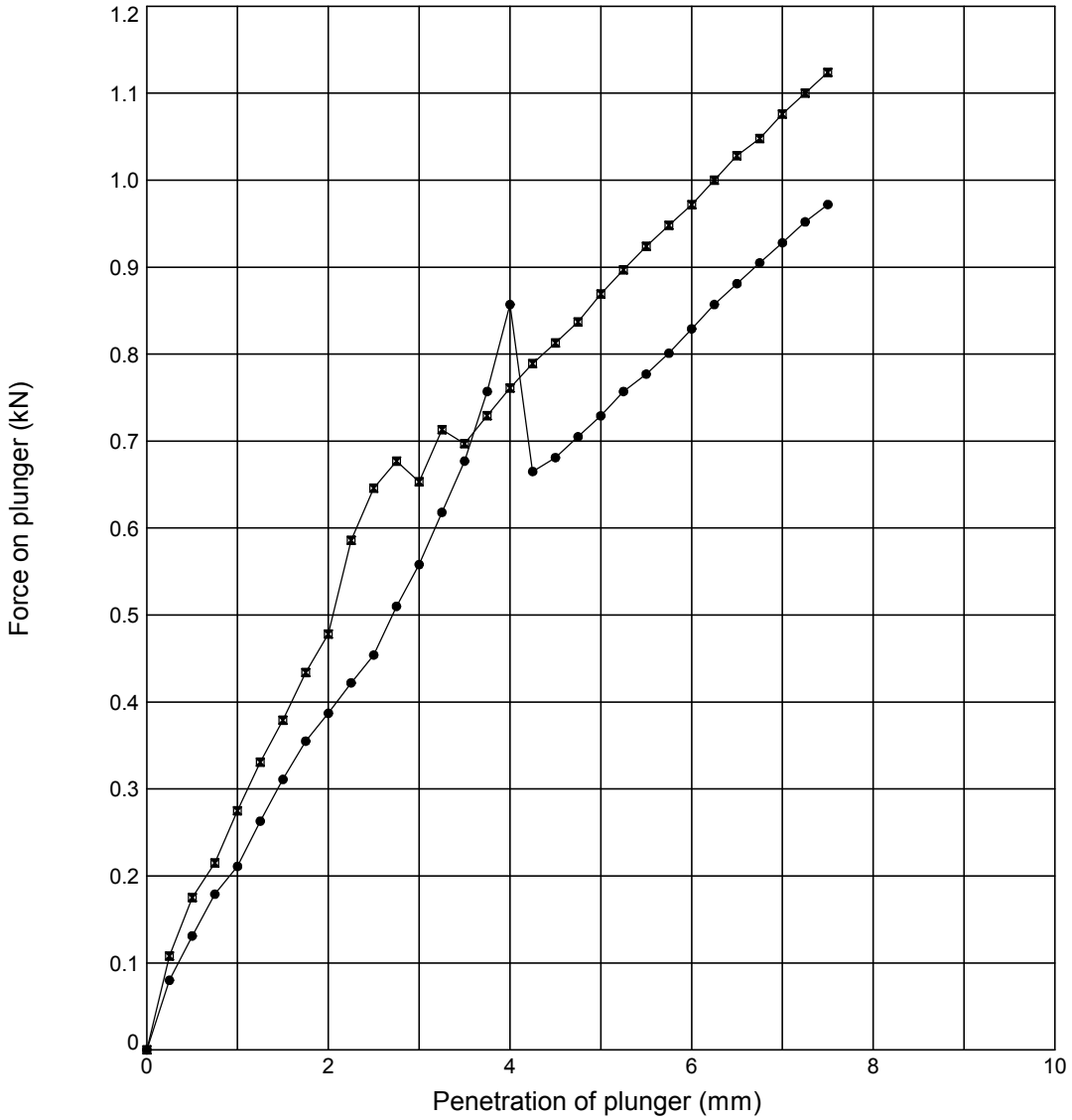
LABORATORY CALIFORNIA BEARING RATIO TEST

In accordance with clause 7 of BS1377:Part 4:1990
NON STANDARD TEST

Trial Pit: **TP133** Sample Ref: **1** Sample Type: **B** Depth (m): **0.40**



Initial Sample Conditions			Test Details			Test Results	Top	Base
Initial Moisture Content (%)	:	**13**	Compaction Type	:	**4.5 kg Dynamic**	Moisture Content (%)	**13**	**13**
Initial Bulk Density (Mg/m^3)	:	**2.20**	Surcharge (kg)	:	**4.0**	CBR value (%)	**3.7**	**4.9**
Initial Dry Density (Mg/m^3)	:	**1.94**	Soaking Time (hrs)	:	**-**	Remarks: **None**		
% retained on 20mm sieve	:	**5**	Swelling (mm)	:	**-**			

Sample Description	Key
Brown sandy slightly gravelly CLAY	● **Top** ⧓ **Base**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
[redacted]	
MAUREEN FISHER	**23/05/17**

Contract	Contract Ref:
Willen Road	**782551**

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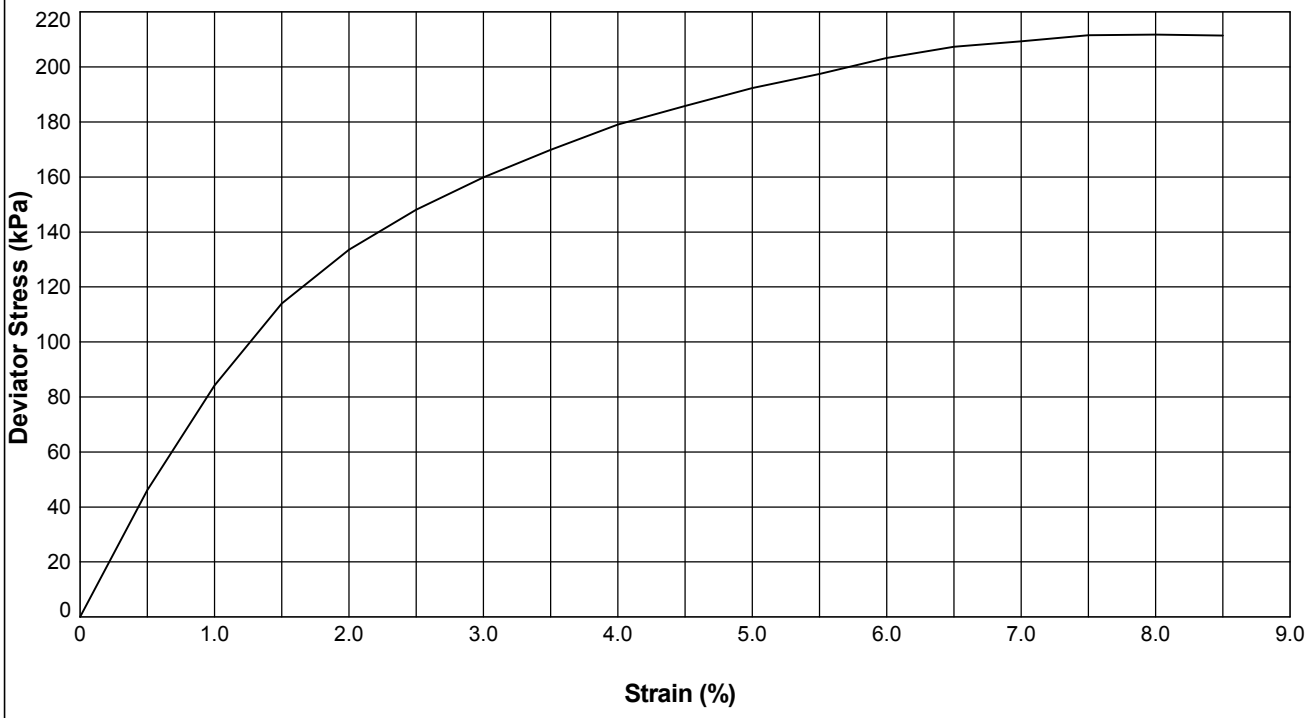
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Position ID: **CP102** Sample Ref: **1** Sample Type: **U** Depth (m): **6.50**

