



DESFORD LANE, RATBY, LEICESTERSHIRE

PHASE II SITE APPRAISAL
FOR
GLADMAN DEVELOPMENTS LTD

Project Ref:
P10567/PIISAR.2

Date:
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Prepared for:
Gladman Developments Ltd
Gladman House
Alexandria Way
Congleton
Cheshire
CW12 1LB

This report has been prepared in accordance with GRM's Accredited Quality Procedures

If you have any queries regarding this report please contact the project manager in the first instance.

Prepared by:	Reviewed by:	Approved by:
Robert Crossland MSc FGS CGeol (Senior Engineering Geologist / Project Manager) robert.crossland@grm-uk.com	Paul Wardle BSc MA FGS (Acting Principal Geologist) paul.wardle@grm-uk.com	Geoff Beckett BSc (Hons) FGS CGeol (Director) geoff.beckett@grm-uk.com
When required in-house geological, geotechnical, environmental, structural and civil staff helped to produce this document.		
Issue	Description of Revision	Signature
PIISAR.2 (July 2024)	All gas monitoring results now included with revision to gas risk assessment comments	



Site Appraisal for Desford Lane, Ratby, Leicestershire

SUMMARY OF RECOMMENDATIONS

Where further assessment is required it is indicated with a "Y" in the right hand column.		
Proposed Development	Residential properties with associated private gardens, soft landscaped areas including public open spaces and attenuation basins.	
CONTAMINATION ASSESSMENT - REMEDIATION / WASTE DISPOSAL		
End Users	No remediation required.	
Site Workers	No remediation required.	
Construction Materials	Appropriate concrete specification. PE water supply pipes required (to be confirmed by water company).	
Groundwater	No remediation required.	
Surface Water	No remediation required.	
Waste Disposal	Preliminary Waste Classification: Non-Hazardous for topsoil & natural strata. Assumed Inert for natural strata. Will need to be confirmed by receiving landfill.	Y
GEOTECHNICAL ASSESSMENT – FOUNDATIONS		
Ground Treatment Required	Temporary haul roads and drainage measures. Depending on development proposals, boundary drainage ditches may need to be infilled. For pile foundations, safe working platform would be required – piling matt in the region of 400mm thick likely (if constructed without reinforcement depending on the quality of any earthworks and weight of the rig).	
Main Bearing Strata	Firm to stiff slightly sandy slightly gravelly CLAY; Medium dense gravelly SAND (limited area to shallow depths).	Y
Nett Allowable Bearing Pressure	For trench fill - 110kN/m ² (natural cohesive or granular strata). For piles (if required) – safe working load to be confirmed by piling contractor.	
Rockhead	Yes (northern end of site).	
Tree Influence	Yes.	
Volume Change Potential	Medium.	
Likely Foundation Types	Trench Fill or CFA foundations. Potential for limited pile foundations depending on further investigation works recommended.	Y
Likely Foundation Depth Range	0.9m to 1.8m begl (including deepening due to variable strata). For piles – to be confirmed by piling contractor for piles.	Y
Excavation Hazards	Shallow excavations should generally be stable. Granular soils, where present, are liable to collapse without warning. Shallow perched groundwater should be expected. Areas of variable strata have been confirmed.	
Floor Slab Types	100% suspended floor slabs required at this stage until a development layout plan and final site levels are confirmed – voided suspended floor slabs (beam and block) will be required where there is tree influence.	Y
Gas Protection Requirements Radon and/or Landfill	Gas protection measures (for methane and carbon dioxide) are not required. No radon gas protection measures are required.	
GEOTECHNICAL ASSESSMENT - GENERAL		
Slope Stability Risk	Negligible for majority of site; Low adjacent to boundary drainage ditches.	
Soakaways Potential	Not suitable.	
New Access Roads	Design value of 3% should be assumed at this stage. Insitu CBR testing is recommended immediately prior to road construction.	Y
Buried Concrete Class	DS - 1 / AC – 1. GEN-1 (unreinforced); RC35 concrete (reinforced).	
Retaining Walls and Boundary Features	No retaining walls present (may be required as part of future development). Agricultural fields, sports pitches, trees and a stone works form the site boundaries.	

Further Assessment Targets	Additional ground investigation recommended, once a detailed development layout is available, in areas where soft ground or granular deposits are prevalent and further assessment is required. Once a detailed development layout and final site levels are available, a budgetary foundation schedule can be produced. If piles are required, cable percussion / rotary boreholes will be needed for pile design. Insitu CBR testing to be undertaken once proposed site levels are known and prior to road construction.	Y
Other Comments	Liaison with Local Water Supply Company to determine the appropriate water supply pipes at the site.	

This summary is based on the full report that provides the detailed assessment of the ground risks affecting the development and how to manage them. It should not be used in isolation.

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1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Gladman Developments Ltd (Client), to undertake a Phase II Site Appraisal for land at 'Desford Lane, Ratby, Leicestershire'.

A previous Preliminary Risk Assessment (Phase I Desk Study) report has been undertaken by RSK Environment Limited (Ref: 252470-R01 (00), dated December 2020) and this formed Phase I of the assessment and allowed the geotechnical and geo-environmental setting of the site to be determined.

The Phase II works reported within this document comprised an intrusive ground investigation of window sample boreholes, trial pits and soakaway pits, and included geotechnical soil testing, chemical soil analysis and gas monitoring. The information gained from the Phase II works will be used to refine the conceptual model for the site and determine the most cost-effective development solutions.

This document is intended to provide information that will assist decision making by identifying and recommending solutions to ground engineering and contamination issues.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The Client has confirmed that the proposed residential development scheme has recently won planning consent for 225 units and this investigation report is to aide the sale of the site to a developer. The proposed development comprises residential properties with associated private gardens, soft landscaped areas including public open spaces, access roads, attenuation basins and infrastructure. A development framework plan has been provided by the Client, on which this report is based, and this is presented in Appendix B.

The Client has informed GRM of the following potential development hazard:

- An overhead electricity cable across the middle of the site area.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The principal aims of the Phase II Site Appraisal are as follows:

- a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.
- b) Determine the possible ground-related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.
- c) Provide preliminary development recommendations.
- d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

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GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY SUMMARY

Project Name.	Land off Desford Lane, Ratby, Leicestershire.
Project Reference.	P10567.
Client.	Gladman Developments Ltd.
Site Location (address).	Desford Lane, Ratby, Leicestershire, LE6 0JN. A Site Location and Boundary Plan is presented in Appendix C.
National Grid Reference.	SK511056.
Site Area (Ha).	12
Summary of Proposed Development.	Residential properties with private gardens, soft landscaped areas including public open spaces, attenuation basins and associated infrastructure.
Client Supplied Information.	- Ø Site location Plan. - Ø Development framework Plan. - Ø Topographical Survey. - Ø RSK Environment Ltd Preliminary Risk Assessment Report. - Ø RSK Flood Risk Assessment & Outline Surface Water Drainage Strategy Report. - Ø Utility Records. - Ø Barton Hyett Associates Arboricultural Impact Assessment Report.
Site Setting.	The site is located to the south west of Ratby village, within a predominantly agricultural setting. The site area comprises a single large agricultural field currently used as arable. Mature trees and hedgerows are present along the field boundaries. The northern boundary is formed by sports pitches and a significant number of mature trees. The eastern and southern boundaries are formed by further agricultural fields. The western boundary is formed by continuation of the same arable field, along with a stone works (commercial yard and warehouses) adjacent to the south western corner of the site. A public footpath runs parallel with the western site boundary. Evidence of seasonally waterlogged ground was observed, suggesting poor drainage across the site area. The topography is relatively shallow in gradient and generally slopes down to the south / south east.
Site History.	<u>On-Site</u> The earliest map reviewed (1886) shows the site comprising a number of individual enclosed fields, with a small building located on the central western boundary (no longer present on 1971 map). The 1930 map shows a cart track running north to south

	through the centre of the site, and a railway siding crossing the south western corner of the site (no longer shown on the 1971 map). By the 1971 map, the agricultural field plots have been combined into one large field. <u>Off-Site</u> In close proximity of the site, the following has also been identified: · Alexandra Stone Works, first shown on the 1928-1930 map, adjacent to the south western corner of the site; this remains present today. · A railway line formed the southern site boundary, along with a siding serving the stone works; this was shown as dismantled on the 1971 map.
Geology.	Topsoil is likely to be present throughout the site area. The potential for made ground cannot be discounted in the vicinity of the former railway siding. Superficial deposits of River Terrace Deposits (sand and gravel) are recorded, present as a band running north east to south west, within the south eastern area of the site. In addition, Alluvium (clay, silt, sand and gravel) is recorded within the far south eastern corner of the site. Solid geology of the Gunthorpe Member (red brown mudstone with subordinate siltstone and sandstone; weathering to clay or sand) recorded beneath the vast majority of the site, and likely to be present from shallow depths across the majority of the site area. Also recorded, the Cotgrave Sandstone Member (sandstone interbedded with mudstone and siltstone), located within the far northern part of the site only.
Hydrogeology.	The Environment Agency has classified the superficial deposits as a Secondary A Aquifer. The underlying bedrock (Gunthorpe Member) is classed as a Secondary B Aquifer, whilst the Cotgrave Sandstone Member (if present) is classed as a Secondary A Aquifer. There are no recorded groundwater or potable water abstraction licenses within 500m of the site, and the site is not recorded to be within a Groundwater Source Protection Zone.
Hydrology.	Local surface water features include: · Drainage ditches run along the eastern and southern site boundaries, joining in the south eastern corner to flow into a culvert

	(beneath the former railway line) that is thought to eventually discharge into the Rothley Brook located approximately 60m south of the site. A tributary of the Rothley Brook runs adjacent to the sites north eastern corner and then runs parallel to the eastern site boundary at around 30m at its closest point.
Flooding.	The RSK Flood Risk Assessment Report confirms that the vast majority of the site is located within Flood Zone 1, with the inclusion of Flood Zone 2 and 3 within the south eastern corner of the site. A Phase II ground investigation would provide information on the local groundwater regime so that the risk can be assessed by the project's infrastructure engineer. Any risk associated with the groundwater regime should be catered for within the development infrastructure design.
Mining.	The site is not in an area affected by coal mining activity and the geological mapping confirms the absence of shallow coal seams. GRM have conducted an on-line search, which has shown that the Oil and Gas Authority does not record the site to be within an on-shore licence area, an on-shore hydrocarbon field or a shale prospecting area.
Quarrying.	From the historical mapping, there has been no past quarrying activities within 250m of the site.
Environmental Information.	There are no active or historical landfills / waste sites recorded within 250m of the site. There is a waste exemption recorded for the site, for the storing of sludge.
UXO.	The site is in an area considered to be at low risk of UXO. Accordingly, although vigilance should be maintained during the ground investigation and subsequent construction phases of development, no further action is considered to be necessary.
Potential Soil Contamination Sources.	The following site-specific contaminants have been identified: Potential for pesticides associated with arable crops. In addition, there is the potential for made ground associated with the former railway siding in the south western corner of the site.
Potential Ground Gas Sources (including Radon).	Apart from the potential presence of made ground within the south western corner of the site, no viable sources of ground gas have been identified. The site has been assessed following the guidelines in 'Radon: guidance on protective

	measures for new dwellings' (BR211 Revised 2023). The site is not within an area recorded to require radon gas protection measures. A BGS Radon report confirming this is presented in Appendix D.
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2.1 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Level of Risk
Agricultural land use (arable) – pesticides.	Indoor and outdoor inhalation of soil dust; the ingestion of, and dermal contact with, contaminated soil and soil dust; ingestion of vegetables that have taken up contamination and contaminated soil attached to vegetables.	End users.	Very Low.
		Construction and Maintenance Workers.	
South western area (former railway sidings) - potentially contaminated made ground.		End users.	Very Low.
		Construction and Maintenance Workers.	
South western area (former railway sidings) – potential for made ground.	Inhalation of ground gas.	End users.	Very Low.
South western area (former railway sidings) – potential for made ground.	Migration of contamination through leaks and joints, degradation of pipe materials.	Water supply pipes.	Very Low.

CONTROLLED WATERS			
South western area (former railway sidings) - potentially contaminated made ground.	Leaching of contaminants and vertical migration to the groundwater.	Secondary A Aquifer (Superficial Deposits & Cotgrave Sandstone Member) / Secondary B Aquifer (Gunthorpe Member).	Negligible.
	Leaching of contaminants and lateral migration to surface waters.	Drainage ditches (on site) / tributary of Rothley Brook (off site).	Negligible.

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3 PHASE II GROUND INVESTIGATION

3.1 FIELDWORK

The ground investigation has been designed in accordance with the general comments outlined in Appendix A (iv).

The ground investigation fieldwork was conducted between the 22nd and 26th April 2024, with groundwater/gas monitoring visits continuing after that period. A total of forty-five exploratory holes (twenty-five window sample boreholes, fifteen trial pits, three soakaway pits and two hand-dug trial holes) were progressed, to a maximum depth of 5.0m below existing ground level (begl). The exploratory hole location plan is presented in Appendix E, whilst the exploratory hole logs are presented in Appendix F.

The exploratory holes were positioned to provide an adequate coverage of the site, target those areas where the new residential properties are proposed to be located, and to provide information with regard to the ground conditions. The location of the soakaway pits was informed by the Client's wishes. The two hand-dug trial holes were located in the south west corner of the site where a former railway siding was present historically. In addition, sixteen dynamic cone penetrometer (DCP) tests were located along the proposed main spineroad within the residential development.

Eight gas and groundwater monitoring standpipes were installed during the site works. The rationale for these works is discussed fully in Section 6. A Gas Monitoring Plan, illustrating the locations of the standpipes is presented in Appendix G. The standpipes will need to remain in place until at least mid-July 2024.

Samples not used for testing will be stored for a month after issue of this report and then disposed of, unless the Client requests in writing that they be kept.

3.2 PROVEN GROUND

The following ground conditions were encountered during the investigation fieldwork:

- Topsoil
- River Terrace Deposits (Superficial Deposits)
- Gunthorpe Member (Solid Strata)

3.2.1 Topsoil

Topsoil (and underlying subsoil) was encountered from the ground surface in all the completed exploratory holes. The topsoil ranged in thickness from 0.2m to 0.41m, with a general thickness of 0.35m.

The topsoil typically comprised:

- Dark brown, slightly sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded, of mudstone, sandstone, flint / chert and quartzite.

No evidence of made ground associated with the former railway sidings was observed in HTP01 or HTP02, with only topsoil recorded.

3.2.2 Superficial Deposits

River Terrace Deposits

The River Terrace Deposits were encountered in all the exploratory holes undertaken across the site, except for six locations (WS03-WS05 inclusive, WS09, WS10 & TP05). The thickness of the deposits varied between 0.13m and 2.7m, with a general thickness recorded of 0.9m. Although these deposits were recorded across the vast majority of the site area, they become deeper and more prevalent within the southern half of the site.

The deposits generally comprised:

- Firm to stiff (medium to high strength), occasionally soft (low strength), orangish brown / yellowish brown / reddish brown, slightly sandy slightly gravelly CLAY. Gravel is fine / medium to coarse, subangular to subrounded, of mudstone, sandstone, flint and quartzite. Occasional cobbles.
- Medium dense (occasionally loose), orangish brown / light brown, clayey, slightly gravelly / gravelly, fine to coarse SAND. Gravel is fine / medium to coarse, subangular to subrounded, of mudstone, sandstone and quartzite. Mostly encountered in the southern half of the site, on the lower side of the sloping ground.
- Loose to medium dense, orangish brown, clayey sandy GRAVEL. Gravel is fine to coarse, subangular to subrounded, of quartzite and mudstone. Encountered in TP03, SA03 and HTP01 only.

Hand shear vane measurements in the cohesive strata recorded shear strengths between 20kPa and 120kPa. There is no clear pattern to the low strengths recorded, however they are more prevalent in the southern half of the site and typically from a depth of approximately 2.0m begl.

Standard Penetration Test N-values are tabulated below:

Depth (No of readings)	Range in SPT 'N' Value		Correlation to strength *	
	Cohesive	Granular	Cohesive	Granular
1.0m (9)	5 to 12	7 to 34	Low to Medium *	Loose to Medium Dense
2.0m (2)	20	18	High *	Medium dense

*Utilising the empirical relationship formulated by Stroud (1974) where undrained shear strength is related to SPT N-values and a factor based on plasticity.

It should be noted that no evidence of the recorded Alluvium deposits were observed in the south eastern area of the site.

3.2.3 Solid Strata

In terms of geotechnical behaviour most solid strata are rocks, although some have remained as, or have become, soil (the latter as part of the weathering process). The solid strata at shallow depths beneath this site may be representative of a soil (which takes the form of weathered rock), becoming less weathered with depth until they are a rock. The weathered rock will have the geotechnical characteristics of a soil.

Gunthorpe Member

These strata were encountered in all the exploratory holes completed. The full thickness was not proven. These strata initially comprised a more weathered zone comprising the following:

- Firm to very stiff (medium to very high strength), becoming soft (low strength) in places, reddish brown and light grey, slightly gravelly CLAY or slightly sandy CLAY. Gravel is fine / medium to coarse, angular to subangular, of mudstone and sandstone.
- Medium dense, light grey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, angular sandstone. Encountered in WS01-WS03, WS09-WS10, WS15, WS24 & TP01 only, mostly in the north west of the site.

The weathered zone was underlain by more competent rock quality strata comprising extremely weak, reddish brown, slightly clayey MUDSTONE (recovered as medium to coarse angular gravel) encountered in WS04, WS07 & WS08 only, or medium strength, light grey, SANDSTONE encountered in TP02, TP06 & TP08 only. The depth to proven rockhead varied between 2.0m begl (WS07) and 3.8m begl (TP02 & TP08), and was recorded only in the northern half of the site, on the higher ground.

Hand shear vane measurements in the cohesive strata recorded shear strengths between 20kPa and 120kPa. Soft strata, either present as a distinct layer or occasional soft spots within firmer strata, is prevalent within the southern half of the site, on the lower end of the sloping ground.

Standard Penetration Test N-values are tabulated below:

Depth (No of readings)	Range in SPT 'N' Value		Correlation to strength *	
	Cohesive	Granular	Cohesive	Granular
1.0m (15)	9 to 24	-	Medium to High *	-
2.0m (23)	3 to 30	10	Low to High *	Medium dense
3.0m (24)	7 to 50 (6 refusals)	14 to 26	Low to Very High *	Medium dense
4.0m (18)	9 to 50 (11 refusals)	-	Medium to Very High *	-
5.0m (5)	19 to 50 (3 refusals)	-	High to Very High *	-

*Utilising the empirical relationship formulated by Stroud (1974) where undrained shear strength is related to SPT N-values and a factor based on plasticity.

Refusals (where SPTs recorded 50+) were recorded in twenty-one of the window sample boreholes. Refusals were indicative of very stiff clay or proven bedrock.

It should be noted that no evidence of the recorded underlying solid strata of the Cotgrave Sandstone Member was observed.

3.3 CONTAMINATION OBSERVATIONS

No made ground or visual evidence of potential contamination was observed within the natural strata.

No visual or olfactory evidence of petroleum hydrocarbon contamination was encountered during the fieldwork.

3.4 GROUNDWATER OBSERVATIONS

Seepages of perched groundwater from sand layers or pockets, or rock strata, were recorded within the natural strata, in the following exploratory holes:

	Depth	Groundwater observations and strata affected
TP01	2.5m begl	Slight seepage from sand layer (Gunthorpe Member)
TP02	3.8-3.9m begl	Fast inflow from rock strata (Gunthorpe Member)
TP03	0.8-1.1m begl	Damp strata recorded from gravel layer (River Terrace Deposits)
TP06	2.3-2.6m begl	Fast inflow from rock strata (Gunthorpe Member)
TP10	1.5-1.8m begl	Moderate seepage from gravel layer (Gunthorpe Member)
TP12	3.1-3.8m begl	Moderate seepage from gravelly clay (Gunthorpe Member)
WS15	3.0-3.4m begl	Seepage within sand layer (Gunthorpe Member)
WS17	2.6-2.7m begl	Seepage within sand layer (River Terrace Deposits)

	Depth	Groundwater observations and strata affected
WS18	2.0-2.8m begl	Fast inflow within sand layer (River Terrace Deposits)
WS20	1.4-1.5m begl	Seepage within sand layer (River Terrace Deposits)
WS23	1.7-1.8m begl	Seepage within sand layer (River Terrace Deposits)
WS24	3.0-3.4m begl	Seepage within sand layer (Gunthorpe Member)

Six groundwater monitoring visits have been conducted and the results of the monitoring are reported in Appendix H. In summary, standing water was recorded in each of the installations, varying between 0.5m and 3.5m begl, over the course of the monitoring visits.

It should be noted that the response zones in up to three of the installations were recorded as being 'flooded', during the monitoring visits completed.

Long term monitoring of groundwater levels has not been conducted as part of this investigation and interpreted levels are approximate and may be dependent on seasonal variations.

3.5 GROUND GAS AND VAPOURS

Ground gases are discussed in full in Section 6. In summary, the concentrations of ground gases recorded after completion of the monitoring programme are presented in Appendix H and summarised below:

- Methane has not been detected.
- Carbon dioxide between 0.1%v/v and 7.1%v/v.
- Oxygen between 13.1%v/v and 20.9%v/v.

A maximum gas flow of 0.1l/hr has been recorded during the monitoring programme. It should be noted that the response zones in up to three of the installations were recorded as being 'flooded', during the monitoring visits.

3.6 SUMMARY OF FIELDWORK OBSERVATIONS

The fieldwork has revealed/confirmed the following:

Significant Features identified during fieldwork
Made ground – none recorded. Contamination – none observed. Natural Strata – dominantly shrinkable strata encountered. Variable and low strength strata – recorded across the southern half of the site. Groundwater – intermittently recorded associated with perched water in sand layers or where sandstone was present. Excavations – generally stable. Ground Gas - no methane detected, with carbon dioxide concentrations above 5%v/v (in two installations only).

4 LABORATORY ANALYSES RATIONALE

4.1 CHEMICAL LABORATORY ANALYSIS

Chemical laboratory analyses were selected to provide the parameters necessary to make an initial assessment of potentially contaminated soils and/or waters, for the budgetary design of the development. The choice of contamination testing was based on the Phase I assessment, identified past uses of the site, site observations and comprised:

- Twenty-nine samples (8 of topsoil and 21 of natural strata) were analysed for a general suite of contaminants (metals, inorganics and speciated PAH).
- Three samples of topsoil (from holes in the area of the historical railway sidings) have been screened for the presence of asbestos.
- Three samples of topsoil were screened for the presence of pesticides.
- One sample of natural strata underwent a WAC leachate analysis (inert suite).

The chemical analysis results are presented in Appendix I. Representative samples from across the area investigated were tested.

4.2 GEOTECHNICAL LABORATORY TESTING

Geotechnical soils testing has been undertaken as part of the ground investigation including the following:

- Nine samples of the natural strata (2 of River Terrace Deposits and 7 of Gunthorpe Member) were tested for Natural Moisture Content.
- Nine samples of the natural strata (2 of River Terrace Deposits and 7 of Gunthorpe Member) underwent Atterberg Limits (PI) classification.
- Thirty-eight samples (8 of topsoil and 30 of natural strata) underwent pH and water soluble sulphate testing, for concrete designation.

Geotechnical tests were selected to provide the parameters necessary for the budgetary design of the development including foundations and infrastructure. The geotechnical test results are presented in Appendix J and summarised in Section 10.2. Representative samples from across the area investigated were tested.

5 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (SOIL)

5.1 INTRODUCTION

Development proposals comprise the construction of a number of residential properties with associated private gardens, along with soft landscaped areas including public open spaces, access roads, attenuation basins and infrastructure.

Various sources of contamination have been put forward in the earlier text and summarised in the Phase I conceptual model. As there was no evidence of made ground recorded in the area of the historical railway sidings, the material on site identified as being the most likely to be contaminated was the topsoil.

Representative samples of all strata and those considered to be potentially contaminated by virtue of the desk study and/or based on site observations were collected for further examination and/or potential testing. Representative samples of the topsoil and underlying strata were chemically analysed.

The rationale for the end use specific Tier 1 Acceptance Criteria (TAC) used by GRM is outlined in Appendix A (vi) and for this site the chemical analysis results are being compared against the TAC for a residential end use with plant uptake. In order to adopt a conservative approach when assessing organic compounds, a Soil Organic Matter (SOM) content of 1% has been used to assess both the topsoil and natural strata, as this closely reflects the lowest SOM recorded.

To provide an initial assessment, the results have been assessed to determine whether benzo(a)pyrene could be used as a surrogate marker in the assessment of carcinogenic risks posed by genotoxic PAHs in soils. It is recommended that such assessments should be based upon toxicological benchmarks derived from the data for two coal tar mixtures presented by Culp et al. (1998) and as described in the Public Health England document contaminated land information sheet: risk assessment approaches for polycyclic aromatic hydrocarbons (PAHs) dated 2017. The graph completed shows that benzo(a)pyrene can be used as a surrogate marker for genotoxic PAHs, with the exception of naphthalene, for the natural soils. GRM's TACs use published C4SL values which are based on minimal risk levels and have been confirmed to be suitable for use in a planning context by the UK Government. Other commercially available values have been published and have been used where C4SLs are not available.

The chemical analysis results are presented in Appendix I. The GRM contaminant screening values used in this assessment and a copy of the PAH profile graph are presented in Appendix K. The PAH profile graph confirms that the use of benzo(a)pyrene as a marker is appropriate.

5.2 RISK TO END USERS

Whilst the number of samples tested is considered sufficient to characterise the topsoil and natural strata, it is not considered appropriate to carry out statistical analysis on this data set. Therefore, the results for the topsoil and natural strata have been compared directly against the TAC for a residential end use with plant uptake.

The test results for the asbestos screening and pesticide screening will be assessed separately.

5.2.1 Analysis of Soil Contamination Data

GRM General Suite

Topsoil

Nine representative samples of the topsoil have been analysed for a general suite of contaminants. The recorded concentrations of all the contaminants were below the relevant TAC for a residential end use with plant uptake.

Natural Strata

Twenty representative samples of the natural strata have been analysed for a general suite of contaminants. The recorded concentrations of all the contaminants were below the relevant TAC for a residential end use with plant uptake. The only exception to this was an unexpected elevated arsenic concentration (51mg/kg) in one sample of the River Terrace Deposits; this is considered an anomalous result and not representative of the site conditions. There is considered to be no significant risk from naturally occurring arsenic.

Asbestos Screening

Three representative samples of the topsoil have been screened for the presence of asbestos. No asbestos has been detected in any of the samples.

Pesticide Screening

Three representative samples of the topsoil have been screened for the presence of pesticides. The presence of pesticides has been undetected, with concentrations below the laboratory detection level of <1mg/kg.

Petroleum Hydrocarbons

No visual or olfactory evidence of petroleum hydrocarbon contamination was observed in the topsoil or underlying natural strata. Therefore, no TPHCWG testing was considered necessary.

5.2.2 Water Supply Pipes

It is considered that, based on the UKWIR guidance, the concentrations of contaminants recorded to date are such that PE water supply pipes should be suitable for the site. There was no visual or olfactory evidence for the presence of petroleum hydrocarbons.