Description : **Dark grey brown slightly sandy CLAY**

STAGE NUMBER			**1**	**2**	**3**
SAMPLE DETAILS	Sample Condition		**Undisturbed**		
	Orientation of sample		**Vertical**		
	Diameter	(mm)	**103.33**		
	Height	(mm)	**211.00**		
	Moisture Content	(%)	**18**		
	Bulk Density	(Mg/m^3)	**2.09**		
	Dry Density	(Mg/m^3)	**1.78**		
TEST DETAILS	Membrane Thickness	(mm)	**0.30**		
	Rate of Axial Displacement	(%/min)	**2.00**		
	Cell Pressure	(kPa)	**130**		
	Membrane Correction	(kPa)	**0.56**		
	Corrected Deviator Stress	(kPa)	**212**		
	Undrained Shear Strength	(kPa)	**106**		
	Strain at Failure	(%)	**8.0**		
	Mode of Failure		**Brittle**		



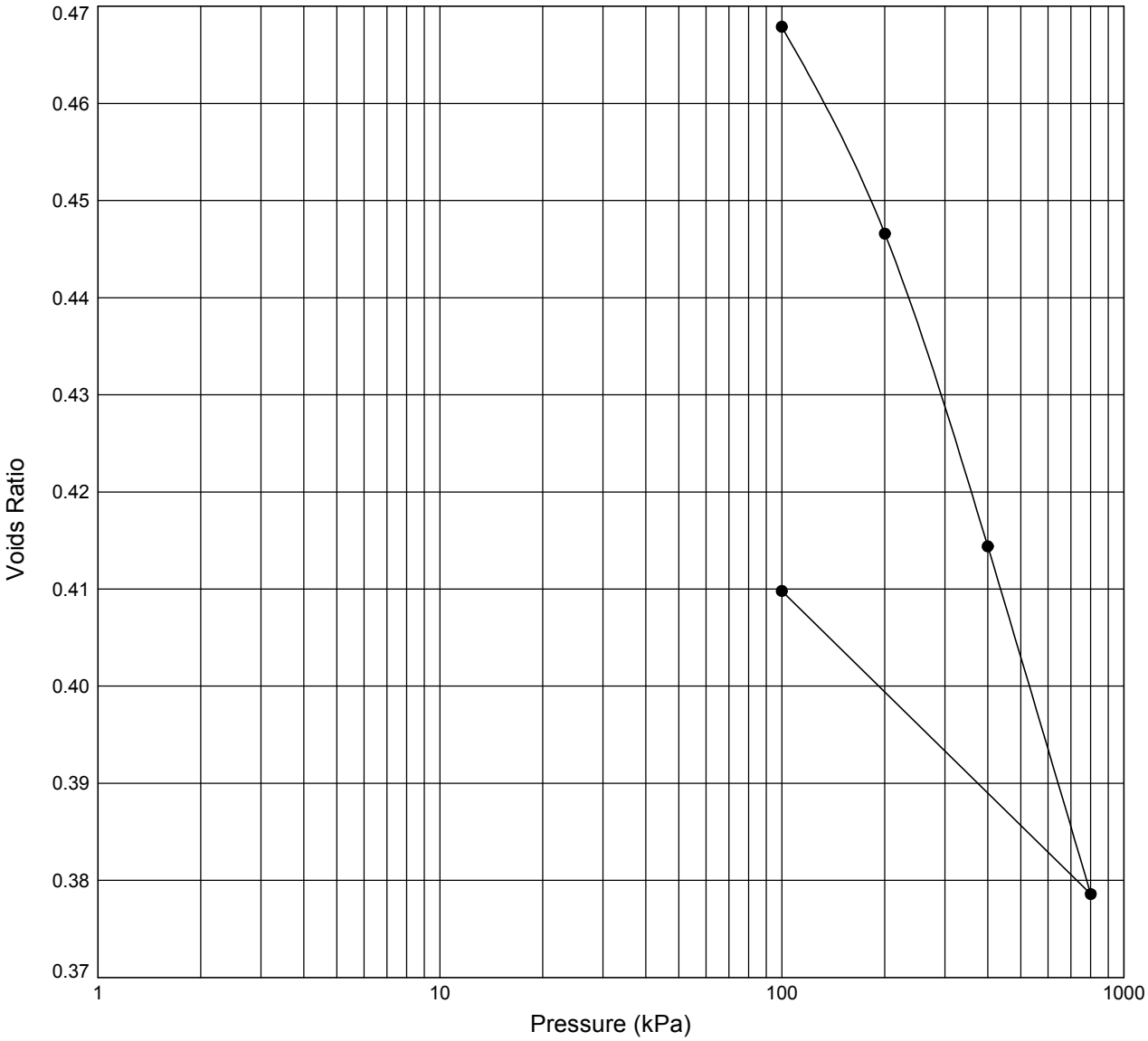
STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
[redacted]	**MARK ATHORNE**	**02/06/17**
Contract: **Willen Road**	Contract Ref: **782551**	

ONE DIMENSIONAL CONSOLIDATION TEST

In accordance with BS1377:Part 5:1990

Position ID: **CP102** Sample Ref: **1** Sample Type: **U** Depth (m): **6.50**



Initial Specimen Condition			Final Specimen Condition		
Moisture Content (%)	:	**16**	Moisture Content (%)	:	**17**
Bulk Density (Mg/m^3)	:	**2.07**	Bulk Density (Mg/m^3)	:	**2.20**
Dry Density (Mg/m^3)	:	**1.78**	Dry Density (Mg/m^3)	:	**1.88**
Void Ratio	:	**0.4856**	Void Ratio	:	**0.4098**

Specimen Details			
Description	Height (mm)	:	**19.10**
Dark grey brown slightly sandy CLAY	Diameter (mm)	:	**63.50**
	Particle Density (Mg/m^3) (assumed)	:	**2.65**
	Swelling Pressure (kPa)	:	**NA**

Test Results			
Pressure Range (kPa)	Mv (m^2/MN)	Cv (m^2/yr)	Voids Ratio
0 - 100	**0.12**	**16**	**0.4679**
100 - 200	**0.15**	**9.7**	**0.4466**
200 - 400	**0.11**	**7.1**	**0.4144**
400 - 800	**0.063**	**4.0**	**0.3786**
800 - 100	**NA**	**NA**	**0.4098**

Notes: Method of time-setting used: **T90.**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By: [redacted] **MARK ATHORNE** Date: **02/06/17**