However, it is recommended that the local water supply company for the site be contacted to confirm their requirements with regard to pipe materials.

5.2.3 Summary of Risk to End Users

There is considered to be no significant risk to the end user, from either the topsoil or the underlying natural strata. The risk to end users from soil contamination is therefore considered to be negligible.

Remedial works are not considered to be necessary. The topsoil is chemically suitable for reuse on site and for sale, if there is a surplus of material.

5.3 RISK TO SITE WORKERS

The investigation has not revealed any specific contamination risk to site workers; however, the general comments outlined in Appendix A (vii) should be considered when site specific risk assessments are completed. The use of suitable PPE should be enforced during the ground works stage of construction.

6 QUANTITATIVE RISK ASSESSMENT – HUMAN HEALTH (GROUND GAS)

The gas risk assessment methodology used by GRM is outlined in Appendix A (v).

The proposed land use is classed as high sensitivity (residential housing with gardens), and eight 35mm diameter gas/water monitoring standpipes have been installed across the site development area. The standpipes have been installed in the window sample boreholes (WS02, WS05, WS07, WS11, WS12, WS16, WS17 & WS21), with response zones in the natural strata due to the absence of made ground.

Based on 'BS8576:2013 Guidance on investigations for ground gas – Permanent Gases and Volatile Organic Compounds', the gas hazard is considered to be very low (natural soil strata with low degradable organic content).

The monitoring programme comprised six visits over a three month period. The gas monitoring results to date are presented in Appendix H and summarised in Section 3.5. The gas monitoring has been undertaken using a Gas Data GFM436.

The primary guidance document to determine if protection measures are required is BS8485:2015+A1:2019 *Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Screening Value (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

A maximum steady state gas flow rate of 0.1l/hr has been recorded and this will be used in the following assessment. As the methane concentrations have been consistently below the monitor's lower limit of detection for the installations within the natural strata, a default methane concentration of 0.1%v/v have been used in the following assessment.

Using a maximum flow rate of 0.1l/hr and a default methane concentration of 0.1%v/v, a Q_{hg} of 0.0001l/hr has been calculated for methane. Using the same flow rate, the maximum steady state carbon dioxide concentration of 7.1%v/v equates to a Q_{hg} of 0.0071l/hr. On this basis, the GSV for the site is determined as 0.0071l/hr.

Although the maximum concentration of methane is <1%v/v and the GSV is less than 0.07l/hr, a concentration of carbon dioxide has been recorded in excess of 5%v/v and as such, further consideration has to be given to the most appropriate Characteristic Situation for the natural strata.

Although a carbon dioxide concentration above 5%v/v was recorded on two occasions in WS12 (5.6%v/v and 7.1%v/v) and on one occasion in WS21 (6.2%v/v), it was noted that carbon dioxide concentrations were not above 5%v/v in any other standpipes. At this stage, the ground gas could be generated by microbial activity within the soils (as no on site or nearby sources of ground gas have been identified), which is characterised by very low methane and low flow with carbon dioxide concentrations

which could reach up to 21% (maximum of 7.1% recorded). Given no significant positive flow has been detected the concentrations are not being generated at a sufficient rate to pose a risk to the proposed development, as referred to in 'Wilson S, Collins F and Lavery R (2018), using ternary plots for interpretation of ground gas monitoring results. Ground Gas Information Sheet No 1. Ambisense Limited and EPG Limited'.

A ternary plot using the ground gas data collected has been produced and is presented in Appendix L. From this, the plotting of the gas concentrations suggests that the source of the ground gas (and observed carbon dioxide) is indicative of microbial respiration within the natural strata.

Based on the desk study and the findings of the ground investigation and the ternary gas plot, it has been concluded that increasing the characteristic situation from CS1 to CS2 is not necessary. As such, Characteristic Situation 1' or CS1 as outlined in BS8485:2015+A1:2019 is deemed a suitable assessment for the natural strata and no gas protection measures will be required.

It should be noted that falling pressure (worst case condition) has been recorded on two occasions during the monitoring programme.

It should also be noted that the response zones in up to three of the installations were recorded as being 'flooded', during the monitoring programme. However, the flooded wells are not considered to have significantly affected the results given the lack of a source of ground gas.

Therefore, it is considered that gas protection measures for methane or carbon dioxide are not required for the proposed residential development. In addition, the desk study risk assessment determined that no radon gas protection measures are required.

Depleted levels of oxygen have been recorded during the gas monitoring visits. There is a risk to construction workers entering excavations and where possible, strategies to avoid entering excavations should be adopted. If the need to enter an excavation cannot be avoided, appropriate PPE/RPE should be used to protect those entering the excavation from depleted levels of oxygen, in line with the Confined Spaces Regulations 1997.

6.1 SUMMARY OF RISK FROM GAS

The investigation has not revealed any specific risk to end users from methane or carbon dioxide and gas protection measures are not required.

In addition, the investigation has also revealed the potential for depleted oxygen levels, which may pose a potential hazard to site workers working in confined spaces.

7 QUANTITATIVE RISK ASSESSMENT - CONTROLLED WATERS

The methodology, rationale and guidance GRM have used to assess the risk to controlled waters is set out in Appendix A (viii).

Following the ground investigation works, the primary receptors for the site are confirmed to be the Secondary A Aquifer of the River Terrace Deposits, as well as the drainage ditches that run along the eastern and southern site boundaries (which eventually flow via a culvert into the Rothley Brook).

There are no recorded groundwater or potable water abstraction licenses within 500m of the site, and the site is not recorded to be within a Groundwater Source Protection Zone. Although the vast majority of the site is located within Flood Zone 1, the south eastern corner of the site is located within Flood Zone 2 and 3.

The primary pathways are vertical migration to the groundwater and overland flow to the drainage ditches.

A significant source of contamination has not been identified at the site. The underlying geology is predominately cohesive in nature, with intermittent sand layers. In the absence of a source of contamination, there is considered to be no risk to controlled waters and so soil leachate/water analysis has not been undertaken.

7.1 INTERPRETATION OF GROUNDWATER OBSERVATIONS AND MONITORING

Occasional seepages of perched groundwater from sand layers or pockets, or rock strata, were recorded within the natural strata.

Two groundwater monitoring visits have been conducted at this stage and the results of the monitoring are reported in Appendix H. In summary, standing water was recorded in each of the installations, varying between 0.5m and 3.5m begl, over the course of the two monitoring visits. There is no clear pattern to the recorded depth of the standing water across the site. However, it is anticipated that any groundwater will generally be shallower in the southern part of the site where the more variable and granular deposits are present.

It should be noted that the response zones in up to three of the installations were recorded as being 'flooded', during the monitoring visits completed at this stage.

7.2 SUMMARY OF RISK TO CONTROLLED WATERS

As no source of soil contamination has been identified, the risk to the primary receptors (aquifer and drainage ditches) is negligible.



8 PHASE II CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	Pathway	Receptor	Remedial Solution
No source identified.	Indoor and outdoor inhalation of soil dust; the ingestion of, and dermal contact with, contaminated soil and soil dust; ingestion of vegetables that have taken up contamination and contaminated soil attached to vegetables.	End users.	No remediation required.
		Construction workers.	
No source identified.	Inhalation of ground gas.	End users.	Gas precautions not required.
No source identified.	Migration of contamination through leaks and joints, degradation of water pipe materials.	Water supply pipes.	PE water supply pipes and clean backfill required (to be confirmed by water supply company).

CONTROLLED WATERS			
No source identified.	Leaching of contaminants and vertical migration to the groundwater.	Secondary A Aquifer (River Terrace Deposits).	No remediation required.
	Leaching of contaminants and lateral migration to surface waters.	Drainage ditches / drains (onsite).	

9 REMEDIATION

9.1 RECOMMENDED REMEDIAL MEASURES AND VALIDATION REQUIREMENTS

9.1.1 Protection of End Users

Soil Contamination

Development proposals comprise the construction of a number of residential properties with associated private gardens, along with soft landscaped areas including public open spaces, access roads, attenuation basins and other associated infrastructure.

A source of soil contamination has not been identified and so remedial measures are not required.

The existing topsoil has been shown to be uncontaminated and can be used as a growing medium in private gardens and soft landscaping.

Any topsoil / subsoil strip will need to be undertaken when the material is dry. The stripped material will need to be stockpiled and stored in accordance with the Defra Code of Practice *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*, BS8332:2015 and BS8601:2013. The topsoil / subsoil will need to be placed within garden areas in accordance with the methods outlined in the aforementioned documents, taking care not to compact them whilst doing so. Should soils become compacted as part of the building process then allowance should be made for the soils to be loosened and thereby promote aeration and drainage, which will reduce water-logging and subsequent aftercare costs.

Should any material suspected of being significantly contaminated be encountered during the redevelopment of the site, GRM can be contacted to undertake additional investigation if necessary. The local Environmental Health Officer should be contacted and informed of any additional remedial work required.

Ground Gas

Gas protection measures for methane or carbon dioxide are not required.

No radon gas protection measures are required.

9.1.2 Protection of Site Workers

The risk to site workers from soil contamination is negligible. No remedial measures are required. However, the use of suitable PPE should be enforced during the ground works stage of construction.

The investigation has revealed the potential for depleted oxygen levels, which may pose a potential hazard to site workers working in confined spaces. It is recommended that there is no entry into excavations. If man entry is required, it is recommended that

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gas monitoring is conducted during operations to ensure adequate concentrations of oxygen are present and ventilation of excavations is undertaken. A banksman should also be present to monitor for any problems.

9.1.3 Protection of Controlled Waters

The risk to controlled waters is considered negligible and no remedial measures are required.

9.1.4 Protection of Water Pipes

It is considered that, based on the UKWIR guidance, the concentrations of contaminants recorded to date are such that PE water supply pipes should be suitable for the site. There was no visual or olfactory evidence for the presence of petroleum hydrocarbons.

However, it is recommended that the local water supply company for the site be contacted to confirm their requirements with regard to pipe materials.

9.2 REMEDIAL STRATEGY

A Remediation Method Statement is not considered to be necessary.

A Gas Protection Measures Design and Verification Plan is not required.

Following your review of this document, we would recommend that a copy of it be forwarded to the Local Authority for comment and approval, prior to commencing development of the site. The Local Authority may choose to include other consultees as part of the planning process (such as the Environment Agency).

Consultation should be undertaken at the earliest possible opportunity to avoid abortive or delayed works.

9.3 DISPOSAL AND CLASSIFICATION

Based on the chemical results, the topsoil and underlying natural strata at the site have been classified using the HazWaste Online software, should they require disposal offsite. Waste Classification Reports for both the topsoil and natural strata are presented in Appendix M.

Both the topsoil and natural strata have been classified as Non-Hazardous Waste.

The WAC analysis undertaken on a representative sample of the natural strata confirms that the material should be suitable for disposal at an inert landfill. Further WAC testing on the natural strata, prior to any disposal off site, should be considered to confirm this assessment. Early consultation with the relevant landfill sites over their

particular acceptance criteria may produce cost savings. Reference should be made to the relevant notes presented in Appendix A (x).

At this stage, allow for the topsoil to be disposed of as non-hazardous waste (if it cannot all be reused) and the underlying subsoil to be disposed as inert.

Care should be taken to keep natural arisings separate from construction materials, as natural soils mixed with construction materials may attract additional disposal costs.

It is recommended that any materials to be exported are stockpiled and tested to confirm disposal rates, as this may be more cost effective than using the results contained within this report.

10 GEOTECHNICAL ASSESSMENT

10.1 INTRODUCTION

The development proposals comprise the construction of a number of residential properties with associated private gardens, along with soft landscaped areas including public open spaces, access roads, attenuation basins and other associated infrastructure. For the purposes of this report and geotechnical assessment, it is assumed that traditional two-storey housing is proposed.

Finished floor levels and the levels of any underground engineering works have not been provided.

In addition to the site specific comments below reference should be made to the general comments relating to the Geotechnical Assessment listed in Appendix A (xi to xvi).

10.2 GEOTECHNICAL TESTING

Geotechnical testing has been carried on site; the results of this testing are provided on the logs in Appendix F and in Appendix J. These results are summarised in the tables below:

In situ Testing for River Terrace Deposits (Superficial Deposits):

Test Parameter	Range of Results
SPT 'N' values	5 to 34 @ 1m (low to medium strength or loose to medium dense) 18 to 20 @ 2m (high strength or medium dense)
Hand Shear Vane	20 to 120kPa

In situ Testing for Gunthorpe Member:

Test Parameter	Range of Results
SPT 'N' values	9 to 24 @ 1m (medium to high strength) 3 to 30 @ 2m (low to high strength or medium dense) 7 to 50 @ 3m (low to very high strength or medium dense) 9 to 50 @ 4m (medium to very high strength) 19 to 50 @ 5m (high to very high strength)
Hand Shear Vane	20 to 120kPa

Laboratory Testing for River Terrace Deposits (Superficial Deposits):

Test Parameter	Range of Results
Natural Moisture Content	11% to 23%
Plasticity Index	23% to 24%

Laboratory Testing for Gunthorpe Member:

Test Parameter	Range of Results
Natural Moisture Content	16% to 24.5%
Plasticity Index	17% to 28%

The above Plasticity Index (PI) test results indicate the cohesive strata for the River Terrace Deposits are of medium (PI 20% to <40%) volume change potential (VCP), whilst the cohesive strata for the Gunthorpe Member are of low (PI 10% to <20%) to medium (PI 20% to <40%) volume change potential (VCP). For the subsequent foundation assessment, medium volume change potential has been used and should also be used for design purposes.

10.3 ENGINEERING GROUND TREATMENT AND EARTHWORKS

ENGINEERING GROUND TREATMENT

The near surface soils were generally firm under foot at the time of the investigation works, but areas of standing water are likely during the winter months. Standing water may be present in the south eastern area of the site (lowest point) during periods of heavy / persistent rainfall (this area will be proposed public open space with the location of an attenuation pond). It is recommended that temporary haul roads and site drainage are implemented until the main roads are constructed.

If a piled foundation solution (see Section 10.6) is required, a suitable working platform (i.e. piling mat) will be required. It is recommended that the design of the working platform is carried out as soon as possible. The working platform certificate requires signing by the Principal Contractor for the site. An allowance for this, and responsibility for the design of the platform (estimated at 400mm thick if constructed without reinforcement depending on the quality of any earthworks and weight of the rig), should be made in tender packages and site programmes.

EARTHWORKS

Should site levels require raising then, in line with NHBC Standards Chapter 4.6, the following are likely to be required:

- An earthworks specification.
- Geotechnical Design Report or Geotechnical Design Statement.
- Geotechnical testing to confirm the earthworks parameters for any fill material.
- At least some third party supervision of the earthworks.

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- Geotechnical verification testing during the earthworks.
- A verification report at the end of the earthworks.

10.4 EXCAVATION CONDITIONS

Excavation of the materials encountered during the ground investigation should be readily achieved using conventional hydraulic excavation techniques.

From the trial pit stability observations, it is likely that excavations will mostly remain stable. Some side trench collapse is inevitable particularly in the medium term and in inclement periods. Granular soils are liable to collapse without warning; this situation is likely to be exacerbated by water ingress. If required, trench stability should be maintained by providing full support to the side walls, in line with the necessary Temporary Works procedures and Code of Practices.

The observed groundwater conditions suggest that the use of conventional sump pumping would be adequate to control any water ingress in shallow excavations. However, if the use of full dewatering systems (e.g. well pointing) becomes necessary to dewater deeper excavations and where granular strata are present, care should be taken to ensure that dewatering does not lead to settlement of soils below existing structures or services on or off-site.

Evidence of seasonally waterlogged ground was observed during the siteworks, suggesting poor drainage across the site area. If filling in the boundary ditches forms part of the site development proposals, there will be a need to implement temporary and permanent surface water drainage measures to replicate the ditches.

10.5 EXISTING STRUCTURES / SUBSTRUCTURES

At the time of the investigation works, no building structures were present within the site. There has been no previous development of the site, although a small building located on the central western boundary was present from the earliest available maps until the early 1970s.

10.6 FOUNDATIONS

The topsoil and any soft cohesive strata are considered unsuitable as a bearing stratum and all new foundations should be carried down through them to found on the more competent natural cohesive or granular strata (with an undrained shear strength of more than 60kPa).

Anticipated founding strata comprises firm to stiff slightly sandy slightly gravelly CLAY / sandy CLAY or medium dense gravelly SAND. For cohesive strata, a minimum foundation depth of 0.9m begl (medium volume change potential) will be applicable for

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this site. For granular strata, a minimum foundation depth of 0.6m begl will be applicable.

Hedgerows and mature trees border the northern, eastern, southern and partial western site boundaries. This means that appropriate foundation deepening may be required, particularly for those plots close to the edges of the site boundary. Anticipated founding depths could be deeper than 2.5m begl in places, due to deepening for trees / hedges.

If drainage ditches, that border the eastern and southern site boundaries, are to be infilled as part of the proposed development they will need to be filled with material which is engineered to an appropriate standard into the drainage ditch. Foundations are not expected to cross the infilled drainage ditches.

Development proposals comprise the construction of a number of residential properties (assumed mostly two storey in height).

TRENCH FILL

It is considered likely that trench fill foundations, founded within the natural cohesive or granular strata, will be suitable for the proposed residential development. For the site development area within the northern half of the site, a minimum foundation depth of 0.9m begl within cohesive strata, will be applicable. Some deepening beyond the minimum depth may also be needed where shallow 'softer' clay is present within the southern half of the site area.

Towards the southern end of the site, shallow granular strata becomes more prevalent with potential foundation depths of between 0.6m and 1.2m begl. Deepening to depths of between 1.2m and 1.8m begl will be required in this area of the site, to found within the underlying cohesive strata if and where it is sufficiently competent, and not suffer from excessive settlement.

The natural cohesive soils encountered, at anticipated foundation depths, were generally at least firm (medium strength). It is anticipated that a nett allowable bearing pressure of at least 110kN/m² should be available for conventional strip or trench fill footings. This will allow line loads up to 50kN/m to be taken on footings 450mm wide and 66kN/m on footings 600mm wide. For the natural clay strata that is stiff (high strength), a nett allowable bearing pressure of at least 150kN/m² is considered appropriate and this will allow line loads up to 68kN/m to be taken on footings 450mm wide and 90kN/m on footings 600mm wide. These line loads should result in total settlements of not more than 25mm, keeping differential settlements within acceptable limits.

The natural granular soils encountered (within the proposed development area of the site), at anticipated foundation depths, were generally at least medium dense. It is anticipated that a nett allowable bearing pressure of at least 110kN/m² (taking into account the presence of groundwater) should be available for conventional trench fill footings. This will allow line loads up to 99kN/m to be taken on footings 450mm wide

and 132kN/m on footings 600mm wide. This should also result in total settlements of not more than 25mm, keeping differential settlements within acceptable limits.

Wider footings may be required for higher point/line loads such as at party walls etc. Should wider footings be required for higher point/line loads, GRM should be contacted for further advice.

Where variable strata (including soft spots) is anticipated within the southern end of the site, an allowance should be made for the localised use of reinforcement, if deepening of foundations to consistent strata is not possible.

Heave precautions will be required where the foundations lie within the heave zone of trees / hedges as defined in the NHBC Standards Chapter 4.2. Foundations should be remote from the direct action of tree roots, and should not be constructed so close to trees as to significantly damage their root systems.

Where trees and / or hedges are present within influencing distance of new build structures, the foundations within the zone of influence of these trees / hedges will need to be deepened in line with guidance in NHBC Standards Chapter 4.2. The resultant foundation depths can only be determined by a tree survey and tree influence drawing (as well as proposed site levels and detailed layout drawings).

A foundation zoning plan is presented in Appendix N. A minimum foundation depth of 0.9m begl for cohesive strata (with an ABP of 110kN/m²) will be applicable for the northern half of the development area. However, the shaded area indicated on the foundation zoning plan within the southern half of the development area confirms the presence of shallow granular strata or soft strata that would need to be deepened through to achieve consistent and competent cohesive founding strata.

PILES

Depending on the final development layout, some plots may be located close enough to the existing trees / hedges along the boundaries of the site to require deepened trench fill foundations or even pile foundations. In addition, depending on the presence of deep variable or soft strata, the need for pile foundations may also be required.

At this stage, and based on the Development Framework Plan on which this report is based, there is unlikely to be any requirement for pile foundations due to trees. A preliminary tree ring drawing, based on the Barton Hyett Associates Arboricultural Impact Assessment Report (Ref: 4036, dated September 2021), showing the impact from the trees / hedges around the periphery of the site is presented in Appendix O.

Once a detailed development layout is available and depending on the presence of houses in close proximity to trees / hedges, the need for pile foundations should be reviewed. In addition, further investigation within the southern half of the site (particularly in the vicinity of TP13 and WS21) should also be considered due to soft strata / poor ground and the potential need for pile foundations.

The bearing strata for any piles will be the Gunthorpe Member, which should comprise clay along with variable sand layers, or potentially rock strata.

A piling specialist will need to be approached to provide pile dimensions and safe pile capacities. They are likely to require the provision of cable percussion / rotary boreholes to provide information for detailed design (the boreholes would need to be a minimum 5m beyond anticipated pile lengths). Consideration should be given to any nearby structures and infrastructure and achieving sufficient penetration to resist heave, when choosing the appropriate pile type. Piles less than 7.5m long are unlikely to be acceptable to the warranting bodies where the potential influence of trees is greater than 2.5m. Non-displacement piling techniques such as CFA or bored piled foundations are recommended.

Whilst piled foundations would end bear beneath the influence of trees, the piles and ring beams should be designed to resist potential heave, down-drag and negative skin friction.

A testing regime and objectives of the works will need agreeing with regulatory and warranting bodies prior to works. The pile design will need to be justified to the warranting bodies and the justification should be included within the piling contract.

It should be noted that a working platform will be required by the piling contractor.

Pile layouts and ground beams will need to be engineer designed.

10.7 FLOOR SLABS

Once the development proposals have been finalised, then the type of floor slab can be confirmed. As proposed site levels are currently unknown, at this stage allowance for suspended floor slabs should be made throughout.

A suspended floor system incorporating a sub-floor void, such as beam and block, will be required for all properties where the foundations lie within the heave zone of trees as defined by NHBC Standards in Chapter 4.2, and where seasonally desiccated soils are present at the time of construction.

Gas protection measures for methane or carbon dioxide are not required. No radon gas protection measures are required.

10.8 BURIED CONCRETE

Testing for pH and water soluble sulphate has been undertaken in the topsoil and natural soils. The results of the water soluble sulphate and pH testing are presented in Appendix I.

Based on the recorded water soluble sulphate and pH levels in the soils below the site and assuming mobile (limited areas of shallow granular deposits) groundwater conditions for the site as worst case, in accordance with the requirements of BRE Special Digest 1 (2005), 'Concrete in Aggressive Ground', the Design Sulphate Class for buried concrete at the site should be assumed as DS-1 and the ACEC Class as AC-1.

For unreinforced trench fill foundations with a width of greater than 450mm, the classifications above equate to a concrete designated as GEN1 in BS8500 and RC35 for reinforced foundations.

10.9 SLOPE STABILITY AND RETAINING STRUCTURES

The topography is relatively shallow in gradient and generally slopes down to the south / south east.

There is a negligible risk of slope instability occurring at present gradients.

10.10 SEDIMENT MANAGEMENT

If required, mitigation measures should be implemented to prevent the runoff of sediment and potential pollution into any surface water (including the drainage ditches), during the construction and earthworks process. Reference should be made to CIRIA C532 'Control of Water Pollution from Construction Sites'.

An Environmental Management Plan and Construction Management Plan will be required to prevent pollution of Controlled waters.

10.11 SOAKAWAY DRAINAGE

The strata encountered during the investigation (predominantly clay) is not suitable for soakaway drainage.

However, soakaway testing was undertaken as requested by the Client. The exploratory hole location plan presented in Appendix E shows the approximate locations of the tests, corresponding to the relevant trial pits (SA01, SA02 & SA03). The soakaway tests were carried out in the River Terrace Deposits, which generally comprised sandy slightly gravelly clay and clayey sandy gravel (in SA03 only).

Only one test was able to be undertaken at each soakaway location, lasting between 4.5 and 6.6 hours. During the soakaway testing, the water in each pit was very slow to drop, if at all, and the tests could not be completed satisfactorily. For each of the tests, the water level was virtually flat-lining (not significantly dropping) throughout the testing duration period. The time required for 25% or 75% of the pit to be emptied of water

could not be achieved at any testing location. Therefore, a valid infiltration rate could not be calculated due to insufficient testing data.

Based on the soakaway testing undertaken, the cohesive strata predominantly encountered during the investigation have been shown to be fairly impermeable and are not suitable for soakaway drainage. Although granular strata was encountered at shallow depths at a few exploratory hole locations in the southern part of the site, these areas are very limited both in extent and depth and may already contain groundwater, and are unlikely to be connected. Therefore, an alternative drainage system should be considered for the disposal of surface water.

Attenuation basins are to be constructed as part of the development proposals. When constructing attenuation basins, any granular strata should be excavated and replaced with compacted clay to a suitable depth, to prevent water ingress and instability. Alternatively, a liner could be used with measures against floatation.

10.12 NEW ACCESS ROADS

The topsoil and any soft natural strata are considered unsuitable as a sub-grade.

Site observations suggest that the natural cohesive materials will have minimum CBR values of between 2% and 4% (generally >5% where granular deposits are present), when suitably drained. Lower CBRs can be expected during inclement weather.

Dynamic Cone Penetrometer (DCP) testing was carried out across the site at sixteen locations along the proposed main spineroad within the residential development. This insitu testing was undertaken to obtain approximate in situ CBR values for the natural deposits down to a maximum depth of approximately 0.95m begl. A plan showing the test locations is provided in Appendix E. The results of the DCP are converted into equivalent CBR results.

For the River Terrace Deposits, ignoring anything greater than 10% (which are likely to be gravel related), equivalent CBR values varied between 3.4% and 9.2%. For the Gunthorpe Member, ignoring anything greater than 10% (which are likely to be gravel related), equivalent CBR values of between 4.1% and 9.0% were determined. Whilst the results indicate that a design value of around 6% could potentially be suitable, at this stage we recommend allowing for an equilibrium CBR value of 3%. This will reflect the potential degradation of the formation layer through seasonal influence at the time of construction.

Proof rolling and the improvement of soft spots may result in increased CBR values and the incorporation of a geotextile grid into sub-base layers may allow for reduced capping thickness.

Further insitu CBR testing immediately prior to road construction, if this is acceptable under the adopting authorities procedures, may allow a greater CBR value to be used for design purposes.

11 ONGOING WORKS

Elements of the ground investigation are currently still ongoing at the site, these include the following:

- Completion of the gas and groundwater monitoring programme, and issue of a Gas Addendum Letter Report.