Contr **Willen Road**

Contract Ref: **782551**

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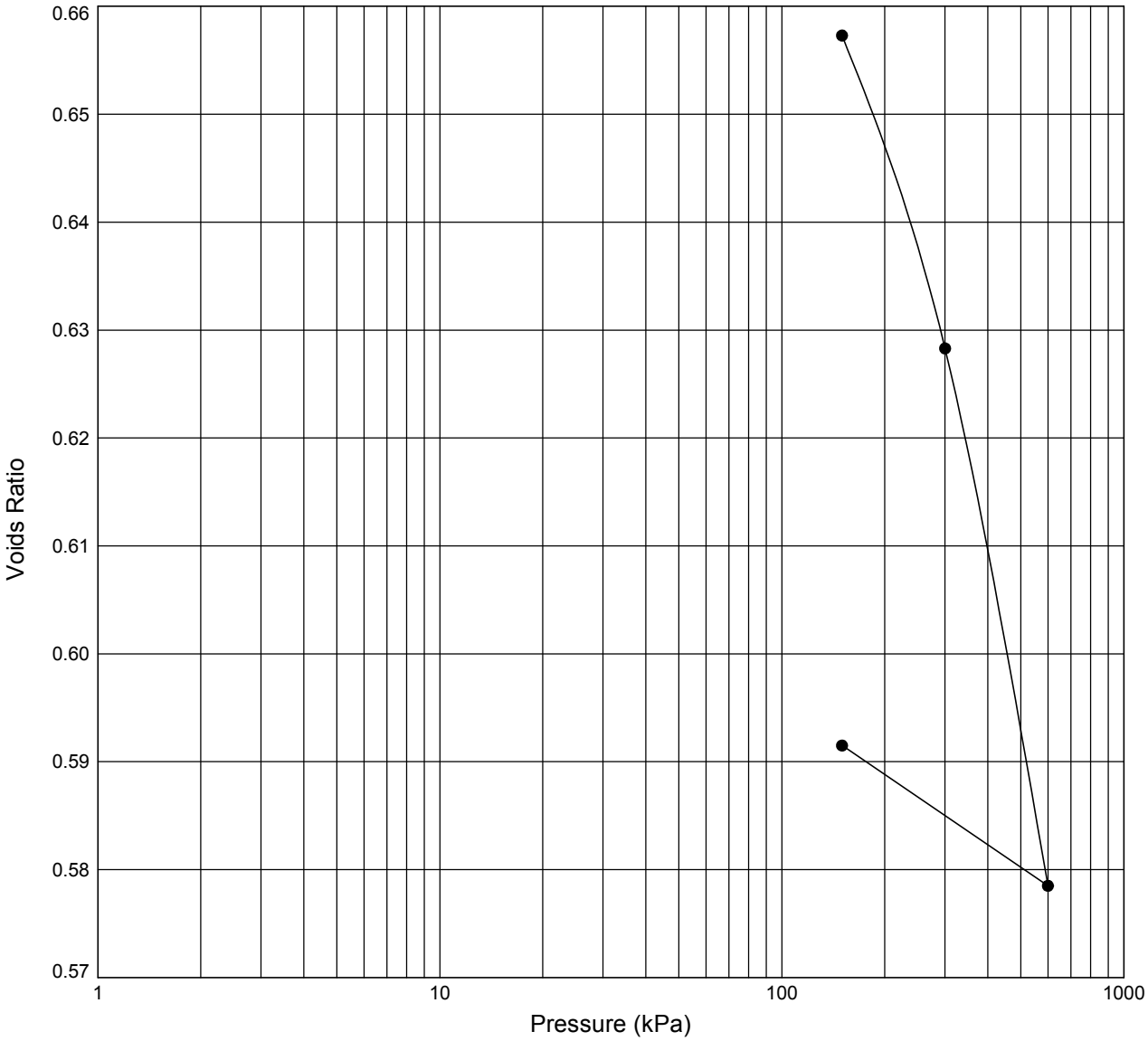
ONE DIMENSIONAL CONSOLIDATION TEST

In accordance with BS1377:Part 5:1990

Position ID: **CP102** Sample Ref: **2** Sample Type: **U** Depth (m): **7.50**



Initial Specimen Condition			Final Specimen Condition		
Moisture Content (%)	:	**26**	Moisture Content (%)	:	**27**
Bulk Density (Mg/m^3)	:	**1.97**	Bulk Density (Mg/m^3)	:	**2.11**
Dry Density (Mg/m^3)	:	**1.56**	Dry Density (Mg/m^3)	:	**1.66**
Void Ratio	:	**0.6971**	Void Ratio	:	**0.5915**

Specimen Details			
Description	Height (mm)	:	**19.10**
	Diameter (mm)	:	**63.50**
Dark grey CLAY	Particle Density (Mg/m^3) (assumed)	:	**2.65**
	Swelling Pressure (kPa)	:	**NA**

Test Results			
Pressure Range (kPa)	Mv (m^2/MN)	Cv (m^2/yr)	Voids Ratio
0 - 150	**0.16**	**20**	**0.6573**
150 - 300	**0.12**	**3.7**	**0.6283**
300 - 600	**0.10**	**3.8**	**0.5785**
1200 - 150	**NA**	**NA**	**0.5915**

Notes: Method of time-setting used: **T90.**

STRUCTURAL SOILS
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Compiled By	Date
MARK ATHORNE	**02/06/17**

Contrac **Willen Road**

Contract Ref: **782551**

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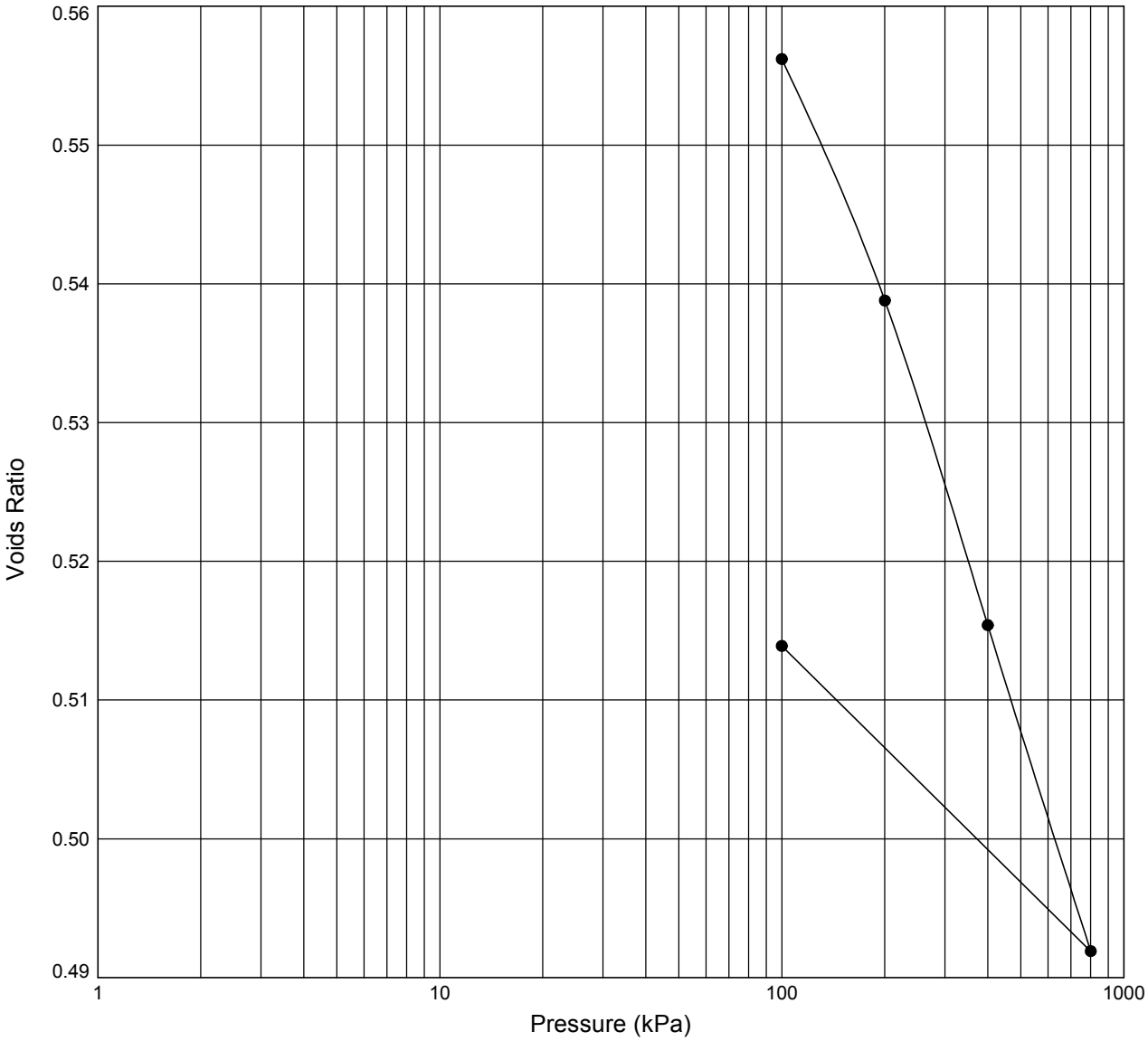
ONE DIMENSIONAL CONSOLIDATION TEST

In accordance with BS1377:Part 5:1990

Position ID: **CP107** Sample Ref: **6** Sample Type: **U** Depth (m): **6.50**



Initial Specimen Condition			Final Specimen Condition		
Moisture Content (%)	:	**22**	Moisture Content (%)	:	**21**
Bulk Density (Mg/m^3)	:	**2.02**	Bulk Density (Mg/m^3)	:	**2.12**
Dry Density (Mg/m^3)	:	**1.66**	Dry Density (Mg/m^3)	:	**1.75**
Void Ratio	:	**0.5993**	Void Ratio	:	**0.5139**

Specimen Details			
Description	Height (mm)	:	**19.10**
	Diameter (mm)	:	**63.50**
Grey silty slightly gravelly CLAY	Particle Density (Mg/m^3) (assumed)	:	**2.65**
	Swelling Pressure (kPa)	:	**NA**

Test Results			
Pressure Range (kPa)	Mv (m^2/MN)	Cv (m^2/yr)	Voids Ratio
0 - 100	**0.27**	**20**	**0.5562**
100 - 200	**0.11**	**19**	**0.5388**
200 - 400	**0.076**	**26**	**0.5154**
400 - 800	**0.039**	**18**	**0.4919**
800 - 100	**NA**	**NA**	**0.5139**

Notes: Method of time-setting used: **T90.**

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By	Date
MARK ATHORNE	**02/06/17**

Contract: **Willen Road**

Contract Ref: **782551**

AGS

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/02798
Issue Number: 1 **Date:** 28 April, 2017

Client: Structural Soils Limited (Castleford Lab)
The Potteries
Pottery Street
Castleford
West Yorkshire
UK
WF10 1NJ

Project Manager: Mark Athorne
Project Name: Willen Road, Newport Pagnell
Project Ref: 313114
Order No: N/A
Date Samples Received: 21/04/17
Date Instructions Received: 24/04/17
Date Analysis Completed: 28/04/17

Prepared by:	**Approved by:**
[redacted]	
Melanie Marshall	Iain Haslock
Laboratory Coordinator	Analytical Consultant

Envirolab Job Number: 17/02798

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02798/1	17/02798/2	17/02798/3	17/02798/4	17/02798/5	17/02798/6	17/02798/7	17/02798/8	Units	Method ref
Client Sample No	10									
Client Sample ID	CP102	CP102	CP104	CP104	CP104	CP105	CP105	CP105		
Depth to Top	4.50	6.00	5.00	7.00	9.00	2.00	4.00	7.00		
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	5	3	3A	3A	3	4B	3A	5A		
% Stones >10mm$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	<0.1	<0.1	% w/w	A-T-044
pH BRE$_D^{M\#}$	7.34	7.75	7.68	8.30	8.15	7.99	7.65	7.54	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	938	499	591	266	498	<10	597	866	mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.22	0.19	0.27	0.09	0.14	0.04	0.18	0.23	% w/w	A-T-028s
Sulphur BRE (total)$_D$	1.12	2.50	0.66	2.13	2.97	0.06	1.35	1.30	% w/w	A-T-024s

Envirolab Job Number: 17/02798

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02798/9	17/02798/10	17/02798/11	17/02798/12	17/02798/13	17/02798/14	17/02798/15	17/02798/16	Units	Method ref
Client Sample No										
Client Sample ID	TP105	TP118	TP119	TP119	TP121	TP127	TP128	TP129		
Depth to Top	2.50	1.20	1.60	2.80	1.40	1.50	1.00	1.00		
Depth To Bottom	3.70	2.50	2.10	3.00	1.80	2.20	2.00	2.10		
Date Sampled								29-Mar-17		
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	5A	6A	6A	3	6AE	4A	2AE	2AE		
% Stones >10mm$_A^{\#}$	<0.1	<0.1	<0.1	<0.1	5.6	<0.1	5.6	1.9	% w/w	A-T-044
pH BRE$_D^{M\#}$	8.22	8.00	7.99	7.98	7.48	6.97	7.76	8.11	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	28	108	51	110	117	<10	108	94	mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.03	0.06	0.06	0.03	0.08	<0.02	0.06	0.09	% w/w	A-T-028s
Sulphur BRE (total)$_D$	0.02	0.04	0.04	0.02	0.07	<0.01	0.04	0.09	% w/w	A-T-024s

Envirolab Job Number: 17/02798

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02798/17	17/02798/18	17/02798/19	17/02798/20	17/02798/21	17/02798/22	17/02798/23	17/02798/24	Units	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS103	WS104	WS108	WS110	WS110	WS112		
Depth to Top	1.50	4.00	3.50	3.00	3.00	3.00	6.00	3.00		
Depth To Bottom										
Date Sampled										
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
Sample Matrix Code	5A	5A	5	1AE	1A	6	5A	5		
% Stones >10mm$_A^{\#}$	13.9	6.3	<0.1	36.6	12.9	<0.1	<0.1	<0.1	% w/w	A-T-044
pH BRE$_D^{M\#}$	6.92	7.97	7.56	8.32	8.92	7.70	7.36	8.26	pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	<10	153	468	22	<10	122	850	49	mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	<0.02	0.11	0.15	<0.02	<0.02	0.05	0.21	0.04	% w/w	A-T-028s
Sulphur BRE (total)$_D$	<0.01	0.55	1.22	0.02	<0.01	0.20	1.22	0.03	% w/w	A-T-024s

Envirolab Job Number: 17/02798

Client Project Name: Willen Road, Newport Pagnell

Client Project Ref: 313114

Lab Sample ID	17/02798/25	17/02798/26	17/02798/27	17/02798/28	17/02798/29	17/02798/30			Units	Method ref
Client Sample No										
Client Sample ID	WS112	WS114	WS115	WS115	TP104	WS103				
Depth to Top	5.00	2.00	2.50	3.80	2.60	1.20				
Depth To Bottom					3.30	2.00				
Date Sampled					28-Mar-17					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil				
Sample Matrix Code	3E	5A	5A	2AB	3A	4A				
% Stones >10mm$_A^{\#}$	<0.1	11.7	11.9	24.9	<0.1	21.9			% w/w	A-T-044
pH BRE$_D^{M\#}$	7.95	7.08	8.34	7.78	8.07	8.48			pH	A-T-031s
Sulphate BRE (water sol 2:1)$_D^{M\#}$	394	<10	<10	360	134	12			mg/l	A-T-026s
Sulphate BRE (acid sol)$_D^{M\#}$	0.13	<0.02	<0.02	0.22	0.06	0.03			% w/w	A-T-028s
Sulphur BRE (total)$_D$	2.20	0.02	0.02	2.94	0.05	0.02			% 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. 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.