12 FURTHER INVESTIGATION

Further investigation, to determine more accurately the effect of some of the identified hazards on the development, is recommended. This includes the following:

Works That GRM Can Complete

- Additional ground investigation, once a detailed development layout is available, should be undertaken where soft ground or granular deposits are prevalent and further assessment is required.
- Cable percussion / rotary boreholes will need to be undertaken to provide additional geotechnical information for pile design.
- A budget foundation schedule should be completed once detailed layout drawings, proposed site levels and a tree survey are available.
- Insitu CBR testing to be undertaken once proposed site levels are known and immediately prior to road construction.
- Liaison with the Local Water Supply Company to determine the appropriate water supply pipes at the site.

A copy of this report should be submitted to the Planning Department of the Local Authority/Local Authority EHO for review, if planning conditions exist for this site.

13 CONCLUSIONS

Assuming compliance with all the recommendations contained within this report (for abridged version see 'Summary of Recommendations' table at the beginning of the report) the site is suitable for the proposed development.

Based on the evidence currently available the site is assessed as being of low to moderate risk for geotechnical hazards and of low risk for contamination hazards.



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GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records: <https://mapapps2.bgs.ac.uk/geoindex/home.html>
- BGS online viewer: <https://geologyviewer.bgs.ac.uk>
- Magic Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: <http://www.environment-agency.gov.uk/>
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2023), 'Radon: Guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment projects)'
- UK HSA Radon Maps: <https://www.ukradon.org/information/ukmaps>
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015 +A1: 2019, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- | | | |
|------------|-------------------|--|
| · Arsenic | · Copper | · Water soluble sulphate |
| · Cadmium | · Nickel | · PAH (polycyclic aromatic hydrocarbons) |
| · Chromium | · Zinc | |
| · Lead | · Phenols | |
| · Mercury | · cyanide (total) | |
| · Selenium | · pH | |

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (including supplementary advice for extensions, conversions and refurbishment projects) (BR211: 2023)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables. For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values.

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Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv **GEOTECHNICAL ASSESSMENT – SOAKAWAYS**

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.
- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi **GEOTECHNICAL ASSESSMENT – FOUNDATIONS**

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

NOTES ON LIMITATIONS

General

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

- a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
- b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects. The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.



The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.



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GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



DO NOT SCALE

NOTES:



Approximate site boundary

CD1.03



ECM concentrations did not change from the stressed to the non-stressed state.

GRM

GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249
info@grm-uk.com www.grm-uk.com

GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249
info@grm-uk.com www.grm-uk.com

CLIENT:

Gladman Developments Ltd

PROJECT: **Desford Lane, Ratby,
Leicestershire**

TITLE:

Development Framework Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL

ISSUE: FINAL

DESIGN/DRAWN :	DATE:
RHC	May 2024

DATE: May 2024

PROJECT No:	DRAWING No:
P10567	Figure 1

DRAWING No: **Figure 1**

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GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
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DO NOT SCALE

NOTES:

 Approximate site location

 Approximate site boundary



GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249
info@grm-uk.com www.grm-uk.com

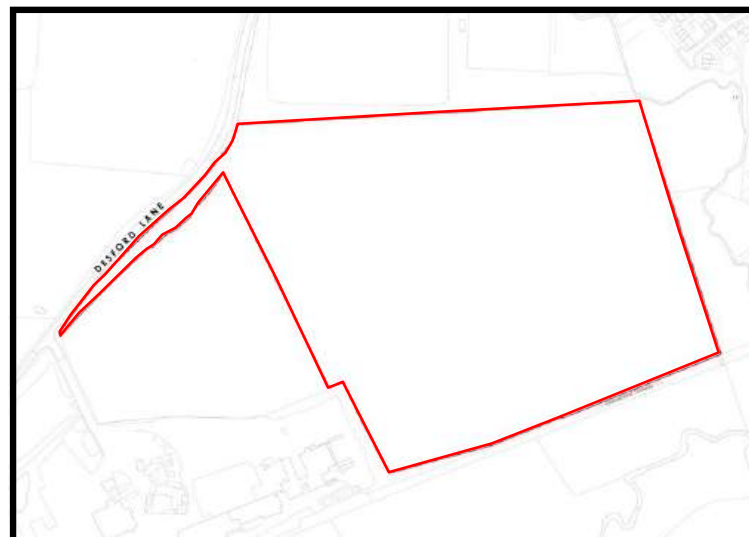
CLIENT:
Gladman Developments Ltd

PROJECT:
**Desford Lane, Ratby,
Leicestershire**

TITLE:
Site Location and Boundary Plan

SCALE@SIZE:	ISSUE:
NTS	FINAL
DESIGN/DRAWN:	DATE:
RHC	May 2024
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GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

A BRYANT
G R M DEVELOPMENT SOLUTIONS LTD
LAURUS HOUSE
FIRST AVENUE
BURTON-ON-TRENT
DE14 2WH
UNITED KINGDOM

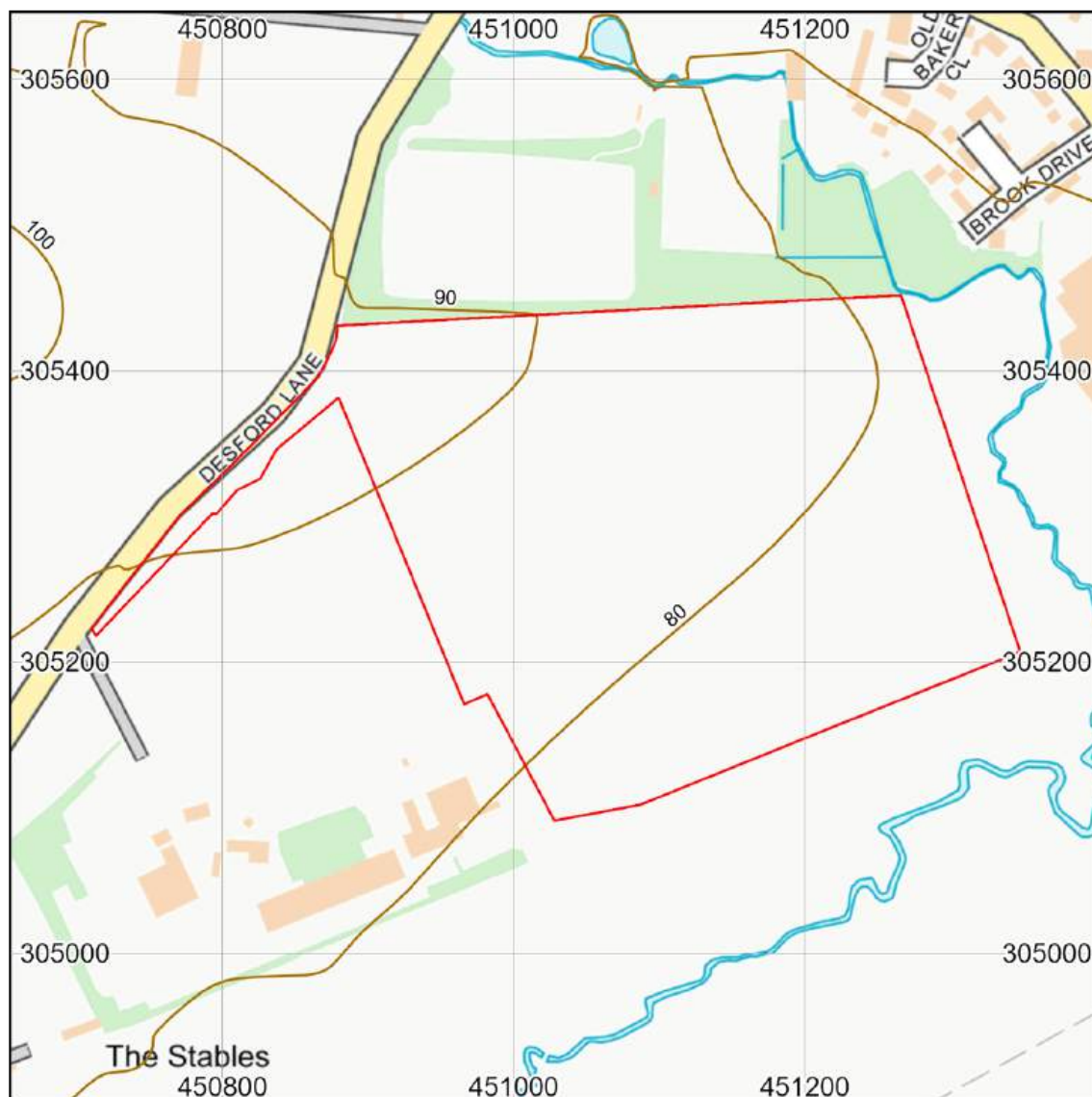
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: *BGS_338170/53848*

Client reference: P10567

Search location



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Search location indicated in red

This report describes a site located at National Grid Reference 451029, 305272. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2023 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2023 edition) Radon: Guidance on protective measures for new buildings?

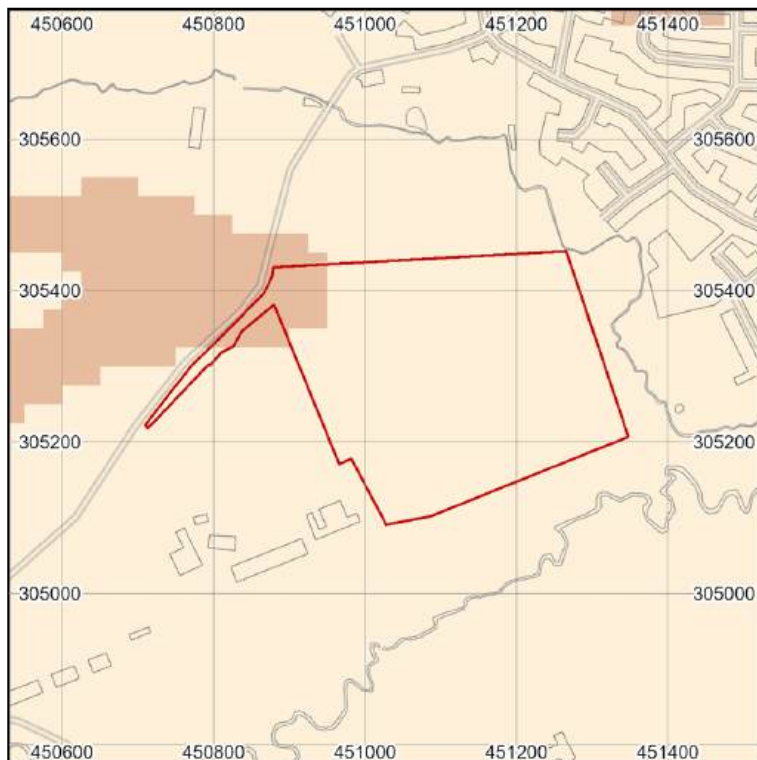
NO RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2023 Edition)*.

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon Affected Area



% Homes estimated to be at or above the action level
0-1%
1-3%
3-5%
5-10%
10-30%
30-100%

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Scale: 1:10 000 (1cm = 100 m)

Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be at or above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREAS WHERE 1 TO 3% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to be at or above the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a high radon level within the property; the only way to determine the radon level is to carry out a radon measurement.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels at or above the Action Level (200 Bq m⁻³) should be remediated. Householders with levels between the Target Level (100 Bq m⁻³) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were at or above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m⁻³). The Government advises householders that, where the radon level is at or above the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations 2017 require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.uk website: www.brebookshop.com

Contact Details

Keyworth Office

British Geological Survey
Environmental Science Centre
Nicker Hill
Keyworth
Nottingham
NG12 5GG
Tel: 0115 9363100
Email: enquiries@bgs.ac.uk

Wallingford Office

British Geological Survey
Maclean Building
Wallingford
Oxford
OX10 8BB
Email: enquiries@bgs.ac.uk

Edinburgh Office

British Geological Survey
Lyell Centre
Research Avenue South
Edinburgh
EH14 4AP
Tel: 0131 6671000
Email: enquiry@bgs.ac.uk

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A P P E N D I X E

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

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www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



NOTES:
- Approximate 60m investigation grid

CLIENT:	Gladman Developments Ltd
PROJECT:	Desford Lane, Ratby, Leicestershire
TITLE:	Exploratory Hole Location Plan

PROJECT No: P10567	DATE: April 2024	DESIGN/DRAWN: RHC
DRAWING NUMBER: Figure 3a	ISSUE: Final	
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GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.comwww.grm-uk.com



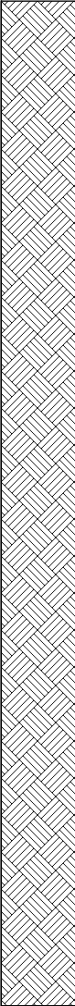
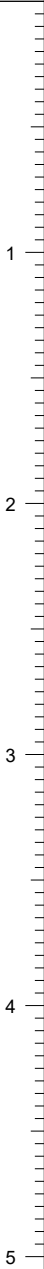
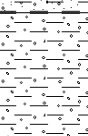
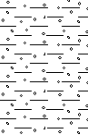
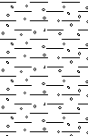
NOTES:	CLIENT:	Gladman Developments Ltd	PROJECT No:	P10567	DATE:	April 2024	DESIGN/DRAWN:	RHC	 GRM Development Solutions Ltd Tel: 01783 551 249 mail@grm-uk.comwww.grm-uk.com
	PROJECT:	Desford Lane, Ratby, Leicestershire	DRAWING NUMBER:	Figure 3b	ISSUE:		Final		
	TITLE:	DCP Test Location Plan	© GRM Development Solutions Ltd © Crown Copyright. AL 100014100						