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 P
RSK WASTE SOILS CHARACTERISATION ASSESSMENT TOOL (HASWASTE)

envirolab

Haswaste, developed by Dr. Iain Haslock.

Site Code and Name										
TP/WS/BH			TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120	TP122
Depth (m)			0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20	1.20
Envirolab reference											
% Moisture		%									
pH (soil)			7.94	8.09	7.52	6.76	7.09	8.25	8.03	7.82	8.04
pH (leachate)											
Arsenic		mg/kg	5	11	14	9	14	24	9	8	14
Cadmium		mg/kg	0.6	0.8	1.0	0.6	0.9	0.8	0.5	0.8	0.9
Copper	updated v5.4e	mg/kg	16	8	10	6	9	1	14	11	12
CrVI or Chromium		mg/kg	1	1	1	1	1	1	1	1	1
Lead		mg/kg	52	18	33	23	12	8	147	21	16
Mercury		mg/kg	0.17	0.17	0.17	0.17	0.17	0.17	0.25	0.22	0.17
Nickel		mg/kg	14	24	26	15	30	17	16	25	25
Selenium		mg/kg	1	1	1	1	1	1	1	1	1
Zinc		mg/kg	67	52	128	36	46	37	79	53	66
Barium		mg/kg									
Beryllium		mg/kg									
Vanadium		mg/kg									
Cobalt		mg/kg									
Manganese		mg/kg									
Molybdenum		mg/kg									
Antimony		mg/kg									
Aluminium		mg/kg									
Bismuth		mg/kg									
CrIII		mg/kg									
Iron		mg/kg									
Strontium		mg/kg									
Tellurium		mg/kg									
Thallium		mg/kg									
Titanium		mg/kg									
Tungsten		mg/kg									
Ammoniacal N		mg/kg									
ws Boron		mg/kg									
PAH (Input Total PAH **OR** individual PAH results)											
Acenaphthene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.01
Acenaphthylene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Anthracene		mg/kg	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02
Benzo(a)anthracene		mg/kg	0.05	0.04	0.04	0.04	0.04	0.04	0.10	0.04	0.04
Benzo(a)pyrene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Benzo(b)fluoranthene		mg/kg	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05
Benzo(ghi)perylene		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Benzo(k)fluoranthene		mg/kg	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Chrysene		mg/kg	0.07	0.06	0.06	0.06	0.06	0.06	0.11	0.06	0.06
Dibenzo(ah)anthracene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Fluoranthene		mg/kg	0.11	0.08	0.09	0.08	0.08	0.08	0.22	0.09	0.08
Fluorene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01
Indeno(123cd)pyrene		mg/kg	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Naphthalene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Phenanthrene		mg/kg	0.04	0.03	0.04	0.03	0.03	0.03	0.16	0.06	0.03
Pyrene		mg/kg	0.09	0.07	0.09	0.07	0.07	0.07	0.18	0.07	0.07
Coronene		mg/kg									
Total PAHs (16 or 17)		mg/kg	0.46	0.08	0.37	0.08	0.08	0.08	0.87	0.24	0.08
TPH											
Petrol		mg/kg									
Diesel		mg/kg									
Lube Oil		mg/kg									
Crude Oil	new v5.4e	mg/kg									
White Spirit / Kerosene		mg/kg									
Creosote		mg/kg									
Unknown TPH with ID		mg/kg	2.7	0.1	0.8	0.4	0.1	0.1	10.5	13.2	0.1
Unknown TPHCWG		mg/kg									
Total Sulphide		mg/kg									
Complex Cyanide		mg/kg									
Free (or Total) Cyanide		mg/kg									
Thiocyanate		mg/kg									
Elemental/Free Sulphur		mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.											
Phenol		mg/kg									
Cresols		mg/kg									
Xylenols		mg/kg									
Resourcinol		mg/kg									
Phenols Total by HPLC		mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.											
Benzene		mg/kg									
Toluene		mg/kg									
Ethylbenzene		mg/kg									
Xylenes		mg/kg									
Total BTEX		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
PCBs (POPs)											
PCBs Total (eg EC7/WHO12)		mg/kg									
PBBs (POPs)											
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg									

Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH		TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120	TP122
Depth (m)		0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20	1.20
Envirolab reference										
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									
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg									
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg									
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg									
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg									
Dieldrin	mg/kg									
Endrin	mg/kg									
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg									
Heptachlor	mg/kg									
Hexachlorobenzene	mg/kg									
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg									
p,p'-DDT ***OR*** *Total DDT*	mg/kg									
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg									
Chlordecone (kepone)	mg/kg									
Pentachlorobenzene	mg/kg									
Mirex	mg/kg									
Toxaphene (camphechlor)	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									

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Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH	TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120	TP122
Depth (m)	0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20	1.20
Envirolab reference									

Asbestos in Soil	Thresholds									
Asbestos detected in Soil (enter Y or N)	Y		NAD	NAD	NAD	Y	NAD	NAD	NAD	NAD	NAD
			Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7								
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%				0.01000					
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%		0.00000	0.00000	0.00000	0.01000	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 cannot use Asbestos % results when visual identifiable pieces are present.								
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y					N					

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.

Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00085	0.00164	0.00204	0.00138	0.00204	0.00336	0.00138	0.00125	0.00204
Irritant HP4	≥10%	<1%	0.00247	0.00236	0.00298	0.00187	0.00287	0.00328	0.00277	0.00230	0.00320
Irritant HP4	≥20%	<1%	0.00470	0.00578	0.00644	0.00374	0.00710	0.00357	0.00495	0.00634	0.00643
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00005	0.00001	0.00004	0.00001	0.00001	0.00001	0.00009	0.00002	0.00001
Specifc Target Organ Toxicity HP5	≥1%		0.00283	0.00485	0.00525	0.01000	0.00606	0.00343	0.00323	0.00505	0.00505
Specifc Target Organ Toxicity HP5	≥10%		0.00838	0.00650	0.01600	0.00450	0.00575	0.00463	0.01470	0.00663	0.00825
Aspiration Toxicity HP5	≥10%		0.00028	0.00002	0.00009	0.00005	0.00002	0.00002	0.00106	0.00133	0.00002
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00068	0.00147	0.00187	0.00121	0.00187	0.00319	0.00121	0.00108	0.00187
Acute Toxicity HP6	≥5%	<0.1%	0.00033	0.00033	0.00033	0.00033	0.00033	0.00033	0.00033	0.00033	0.00033
Acute Toxicity HP6	≥25%	<1%	0.01834	0.01416	0.02584	0.01059	0.01414	0.00908	0.02957	0.01514	0.01637
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00003	0.00002	0.00002
Acute Toxicity HP6	≥2.5%	<0.1%	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00007	0.00009	0.00011	0.00007	0.00010	0.00009	0.00006	0.00009	0.00010
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00027	0.00029	0.00031	0.00027	0.00030	0.00029	0.00027	0.00029	0.00030
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014
Acute Toxicity HP6	≥22.5%	<1%	0.01822	0.01406	0.02569	0.01051	0.01403	0.00898	0.02939	0.01502	0.01626
Carcinogenic HP7	≥0.1%		0.00520	0.00485	0.00525	0.00303	0.00606	0.00343	0.01470	0.00505	0.00505
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00005	0.00001	0.00004	0.00001	0.00001	0.00001	0.00009	0.00002	0.00001
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		2.70	0.10	0.80	0.40	0.10	0.10	10.50	13.20	0.10
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		1.48148	40.00000	5.00000	10.00000	40.00000	40.00000	0.38095	0.30303	40.00000
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		7.94	8.09	7.52	6.76	7.09	8.25	8.03	7.82	8.04
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		7.94	8.09	7.52	6.76	7.09	8.25	8.03	7.82	8.04
Toxic for Reproduction HP10	≥0.3%		0.00838	0.00650	0.01600	0.00450	0.00606	0.00463	0.01470	0.00663	0.00825
Toxic for Reproduction HP10	≥3%		0.00027	0.00019	0.00019	0.00019	0.00019	0.00019	0.00105	0.00132	0.00019
Mutagenic HP11	≥0.1%		0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		2.70	0.10	0.80	0.40	0.10	0.10	10.50	13.20	0.10
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		1.48148	40.00000	5.00000	10.00000	40.00000	40.00000	0.38095	0.30303	40.00000
Mutagenic HP11	≥1%		0.00283	0.00485	0.00525	0.00303	0.00606	0.00343	0.00323	0.00505	0.00505
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00283	0.00485	0.00525	0.00303	0.00606	0.00343	0.00323	0.00505	0.00505
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.07768	0.06400	0.11234	0.04870	0.06552	0.05054	0.12509	0.06692	0.07444
Ecotoxic HP14	≥25%	<0.1%	0.01940	0.01600	0.02808	0.01217	0.01638	0.01264	0.03118	0.01660	0.01861
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.01967	0.01601	0.02816	0.01222	0.01640	0.01265	0.03222	0.01792	0.01862

Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH		TP104	TP108	TP108	TP110	TP112	TP113	TP115	TP120	TP122
Depth (m)		0.60	0.40	1.40	0.50	0.40	2.60	1.00	1.20	1.20
Envirolab reference										
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%	0.000046	0.000008	0.000037	0.000008	0.000008	0.000008	0.000087	0.000024	0.000008
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT)	≥0.025%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

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Haswaste, developed by Dr. Iain Haslock.

Site Code and Name										
TP/WS/BH			TP128	TP131	TP133	TP136	WS110	WS112	WS01	WS02	WS04
Depth (m)			0.60	2.50	1.20	0.20	2.20	1.10	3.50	1.80	0.50
Envirolab reference											
% Moisture		%									
pH (soil)			7.89	7.67	7.72	6.91	7.60	7.80			
pH (leachate)											
Arsenic		mg/kg	16	10	14	10	12	10		10	12
Cadmium		mg/kg	1.1	0.7	1.3	0.8	0.6	0.8		0.5	0.5
Copper	updated v5.4e	mg/kg	11	12	8	12	6	9		16	8
CrVI or Chromium		mg/kg	1	1	1	1	1	1		1	1
Lead		mg/kg	13	21	14	30	20	13		20	10
Mercury		mg/kg	0.17	0.30	0.17	0.17	0.32	0.17		0.20	0.17
Nickel		mg/kg	32	19	30	18	16	25		27	23
Selenium		mg/kg	1	1	1	1	1	1		1	1
Zinc		mg/kg	52	52	65	53	45	53		58	37
Barium		mg/kg									
Beryllium		mg/kg									
Vanadium		mg/kg									
Cobalt		mg/kg									
Manganese		mg/kg									
Molybdenum		mg/kg									
Antimony		mg/kg									
Aluminium		mg/kg									
Bismuth		mg/kg									
CrIII		mg/kg									
Iron		mg/kg									
Strontium		mg/kg									
Tellurium		mg/kg									
Thallium		mg/kg									
Titanium		mg/kg									
Tungsten		mg/kg									
Ammoniacal N		mg/kg									
ws Boron		mg/kg									
PAH (Input Total PAH **OR** individual PAH results)											
Acenaphthene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01
Acenaphthylene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01
Anthracene		mg/kg	0.02	0.02	0.02	0.02	0.02	0.02		0.02	0.02
Benzo(a)anthracene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04		0.06	0.04
Benzo(a)pyrene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04		0.05	0.04
Benzo(b)fluoranthene		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.05
Benzo(ghi)perylene		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05		0.05	0.05
Benzo(k)fluoranthene		mg/kg	0.07	0.07	0.07	0.07	0.07	0.07		0.07	0.07
Chrysene		mg/kg	0.06	0.06	0.06	0.06	0.06	0.06		0.10	0.06
Dibenzo(ah)anthracene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04		0.04	0.04
Fluoranthene		mg/kg	0.08	0.08	0.08	0.08	0.08	0.08		0.19	0.08
Fluorene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01		0.01	0.01
Indeno(123cd)pyrene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03		0.03	0.03
Naphthalene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03		0.03	0.03
Phenanthrene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03		0.06	0.03
Pyrene		mg/kg	0.07	0.07	0.07	0.07	0.07	0.07		0.15	0.07
Coronene		mg/kg									
Total PAHs (16 or 17)		mg/kg	0.08	0.08	0.08	0.08	0.08	0.08		0.93	0.64
TPH											
Petrol		mg/kg									
Diesel		mg/kg									
Lube Oil		mg/kg									
Crude Oil	new v5.4e	mg/kg									
White Spirit / Kerosene		mg/kg									
Creosote		mg/kg									
Unknown TPH with ID		mg/kg	0.1	13.4	0.1	0.1	7.4	3.1		0.1	0.1
Unknown TPHCWG		mg/kg									
Total Sulphide		mg/kg									
Complex Cyanide		mg/kg									
Free (or Total) Cyanide		mg/kg									
Thiocyanate		mg/kg									
Elemental/Free Sulphur		mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.											
Phenol		mg/kg									
Cresols		mg/kg									
Xylenols		mg/kg									
Resourcinol		mg/kg									
Phenols Total by HPLC		mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.											
Benzene		mg/kg									
Toluene		mg/kg									
Ethylbenzene		mg/kg									
Xylenes		mg/kg									
Total BTEX		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
PCBs (POPs)											
PCBs Total (eg EC7/WHO12)		mg/kg									
PBBs (POPs)											
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg									

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Site Code and Name									
TP/WS/BH	TP128	TP131	TP133	TP136	WS110	WS112	WS01	WS02	WS04
Depth (m)	0.60	2.50	1.20	0.20	2.20	1.10	3.50	1.80	0.50
Envirolab reference									
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								
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg								
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg								
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg								
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg								
Dieldrin	mg/kg								
Endrin	mg/kg								
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg								
Heptachlor	mg/kg								
Hexachlorobenzene	mg/kg								
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg								
p,p'-DDT ***OR*** *Total DDT*	mg/kg								
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg								
Chlordecone (kepone)	mg/kg								
Pentachlorobenzene	mg/kg								
Mirex	mg/kg								
Toxaphene (camphechlor)	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								

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Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH	TP128	TP131	TP133	TP136	WS110	WS112	WS01	WS02	WS04
Depth (m)	0.60	2.50	1.20	0.20	2.20	1.10	3.50	1.80	0.50
Envirolab reference									

Asbestos in Soil	Thresholds									
Asbestos detected in Soil (enter Y or N)	Y	NAD	NAD	NAD	NAD	NAD	NAD		NAD	NAD
		Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7								
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%	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 cannot use Asbestos % results when visual identifiable pieces are present.								
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y									

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.

Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00230	0.00151	0.00204	0.00151	0.00178	0.00151	0.00000	0.00151	0.00178
Irritant HP4	≥10%	<1%	0.00336	0.00268	0.00275	0.00268	0.00226	0.00234	0.00000	0.00313	0.00249
Irritant HP4	≥20%	<1%	0.00773	0.00522	0.00699	0.00502	0.00394	0.00609	0.00001	0.00739	0.00563
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00009	0.00006
Specifc Target Organ Toxicity HP5	≥1%		0.00646	0.00384	0.00606	0.00364	0.00323	0.00505	0.00001	0.00545	0.00465
Specifc Target Organ Toxicity HP5	≥10%		0.00650	0.00650	0.00813	0.00663	0.00563	0.00663	0.00001	0.00725	0.00463
Aspiration Toxicity HP5	≥10%		0.00002	0.00135	0.00002	0.00002	0.00075	0.00032	0.00001	0.00002	0.00002
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00213	0.00135	0.00187	0.00134	0.00162	0.00134	0.00000	0.00134	0.00160
Acute Toxicity HP6	≥5%	<0.1%	0.00033	0.00033	0.00033	0.00033	0.00033	0.00033	0.00000	0.00033	0.00033
Acute Toxicity HP6	≥25%	<1%	0.01564	0.01389	0.01664	0.01472	0.01162	0.01410	0.00000	0.01668	0.01130
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00003	0.00002	0.00002	0.00003	0.00002	0.00000	0.00002	0.00002
Acute Toxicity HP6	≥2.5%	<0.1%	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00000	0.00019	0.00019
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00012	0.00008	0.00014	0.00009	0.00007	0.00009	0.00001	0.00006	0.00006
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00032	0.00029	0.00034	0.00029	0.00028	0.00029	0.00000	0.00026	0.00026
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00000	0.00014	0.00014
Acute Toxicity HP6	≥22.5%	<1%	0.01551	0.01380	0.01649	0.01462	0.01154	0.01400	0.00001	0.01652	0.01118
Carcinogenic HP7	≥0.1%		0.00646	0.00384	0.00606	0.00364	0.00323	0.00505	0.00001	0.00545	0.00465
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00000	0.00009	0.00006
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.10	13.40	0.10	0.10	7.40	3.10	0.00	0.10	0.10
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		40.00000	0.29851	40.00000	40.00000	0.54054	1.29032	#DIV/0!	50.00000	40.00000
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		7.89	7.67	7.72	6.91	7.60	7.80	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		7.89	7.67	7.72	6.91	7.60	7.80	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.00650	0.00650	0.00813	0.00663	0.00563	0.00663	0.00000	0.00725	0.00465
Toxic for Reproduction HP10	≥3%		0.00019	0.00134	0.00019	0.00019	0.00074	0.00031	0.00001	0.00019	0.00019
Mutagenic HP11	≥0.1%		0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00001	0.00019	0.00019
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.10	13.40	0.10	0.10	7.40	3.10	0.00	0.10	0.10
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		40.00000	0.29851	40.00000	40.00000	0.54054	1.29032	#DIV/0!	50.00000	40.00000
Mutagenic HP11	≥1%		0.00646	0.00384	0.00606	0.00364	0.00323	0.00505	0.00000	0.00545	0.00465
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00646	0.00384	0.00606	0.00364	0.00323	0.00505	0.00000	0.00545	0.00465
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.07258	0.06298	0.07553	0.06573	0.05473	0.06335	0.00000	0.07365	0.05312
Ecotoxic HP14	≥25%	<0.1%	0.01815	0.01562	0.01889	0.01644	0.01361	0.01581	0.00000	0.01842	0.01328
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.01816	0.01696	0.01890	0.01645	0.01435	0.01612	0.00001	0.01843	0.01330

Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH	TP128	TP131	TP133	TP136	WS110	WS112	WS01	WS02	WS04
Depth (m)	0.60	2.50	1.20	0.20	2.20	1.10	3.50	1.80	0.50
Envirolab reference									
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%	0.000008	0.000008	0.000008	0.000008	0.000008	0.000008	0.000000	0.000093	0.000064
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT)	≥0.025%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

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Site Code and Name										
TP/WS/BH			WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07	
Depth (m)			0.40	0.50	4.30	0.20	0.60	0.50	0.50	0.20	
Envirolab reference											
% Moisture		%									
pH (soil)											
pH (leachate)											
Arsenic		mg/kg	12	11		12	14	25		11	
Cadmium		mg/kg	0.5	0.5		0.5	0.5	0.5		0.5	
Copper	updated v5.4e	mg/kg	14	22		12	10	16		15	
CrVI or Chromium		mg/kg	1	1		1	1	1		1	
Lead		mg/kg	15	67		38	13	20		35	
Mercury		mg/kg	0.21	0.18		0.17	0.17	0.20		0.17	
Nickel		mg/kg	20	26		17	30	23		20	
Selenium		mg/kg	1	1		1	1	1		1	
Zinc		mg/kg	55	62		48	44	65		57	
Barium		mg/kg									
Beryllium		mg/kg									
Vanadium		mg/kg									
Cobalt		mg/kg									
Manganese		mg/kg									
Molybdenum		mg/kg									
Antimony		mg/kg									
Aluminium		mg/kg									
Bismuth		mg/kg									
CrIII		mg/kg									
Iron		mg/kg									
Strontium		mg/kg									
Tellurium		mg/kg									
Thallium		mg/kg									
Titanium		mg/kg									
Tungsten		mg/kg									
Ammoniacal N		mg/kg									
ws Boron		mg/kg									
PAH (Input Total PAH **OR** individual PAH results)											
Acenaphthene		mg/kg	0.02	0.01		0.01	0.01	0.01		0.01	
Acenaphthylene		mg/kg	0.01	0.01		0.01	0.01	0.01		0.01	
Anthracene		mg/kg	0.05	0.02		0.02	0.02	0.03		0.02	
Benzo(a)anthracene		mg/kg	0.15	0.04		0.04	0.04	0.13		0.11	
Benzo(a)pyrene		mg/kg	0.12	0.04		0.10	0.04	0.13		0.14	
Benzo(b)fluoranthene		mg/kg	0.22	0.05		0.12	0.05	0.22		0.15	
Benzo(ghi)perylene		mg/kg	0.10	0.05		0.05	0.05	0.08		0.08	
Benzo(k)fluoranthene		mg/kg	0.12	0.07		0.07	0.07	0.13		0.10	
Chrysene		mg/kg	0.22	0.06		0.10	0.06	0.22		0.18	
Dibenzo(ah)anthracene		mg/kg	0.04	0.04		0.04	0.04	0.04		0.04	
Fluoranthene		mg/kg	0.50	0.08		0.10	0.08	0.42		0.32	
Fluorene		mg/kg	0.01	0.01		0.01	0.01	0.01		0.01	
Indeno(123cd)pyrene		mg/kg	0.09	0.03		0.03	0.03	0.08		0.05	
Naphthalene		mg/kg	0.03	0.03		0.03	0.03	0.03		0.03	
Phenanthrene		mg/kg	0.20	0.03		0.03	0.03	0.12		0.05	
Pyrene		mg/kg	0.33	0.07		0.09	0.08	0.32		0.26	
Coronene		mg/kg									
Total PAHs (16 or 17)		mg/kg	2.21	0.64	0.00	0.85	0.65	1.98	0.00	1.56	
TPH											
Petrol		mg/kg									
Diesel		mg/kg									
Lube Oil		mg/kg									
Crude Oil	new v5.4e	mg/kg									
White Spirit / Kerosene		mg/kg									
Creosote		mg/kg									
Unknown TPH with ID		mg/kg	0.1	0.1		0.1	0.1	0.1		0.1	
Unknown TPHCWG		mg/kg									
Total Sulphide		mg/kg									
Complex Cyanide		mg/kg									
Free (or Total) Cyanide		mg/kg									
Thiocyanate		mg/kg									
Elemental/Free Sulphur		mg/kg									
Phenols Input Total Phenols HPLC **OR** individual Phenol results.											
Phenol		mg/kg									
Cresols		mg/kg									
Xylenols		mg/kg									
Resourcinol		mg/kg									
Phenols Total by HPLC		mg/kg									
BTEX Input Total BTEX **OR** individual BTEX results.											
Benzene		mg/kg									
Toluene		mg/kg									
Ethylbenzene		mg/kg									
Xylenes		mg/kg									
Total BTEX		mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
PCBs (POPs)											
PCBs Total (eg EC7/WHO12)		mg/kg									
PBBs (POPs)											
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg									