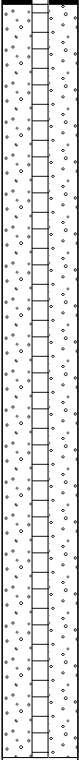


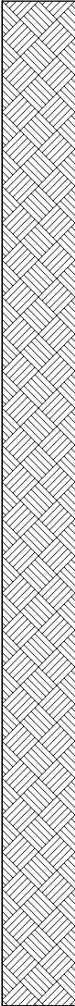
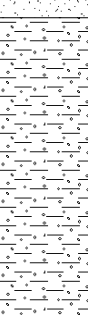
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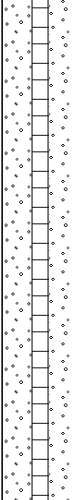
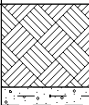
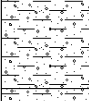
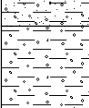
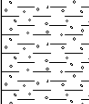
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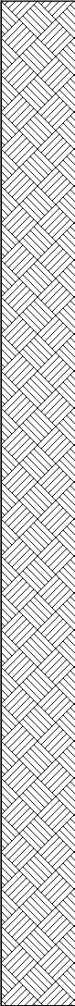
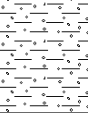
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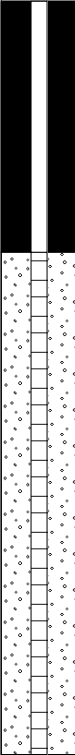
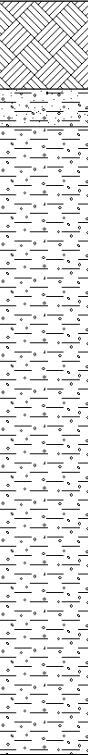
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS01 Sheet 1 of 1			
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 94.13			
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 450818 E 305334 N			
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth	Type	SPT Result							
		0.35	D ES		0.27	93.86		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL			
		0.35			0.40	93.73					
		0.80	HV HV HV D ES	HVP=100 HVP=90 HVP=95 N=10 (1,2/2,2,3,3)					Firm, medium strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS		
		0.80									
		0.80									
		1.00									
		1.00	HV HV HV D	HVP=100 HVP=100 HVP=105					Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>with a pocket of damp reddish brown gravelly fine to coarse sand encountered between 1.10m and 1.20m depth. Soft, low strength in a 0.05m radius around the sand pocket.</i>		
		1.00									
		1.50									
		1.50									
		1.50	HV HV HV D	HVP=100 HVP=100 HVP=105					with a pocket of damp reddish brown clayey fine to coarse sand encountered between 1.80m and 1.85m depth. Soft, low strength in a 0.05m radius around the sand pocket. becoming firm, medium strength and very sandy between 2.00m and 2.70m depth.		
		1.70									
		2.00									
		2.00									
		2.60	D			2.70	91.43		Medium dense light grey slightly silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak mudstone and sandstone. GUNTHORPE MEMBER <i>becoming silty from 3.60m depth. becoming damp between 3.70m and 3.90m depth.</i>		
3.00											
4.00			N=26 (6,9/7,7,6,6)				Very stiff, very high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER End of Borehole at 4.000m				
			N=50 (9,10/50 for 285mm)		3.90 4.00	90.23 90.13					
Crew: Dynamic Sampling UK Ltd		Logger: AT			Weather: Overcast.						
Equipment: Premier Tracker 110											
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.											
Groundwater Remarks: No groundwater encountered during drilling.											
General Remarks:											
Hole Started: 23/04/2024		Hole Complete: 23/04/2024			Version: FINAL		Scale: 1:31				

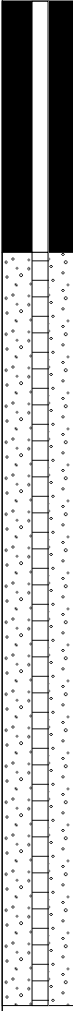
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Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 93.46							
Client: Gladman Developments Ltd						GRM Project Ref: P10567		Coordinates 450916 E 305419 N							
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description							
		Depth	Type	SPT Result											
		0.10	D						Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.						
		0.10	ES												
						0.30	93.16				Firm, medium strength yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite.				
						0.45	93.01								
											RIVER TERRACE DEPOSITS				
		0.80	HV	HVP=85											
		0.80	HV	HVP=88											
		0.80	HV	HVP=90											
						1.00	D	N=12 (2,2/2,2,4,4)			Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.	1			
						1.00	ES								
														GUNTHORPE MEMBER <i>becoming soft, low strength slightly sandy and gravelly between 1.20m and 1.30m depth.</i>	
						1.50	D	HVP=100							
						1.50	HV	HVP=105							
						1.50	HV	HVP=95							
											becoming soft, low strength slightly sandy and gravelly between 1.80m and 1.90m depth.				
						2.00		N=14 (2,3/3,3,4,4)							
														becoming firm, medium strength from 2.00m depth.	2
											becoming soft, low strength slightly sandy and gravelly between 2.20m and 2.40m depth.				
						2.50	D								
									Medium dense light grey and reddish brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone.				3		
				3.00		N=17 (3,3/5,6,3,3)									
									becoming slightly damp between 2.70m and 3.70m depth.						
				3.70								Reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.	4		
				3.80											
				3.90											
				4.00		N=50 (8,8/50 for 285mm)									
									Light grey slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone.						
												GUNTHORPE MEMBER			
									Very stiff, very high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.						
												GUNTHORPE MEMBER			
								End of Borehole at 4.000m			5				
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.								
Equipment: Premier Tracker 110															
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.															
Groundwater Remarks: No groundwater encountered during drilling.															
General Remarks:															
Hole Started: 22/04/2024		Hole Complete: 23/04/2024		Version: FINAL		Scale: 1:31									

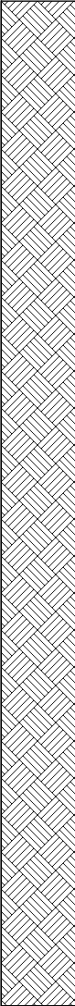
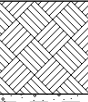
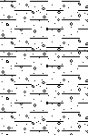
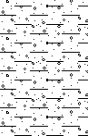
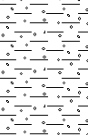
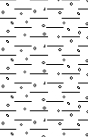
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS03 Sheet 1 of 1			
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 90.38			
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451015 E 305424 N			
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth	Type	SPT Result						
		0.10	D		0.25	90.13		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL		
		0.10	ES							
		0.90	D	HVP=100	1.55	88.83		Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and subrounded to angular of mudstone. GUNTHORPE MEMBER	1	
		0.90	ES	HVP=85						
		0.90	HV	HVP=90						
		0.90	HV	N=12 (2,3/2,3,3,4)						
		0.90	HV							
		1.00								
		1.30	D	HVP=80	2.30	88.08		Loose becoming medium dense, light grey slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone. GUNTHORPE MEMBER	2	
		1.40	HV	HVP=84						
		1.40	HV	HVP=92						
		1.40	HV							
		2.00		N=10 (3,3/3,2,2,3)						
		2.70	D		4.00	86.38		Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>with a pocket of damp reddish brown fine to coarse sand encountered between 2.40m and 2.45m depth. Soft, low strength in a 0.05m radius around the sand pocket.</i> <i>becoming stiff, high strength from 3.00m depth.</i> <i>with a pocket of damp reddish brown fine to coarse sand encountered between 3.20m and 3.30m depth. Soft, low strength in a 0.05m radius around the sand pocket.</i>	3	
		3.00		N=18 (4,3/4,4,5,5)						
4.00		N=50 (5,9/50 for 265mm)	4.00	86.38		End of Borehole at 4.000m	4			
								5		
Crew: Dynamic Sampling UK Ltd				Logger: AT		Weather: Overcast.				
Equipment: Premier Tracker 110										
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.										
Groundwater Remarks: No groundwater encountered during drilling.										
General Remarks:										
Hole Started: 22/04/2024		Hole Complete: 22/04/2024		Version: FINAL		Scale: 1:31				

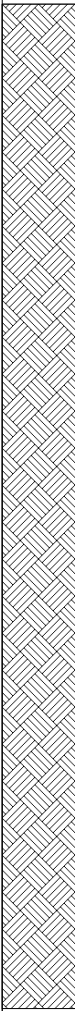
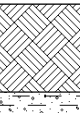
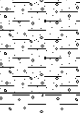
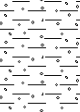
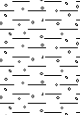
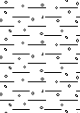
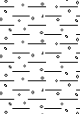
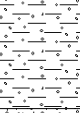
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS07 Sheet 1 of 1									
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 83.25									
Client: Gladman Developments Ltd					GRM Project Ref: P10567				Coordinates 451171 E 305374 N								
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description									
		Depth	Type	SPT Result													
		0.15	D		0.33	82.92		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL									
		0.15	ES														
		0.80	D	HVP=100	0.75	82.50		Stiff, high strength light orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS									
		0.80	ES	HVP=100	0.90	82.35											
		0.80	HV	HVP=100													
		0.80	HV	N=11 (2,3/3,2,3,3)													
		0.80	HV		2.00	81.25		Stiff, high strength reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite including cobbles. RIVER TERRACE DEPOSITS									
		1.00															
		1.35	D														
		1.50	HV	HVP=105													
		1.50	HV	HVP=105	3.00	80.25		Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER									
		1.50	HV	HVP=108													
		2.00		N=30 (4,5/7,7,8,8)				Extremely weak reddish brown slightly clayey MUDSTONE. Recovered as a slightly clayey medium to coarse and angular gravel of weak mudstone. GUNTHORPE MEMBER									
		2.05	D														
		3.00		N=50 (9,10/50 for 235mm)				End of Borehole at 3.000m									
Crew: Dynamic Sampling UK Ltd		Logger: AT		Weather: Overcast.													
Equipment: Premier Tracker 110																	
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.																	
Groundwater Remarks: No groundwater encountered during drilling.																	
General Remarks:																	
Hole Started: 25/04/2024		Hole Complete: 25/04/2024		Version: FINAL		Scale: 1:31											

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS09 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 90.05		
Client: Gladman Developments Ltd						GRM Project Ref: P10567		Coordinates 450982 E 305372 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth	Type	SPT Result						
		0.10	D		0.32	89.73		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL		
		0.10	ES							
					0.80	89.25		Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER		
		1.00		N=10 (6,4/2,2,3,3)	1.05	89.00		Medium dense light grey slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone. GUNTHORPE MEMBER		
		1.10	D	HVP=82 HVP=88 HVP=90	1.70	86.05		Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER with a pocket of clayey reddish brown fine to medium sand encountered between 1.50m and 1.60m depth.		
		1.10	ES							
		1.40	HV							
		1.40	HV	N=8 (2,2/2,2,2,2)	2.00	86.05		becoming firm, medium strength from 2.00m depth. with a pocket of damp reddish brown fine to coarse sand encountered between 2.00m and 2.10m depth. Soft, low strength in a 0.05m radius around the sand pocket.		
		1.40	HV							
		1.70	D	N=25 (4,5/5,6,7,7)	2.80	86.05		becoming stiff, high strength gravelly and recovered with a friable texture from 2.50m depth.		
		3.00	D							
		N=50 (10,10/50 for 255mm)	4.00	86.05		becoming very stiff, very high strength from 3.90m depth. End of Borehole at 4.000m				
4.00										
									5	
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.			
Equipment: Premier Tracker 110										
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.										
Groundwater Remarks: No groundwater encountered during drilling.										
General Remarks:										
Hole Started: 22/04/2024		Hole Complete: 22/04/2024		Version: FINAL		Scale: 1:31				

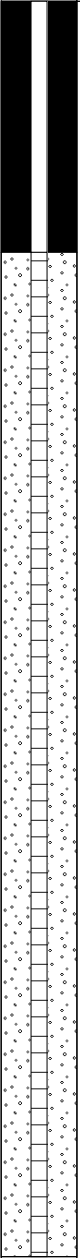
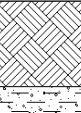
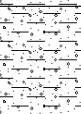
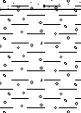
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS11 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 87.97	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 450971 E 305314 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description
		Depth	Type	SPT Result				
		0.40	D		0.35	87.62		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL Stiff, high strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>with a pocket of damp reddish brown fine to coarse sand encountered between 1.00m and 1.10m depth. firm, medium strength in a 0.05m radius around the sand pocket.</i> <i>with a pocket of damp reddish brown clayey fine to coarse sand encountered between 1.80m and 1.85m depth. Soft, low strength in a 0.05m radius around the sand pocket. recovered with a friable texture from 2.00m depth.</i> <i>becoming very stiff, very high strength from 2.90m depth.</i> End of Borehole at 3.000m
		0.40	ES		0.50	87.47		
		0.85	HV	HVP=78				
		0.85	HV	HVP=78				
		0.85	HV	HVP=80				
		1.00		N=9 (1,1/2,2,2,3)				
		1.20	D					
		1.20	ES					
		1.40	HV	HVP=100				
		1.40	HV	HVP=100				
		1.40	HV	HVP=90				
		2.00		N=19 (2,3/4,4,5,6)				
		3.00		N=50 (9,11/50 for 265mm)	3.00	84.97		
Crew: Dynamic Sampling UK Ltd			Logger: AT		Weather: Overcast.			
Equipment: Premier Tracker 110								
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.								
Groundwater Remarks: No groundwater encountered during drilling.								
General Remarks:								
Hole Started: 23/04/2024		Hole Complete: 23/04/2024		Version: FINAL		Scale: 1:31		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS12 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 84.31		
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451074 E 305299 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.10	D		0.20	84.11		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.	
		0.10	ES						
					0.60	83.71		Firm, medium strength yellowish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite including cobbles.	
		1.00		N=24 (2,3/4,5,7,8)	1.10	83.21		RIVER TERRACE DEPOSITS <i>becoming sandy between 0.40m and 0.50m depth.</i>	1
		1.05	D	HVP=100					
		1.05	ES	HVP=102					
		1.05	HV	HVP=95					
		1.05	HV						
		1.50	HV	HVP=85					
		1.50	HV	HVP=85					
		1.50	HV	HVP=90					
		1.80	D	HVP=40	2			Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER	
		1.85	HV	HVP=45					
		1.85	HV	HVP=48					
		1.85	HV	HVP=95					
		1.95	HV						
		2.00		N=7 (1,2/2,2,1,2)	3			with a slight seepage of perched water encountered within a band of slightly clayey angular gravel of mudstone between 1.60m and 1.80m depth. with rare 0.01m to 0.03m sand pockets encountered from 1.80m depth. becoming firm, medium strength between 1.80m and 2.10m depth. recovered with a friable texture from 1.90m depth.	
		2.80	D						
		3.00		N=19 (4,4/4,5,5,5)					
		4.00		N=50 (6,7/50 for 295mm)	4.00	80.31		becoming very stiff, very high strength from 3.90m depth.	4
								End of Borehole at 4.000m	5
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.		
Equipment: Premier Tracker 110									
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.									
Groundwater Remarks: No groundwater encountered during drilling.									
General Remarks:									
Hole Started: 24/04/2024		Hole Complete: 24/04/2024		Version: FINAL		Scale: 1:31			