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Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH		WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07	
Depth (m)		0.40	0.50	4.30	0.20	0.60	0.50	0.50	0.20	
Envirolab reference										
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									
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*	mg/kg									
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*	mg/kg									
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*	mg/kg									
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*	mg/kg									
Dieldrin	mg/kg									
Endrin	mg/kg									
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*	mg/kg									
Heptachlor	mg/kg									
Hexachlorobenzene	mg/kg									
o,p'-DDT *(leave empty if total DDT results used)*	mg/kg									
p,p'-DDT ***OR*** *Total DDT*	mg/kg									
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*	mg/kg									
Chlordecone (kepone)	mg/kg									
Pentachlorobenzene	mg/kg									
Mirex	mg/kg									
Toxaphene (camphechlor)	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									

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Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH		WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07	
Depth (m)		0.40	0.50	4.30	0.20	0.60	0.50	0.50	0.20	
Envirolab reference										
Asbestos in Soil	Thresholds									
Asbestos detected in Soil (enter Y or N)	Y	NAD	NAD		NAD	NAD	NAD		NAD	
		Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7								
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%	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 cannot use Asbestos % results when visual identifiable pieces are present.								
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y									
		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.								
Hazardous Property	Thresholds	Cut Off Value								
Corrosive HP8	≥5%	<1%	0.00178	0.00164	0.00000	0.00178	0.00204	0.00349	0.00000	0.00164	0.00000
Irritant HP4	≥10%	<1%	0.00317	0.00394	0.00000	0.00294	0.00298	0.00511	0.00000	0.00315	0.00000
Irritant HP4	≥20%	<1%	0.00591	0.00782	0.00001	0.00490	0.00728	0.00671	0.00001	0.00593	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00022	0.00006	0.00001	0.00009	0.00007	0.00020	0.00001	0.00016	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00404	0.00525	0.00001	0.00343	0.00606	0.00465	0.00001	0.00404	0.00000
Specifc Target Organ Toxicity HP5	≥10%		0.00688	0.00775	0.00001	0.00600	0.00550	0.00813	0.00001	0.00713	0.00000
Aspiration Toxicity HP5	≥10%		0.00002	0.00002	0.00001	0.00002	0.00002	0.00002	0.00001	0.00002	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00161	0.00147	0.00000	0.00160	0.00187	0.00332	0.00000	0.00147	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.00033	0.00033	0.00000	0.00033	0.00033	0.00033	0.00000	0.00033	0.00000
Acute Toxicity HP6	≥25%	<1%	0.01434	0.02232	0.00000	0.01474	0.01412	0.01689	0.00000	0.01661	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00002	0.00002	0.00000	0.00002	0.00002	0.00002	0.00000	0.00002	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00019	0.00019	0.00000	0.00019	0.00019	0.00019	0.00000	0.00019	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00006	0.00006	0.00001	0.00006	0.00006	0.00006	0.00001	0.00006	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00026	0.00026	0.00000	0.00026	0.00026	0.00026	0.00000	0.00026	0.00000
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00000	0.00014	0.00014	0.00014	0.00000	0.00014	0.00000
Acute Toxicity HP6	≥22.5%	<1%	0.01400	0.02219	0.00001	0.01460	0.01400	0.01658	0.00001	0.01637	0.00000
Carcinogenic HP7	≥0.1%		0.00404	0.00670	0.00001	0.00380	0.00606	0.00465	0.00001	0.00404	0.00000
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00022	0.00006	0.00000	0.00009	0.00007	0.00020	0.00000	0.00016	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.10	0.10	0.00	0.10	0.10	0.10	0.00	0.10	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		120.00000	40.00000	#DIV/0!	100.00000	40.00000	130.00000	#DIV/0!	140.00000	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.00688	0.00775	0.00000	0.00600	0.00606	0.00813	0.00000	0.00713	0.00000
Toxic for Reproduction HP10	≥3%		0.00019	0.00019	0.00001	0.00019	0.00019	0.00019	0.00001	0.00019	0.00000
Mutagenic HP11	≥0.1%		0.00022	0.00019	0.00001	0.00019	0.00019	0.00020	0.00001	0.00019	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.10	0.10	0.00	0.10	0.10	0.10	0.00	0.10	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		120.00000	40.00000	#DIV/0!	100.00000	40.00000	130.00000	#DIV/0!	140.00000	#DIV/0!
Mutagenic HP11	≥1%		0.00404	0.00525	0.00000	0.00343	0.00606	0.00465	0.00000	0.00404	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00404	0.00525	0.00000	0.00343	0.00606	0.00465	0.00000	0.00404	0.00000
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.06559	0.09665	0.00000	0.06695	0.06545	0.08263	0.00000	0.07406	0.00000
Ecotoxic HP14	≥25%	<0.1%	0.01642	0.02417	0.00000	0.01674	0.01636	0.02067	0.00000	0.01852	0.00000
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.01641	0.02418	0.00001	0.01675	0.01638	0.02067	0.00001	0.01853	0.00000

Haswaste, developed by Dr. Iain Haslock.

Site Code and Name									
TP/WS/BH		WS06	TP01	TP01	TP02	TP04	TP05	TP06	TP07	
Depth (m)		0.40	0.50	4.30	0.20	0.60	0.50	0.50	0.20	
Envirolab reference										
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%	0.000221	0.000064	0.000000	0.000085	0.000065	0.000198	0.000000	0.000156	0.000000
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT)	≥0.025%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000