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS13 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 82.84		
Client: Gladman Developments Ltd						GRM Project Ref: P10567		Coordinates 451142 E 305319 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth	Type	SPT Result						
		0.10	D		0.37	82.47		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL		
		0.10	ES							
					0.60	82.24		Stiff, high strength orangish brown slightly sandy and locally sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS		
		0.80	HV	HVP=110	1.50	81.34		Firm to stiff, medium to high strength reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone and quartzite. RIVER TERRACE DEPOSITS <i>becoming sandy between 1.00m and 1.15m depth.</i>		
		0.80	HV	HVP=120						
		0.80	HV	HVP=120						
		1.00		N=7 (1,1/1,2,2,2)				Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>recovered with a friable texture from 2.00m depth.</i>		
		1.20	D	HVP=100						
		1.20	ES	HVP=100						
		1.20	HV	HVP=90						
		1.20	HV							
		1.20	HV							
		2.00		N=16 (3,2/3,4,4,5)	4.00	78.84		becoming very stiff, very high strength from 3.90m depth. End of Borehole at 4.000m		
		2.20	D							
3.00		N=17 (3,3/3,4,5,5)								
3.50	D									
4.00		N=50 (8,9/50 for 265mm)								
									5	
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.			
Equipment: Premier Tracker 110										
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.										
Groundwater Remarks: No groundwater encountered during drilling.										
General Remarks:										
Hole Started: 24/04/2024		Hole Complete: 24/04/2024		Version: FINAL		Scale: 1:31				

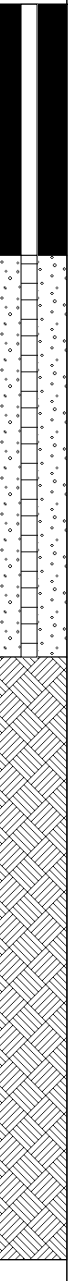
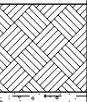
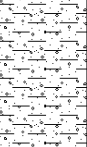
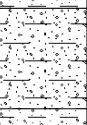
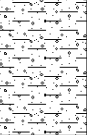
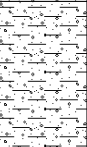
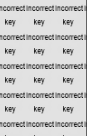
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS15 Sheet 1 of 1				
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 78.15				
Client: Gladman Developments Ltd						GRM Project Ref: P10567			Coordinates 451298 E 305300 N			
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description				
		Depth	Type	SPT Result								
		0.05	D		0.35	77.80		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL				
		0.05	ES									
					0.80	77.35		Stiff, high strength light orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER		1		
		0.75	D									
		0.75	ES									
		0.90	HV	HVP=40								
		0.90	HV	HVP=45								
		0.90	HV	HVP=50								
		1.00		N=11 (2,2/2,2,3,4)								
								with a pocket of damp reddish brown gravelly fine to coarse sand encountered between 1.60m and 1.65m depth. Soft, low strength in a 0.05m radius around the sand pocket. becoming soft, low strength between 1.80m and 2.40m depth.		2		
		1.70	D									
		1.80	HV	HVP=38								
		1.80	HV	HVP=40								
		1.80	HV	HVP=48								
		2.00		N=10 (2,2/2,2,3,3)								
								becoming very soft, very low strength damp and sandy between 2.70m and 2.75m depth. becoming stiff, high strength from 2.75m depth.		3		
		2.20	HV	HVP=35								
		2.20	HV	HVP=38								
		2.20	HV	HVP=42								
		2.80	D									
					3.10	75.05		Medium dense light grey slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone. GUNTHORPE MEMBER Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER becoming stiff, high strength from 3.60m depth. End of Borehole at 4.000m		4		
		3.00		N=14 (2,3/3,3,4,4)								
		3.05	HV	HVP=15								
		3.05	HV	HVP=15								
		3.05	HV	HVP=20	3.40	74.75						
					4.00	74.15						
		4.00		N=50 (9,9/50 for 265mm)								
								5				
Crew: Dynamic Sampling UK Ltd				Logger: AT				Weather: Overcast.				
Equipment: Premier Tracker 110												
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.												
Groundwater Remarks: A slight seepage of perched water encountered between 3.00m depth and 3.40m depth.												
General Remarks:												
Hole Started: 25/04/2024		Hole Complete: 25/04/2024		Version: FINAL		Scale: 1:31						

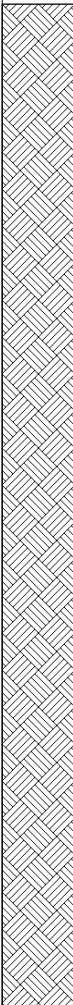
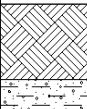
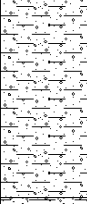
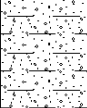
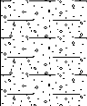
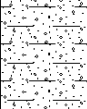
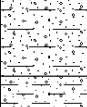
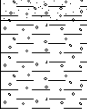
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS16 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 78.37	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451238 E 305251 N	

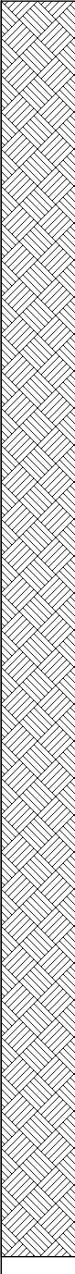
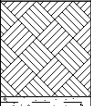
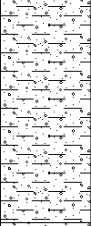
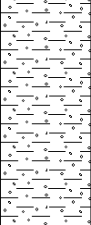
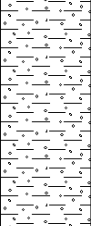
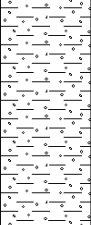
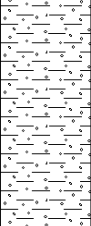
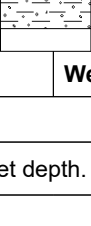
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
					0.34	78.03		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.	
								TOPSOIL	
		0.50	D						
		0.50	ES					Firm, medium strength light orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite.	
		0.90	HV	HVP=58					
		0.90	HV	HVP=62					
		0.90	HV	HVP=65					
		1.00		N=9 (1,2/3,2,2,2)	1.00	77.37		RIVER TERRACE DEPOSITS	1
		1.30	D						
		1.30	ES						
		1.50	HV	HVP=110					
		1.50	HV	HVP=110				becoming stiff, high strength from 1.50m depth.	
		1.50	HV	HVP=90					
		2.00		N=10 (2,2/2,2,3,3)	2.00	76.37		GUNTHORPE MEMBER	2
		2.10	D						
		2.20	HV	HVP=25					
		2.20	HV	HVP=30					
		2.20	HV	HVP=35					
		2.50	HV	HVP=28					
		2.50	HV	HVP=30				becoming gravelly from 2.00m depth.	
	2.50	HV	HVP=35				becoming soft, low strength from 2.20m depth.		
	2.85	HV	HVP=78						
	2.85	HV	HVP=80						
	2.85	HV	HVP=85						
	3.00		N=21 (4,5/5,5,5,6)				becoming stiff, high strength from 2.75m depth.	3	
	3.50	D							
	4.00		N=21 (4,5/5,5,5,6)					4	
	4.50	D							
	5.00		N=32 (4,5/6,8,8,10)	5.00	73.37		End of Borehole at 5.000m	5	

Crew: Dynamic Sampling UK Ltd		Logger: AT		Weather: Overcast.	
Equipment: Premier Tracker 110					
Reason for termination of borehole: Borehole terminated on target depth.					
Groundwater Remarks: No groundwater encountered during drilling.					
General Remarks:					

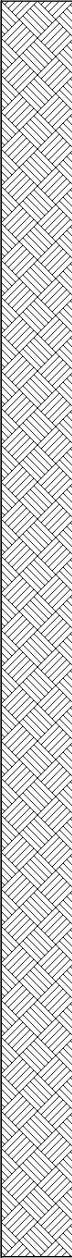
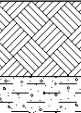
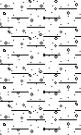
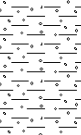
Hole Started:	25/04/2024	Hole Complete:	25/04/2024	Version:	FINAL	Scale:	1:31
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		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS17 Sheet 1 of 1					
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 76.99					
Client: Gladman Developments Ltd					GRM Project Ref: P10567				Coordinates 451195 E 305164 N				
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth	Type	SPT Result									
		0.20	D		0.35	76.64		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL					
		0.20	ES										
		0.80	HV	HVP=80	1.00	75.99		Stiff, high strength light orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS					
		0.80	HV	HVP=85									
		0.80	HV	HVP=90									
		0.95	D	N=7 (1,2/2,1,2,2)									
		0.95	ES		1.40	75.59		Loose orangish brown slightly gravelly clayey fine to coarse SAND. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS					
		1.00											
		1.50	HV	HVP=75									
		1.50	HV	HVP=78									
		1.50	HV	HVP=80	2.00	74.99		Stiff, high strength reddish brown slightly sandy slightly gravelly CLAY. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS					
		1.80	D										
		2.00		N=20 (1,3/4,5,5,6)									
		2.30	HV	HVP=70	2.60	74.39		Firm, medium strength reddish brown slightly sandy slightly gravelly CLAY. Gravel is medium to coarse and subrounded to subangular of mudstone and quartzite. RIVER TERRACE DEPOSITS					
		2.30	HV	HVP=75									
		2.30	HV	HVP=78									
		2.50	D										
					2.70	74.29		Orangish brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS Firm, medium strength reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone and quartzite. RIVER TERRACE DEPOSITS No Recovery GUNTHORPE MEMBER with no recovery between 3.00m and 5.00m.					
		3.00		N=4 (1,1/1,1,1,1)	3.00	73.99							
			4.00			No Recovery GUNTHORPE MEMBER with no recovery between 3.00m and 5.00m.							

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS18 Sheet 1 of 1					
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 79.15					
Client: Gladman Developments Ltd					GRM Project Ref: P10567				Coordinates 451156 E 305201 N				
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description					
		Depth	Type	SPT Result									
					0.30	78.85		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL					
		0.50	HV	HVP=20		Soft, low strength light orangish brown slightly sandy and locally sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS							
		0.50	HV	HVP=22		with a band of sandy clay encountered between 0.80m and 0.90m depth.							
		0.50	HV	HVP=30		becoming very sandy and very gravelly between 1.00m and 1.20m depth.							
		0.80	HV	HVP=20				Medium dense orangish brown slightly clayey gravelly fine to coarse SAND. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS					
		0.80	HV	HVP=22				with occasional clay pockets up to 0.05m diameter encountered from 1.80m depth.					
		0.80	HV	HVP=25				with a rapid inflow of perched water encountered between 2.00m and 2.80m depth.					
		0.85	D	N=34 (8,8/10,8,8,8)									
		0.85	ES										
		1.00											
		1.50	D										
		2.00		N=18 (6,6/6,6,3,3)									
		2.90	D										
		3.00		N=7 (1,1/1,2,2,2)									
		4.00		N=12 (3,3/3,3,3,3)									
													
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.						
Equipment: Premier Tracker 110													
Reason for termination of borehole: Borehole terminated on target depth.													
Groundwater Remarks: A rapid inflow of perched water encountered between 2.00m and 2.80m depth.													
General Remarks:													
Hole Started: 24/04/2024		Hole Complete: 24/04/2024		Version: FINAL		Scale: 1:31							

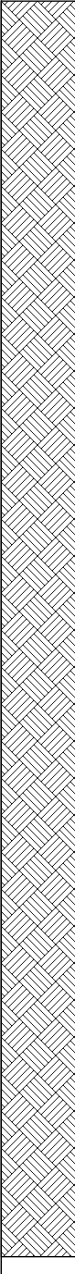
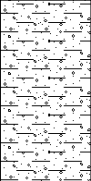
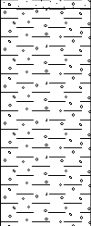
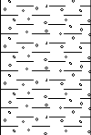
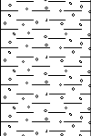
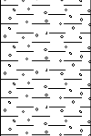
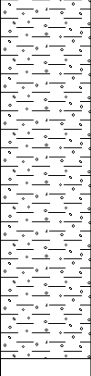
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS19 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 78.24		
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451115 E 305166 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.10	D		0.38	77.86		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.	
		0.10	ES					TOPSOIL	
					1.30	76.94		Stiff, high strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite including cobbles.	1
		0.90	HV	HVP=75				RIVER TERRACE DEPOSITS	
		0.90	HV	HVP=80				becoming slightly damp, soft, low strength and sandy between 1.00m and 1.30m depth.	
		0.90	HV	HVP=88					
		1.00	D	N=5 (1,2/1,2,1,1)					
		1.00	ES						
					2.00	76.94		Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. Becoming firm, medium strength, from 4.0m depth.	2
		1.50	HV	HVP=40				GUNTHORPE MEMBER	
		1.50	HV	HVP=40				becoming soft, low strength with light grey mottling	
		1.50	HV	HVP=58				becoming rare from 2.00m depth.	
		1.60	D	HVP=35					
		1.70	HV	HVP=40					
		1.70	HV	HVP=45					
		1.70	HV	N=3 (1,1/0,1,1,1)					
		2.00	HV	HVP=20					
		2.10	HV	HVP=22					
					2.50	76.94		becoming stiff, high strength from 2.80m depth.	3
		2.10	HV	HVP=25					
		2.10	HV						
		2.50	HV	HVP=28					
					3.00	76.94			3
								N=16 (2,2/3,3,5,5)	
			4.00	76.94		becoming firm, medium strength from 4.00m depth.	4		
						N=9 (2,3/2,2,2,3)			
						becoming soft, low strength between 4.20m and 4.80m depth.			
			5.00	73.24		becoming stiff, high strength from 4.80m depth.	5		
						N=24 (5,5/6,6,6,6)			
			5.00	73.24		End of Borehole at 5.000m			
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.		
Equipment: Premier Tracker 110									
Reason for termination of borehole: Borehole terminated on target depth.									
Groundwater Remarks: No groundwater encountered during drilling.									
General Remarks:									
Hole Started: 24/04/2024			Hole Complete: 24/04/2024			Version: FINAL		Scale: 1:31	

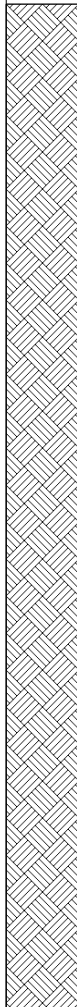
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS20 Sheet 1 of 2	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 81.04	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451043 E 305158 N	

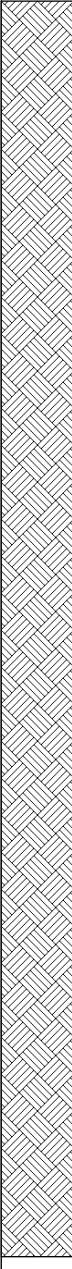
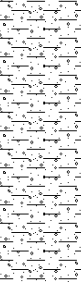
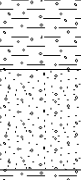
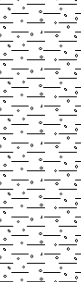
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth	Type	SPT Result							
		0.10	D		0.30	80.74		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL			
		0.10	ES								
				0.80	HV	HVP=85	1.00	80.04		Stiff, high strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite including cobbles. RIVER TERRACE DEPOSITS	1
				0.80	HV	HVP=90					
				0.80	HV	HVP=90					
				0.85	D	N=15 (1,3/3,4,4,4)					
				1.00	D						
				1.00	ES						
				1.60	HV	HVP=100	1.50	79.54		Medium dense orangish brown slightly silty slightly gravelly fine to coarse SAND. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS	2
				1.60	HV	HVP=90					
				1.60	HV	HVP=90					
				1.70	D	HVP=25					
				1.80	HV	HVP=26					
				1.80	HV	HVP=30					
				1.80	HV	N=8 (2,2/2,2,2,2)					
				2.00							
				2.30	HV	HVP=48					
				2.30	HV	HVP=50					
				2.30	HV	HVP=58					
				2.50	HV	HVP=105	3.00			Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER	3
				2.50	HV	HVP=90					
				2.50	HV	HVP=95					
		2.70	D								
		3.00		N=16 (3,4/4,4,4,4)							
		3.50	D		4.00			becoming soft, low strength from 1.70m depth. becoming firm, medium strength from 2.00m depth. with rare slightly damp 0.01m to 0.05m sand pockets encountered between 2.00m and 2.80m depth. becoming stiff, high strength from 2.50m depth.	4		
		4.00		N=16 (5,4/4,4,4,4)							
		5.00		N=50 (6,9/50 for 275mm)	5.00	76.04		becoming gravelly from 3.00m depth.	5		

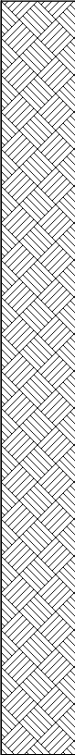
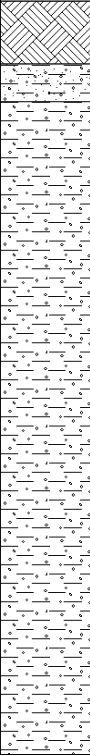
Crew: Dynamic Sampling UK Ltd	Logger: AT	Weather: Overcast.
Equipment: Premier Tracker 110		
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.		
Groundwater Remarks: A slight seepage of perched water encountered between 1.40m and 1.50m depth.		
General Remarks:		
Hole Started: 23/04/2024	Hole Complete: 23/04/2024	Version: FINAL
Scale: 1:31		

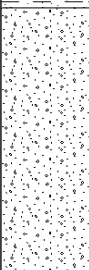
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS20 Sheet 2 of 2	
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 81.04	
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451043 E 305158 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
								Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>becoming very stiff, very high strength from 4.90m depth.</i> End of Borehole at 5.000m	
								6	
								7	
								8	
								9	
								10	
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.		
Equipment: Premier Tracker 110									
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.									
Groundwater Remarks: A slight seepage of perched water encountered between 1.40m and 1.50m depth.									
General Remarks:									
Hole Started: 23/04/2024		Hole Complete: 23/04/2024			Version: FINAL		Scale: 1:31		

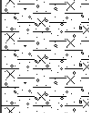
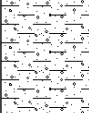
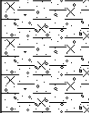
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS22 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 81.26		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451120 E 305235 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth	Type	SPT Result						
		0.10	D		0.35	80.91		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL		
		0.10	ES					Stiff, high strength orangish brown slightly sandy and locally sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone, flint and rare quartzite. RIVER TERRACE DEPOSITS		
		0.90	HV	HVP=100	1.10	80.16				
		0.90	HV	HVP=100						
		0.90	HV	HVP=90						
		0.95	D	N=15 (2,3/3,4,4,4)						
		0.95	ES					Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER		
		1.00								
		1.50	HV	HVP=100	2.00					
		1.50	HV	HVP=90						
		1.50	HV	HVP=95						
		1.60	D							
		2.00		N=9 (1,1/2,2,2,3)				becoming firm, medium strength, slightly damp and gravelly between 2.00m and 2.30m depth.		
		2.20	HV	HVP=40	2.20					
		2.20	HV	HVP=54						
		2.20	HV	HVP=58						
		2.60	D					becoming very gravelly from 2.80m depth.		
3.00		N=12 (3,3/3,3,3,3)	3.00			becoming firm, medium strength from 3.00m depth. with a pocket of damp reddish brown clayey fine to coarse sand encountered between 3.00m and 3.10m depth. Soft, low strength in a 0.05m radius around the sand pocket.				
						with a pocket of damp reddish brown slightly gravelly clayey fine to coarse sand encountered between 3.30m and 3.40m depth. Soft, low strength in a 0.05m radius around the sand pocket. becoming stiff, high strength from 3.40m depth.				
3.80	D		3.80							
4.00		N=9 (3,3/3,2,2,2)				becoming gravelly with a slight seepage of perched water between 4.00m and 4.50m depth.				
5.00		N=19 (2,2/4,5,5,5)	5.00	76.26		End of Borehole at 5.000m				
Crew: Dynamic Sampling UK Ltd				Logger: AT		Weather: Overcast.				
Equipment: Premier Tracker 110										
Reason for termination of borehole: Borehole terminated on target depth.										
Groundwater Remarks: No groundwater encountered during drilling.										
General Remarks:										
Hole Started: 24/04/2024		Hole Complete: 24/04/2024		Version: FINAL		Scale: 1:31				

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS23 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 83.05		
Client: Gladman Developments Ltd						GRM Project Ref: P10567			Coordinates 451064 E 305249 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth	Type	SPT Result						
		0.10	D		0.26	82.79		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.		
		0.10	ES					TOPSOIL		
		0.80	HV	HVP=80	1.05	82.00		Stiff, high strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite.		
		0.80	HV	HVP=90				RIVER TERRACE DEPOSITS		
		0.80	HV	HVP=90				with a pocket of orangish brown slightly silty fine to coarse sand encountered between 0.60m and 0.65m depth.		
		1.00	D	N=18 (2,4/4,4,5,5)				with a pocket of orangish brown slightly silty fine to coarse sand encountered between 0.90m and 0.95m depth.		
		1.00	ES					Medium dense orangish brown slightly silty slightly gravelly fine to coarse SAND. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite.		
		1.80			1.80	81.25		RIVER TERRACE DEPOSITS		
		1.85	D					becoming slightly damp from 1.50m depth.		
		1.90	HV	HVP=88				with a slight seepage of perched water between 1.70m and 1.80m depth.		
		1.90	HV	HVP=90				Firm to stiff, medium to high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.		
		1.90	HV	HVP=90				GUNTHORPE MEMBER		
		2.00		N=5 (2,1/1,1,2,1)				becoming soft, low strength between 2.00m and 2.10m depth.		
		2.05	HV	HVP=28				becoming gravelly from 2.10m and 2.20m depth.		
		2.05	HV	HVP=30				becoming firm, medium strength from 2.50m depth.		
		2.05	HV	HVP=35				becoming stiff, high strength from 2.70m depth.		
		2.05	HV	HVP=55						
		2.50	HV	HVP=62						
		2.50	HV	HVP=65						
		2.50	HV	HVP=100						
		2.70	HV	HVP=100						
		2.70	HV	HVP=90						
		3.00	HV	N=16 (3,3/4,4,4,4)						
		3.50	D					4.00	79.05	
		4.00		N=50 (8,11/50 for 245mm)	End of Borehole at 4.000m					
Crew: Dynamic Sampling UK Ltd				Logger: AT			Weather: Overcast.			
Equipment: Premier Tracker 110										
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.										
Groundwater Remarks: A slight seepage of perched water between 1.70m and 1.80m depth.										
General Remarks:										
Hole Started: 23/04/2024		Hole Complete: 23/04/2024		Version: FINAL		Scale: 1:31				

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS24 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 85.16	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 450990 E 305255 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description
		Depth	Type	SPT Result				
		0.10	D		0.29	84.87		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite.
		0.10	ES					TOPSOIL
		1.00			1.80	83.36		Firm, medium strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite.
		1.10	D	N=12 (5,4/3,3,3,3)				RIVER TERRACE DEPOSITS
		1.10	ES	HVP=85				
		1.20	HV	HVP=85				becoming stiff, high strength from 1.20m depth.
		1.20	HV	HVP=90				becoming damp soft, low strength sandy clay with 0.05m sand pockets between 1.30m and 1.80m depth.
		1.75	HV	HVP=28	N=9 (1,2/3,2,2,2)	82.16		Firm, medium strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.
		1.75	HV	HVP=30				GUNTHORPE MEMBER
		1.75	HV	HVP=31				with a pocket of damp reddish brown fine to coarse sand encountered between 2.00m and 2.05m depth. Soft, low strength in a 0.05m radius around the sand pocket.
		1.90	D					becoming stiff, high strength and recovered with a friable texture and becoming gravelly from 2.45m depth.
		2.00			3.00	81.76		Medium dense light grey slightly gravelly fine to coarse SAND. Gravel is fine to coarse and angular of weak sandstone.
		3.00	D	N=16 (3,3/3,3,5,5)				GUNTHORPE MEMBER
		3.40			4.00	80.16		Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone.
		4.00		N=20 (5,5/5,5,5,5)				GUNTHORPE MEMBER
5.00			N=50 (5,5/50 for 285mm)	5.00	80.16		with light grey mottling becoming rare from 4.50m depth.	
End of Borehole at 5.000m								
Crew: Dynamic Sampling UK Ltd				Logger: AT		Weather: Overcast.		
Equipment: Premier Tracker 110								
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.								
Groundwater Remarks: A slight seepage of perched water encountered between 3.00m and 3.40m depth.								
General Remarks:								
Hole Started: 23/04/2024		Hole Complete: 23/04/2024		Version: FINAL		Scale: 1:31		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole				Borehole No WS25 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire								Ground Level (mAOD) 86.46	
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 450939 E 305250 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.25	D		0.25	86.21		Dark brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse and subrounded to subangular of mudstone, sandstone, flint and quartzite. TOPSOIL Stiff, high strength orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is medium to coarse and subrounded to subangular of mudstone, sandstone and rare quartzite. RIVER TERRACE DEPOSITS Stiff, high strength reddish brown and occasionally light grey mottled slightly gravelly CLAY. Gravel is medium to coarse and angular of extremely weak mudstone. GUNTHORPE MEMBER <i>recovered with a friable texture from 1.50m depth.</i> <i>becoming gravelly from 2.00m depth.</i> <i>becoming very stiff, very high strength from 2.90m depth.</i> End of Borehole at 3.000m	
		0.25	ES		0.40	86.06			
		0.85	HV	HVP=78					
		0.85	HV	HVP=90					
		0.85	HV	HVP=90					
		0.90	D	N=18 (2,3/4,4,5,5)					
		0.90	ES						
		1.00							
		1.40	HV	HVP=100					
		1.40	HV	HVP=110					
		1.40	HV	HVP=110					
		1.50	D						
		2.00							
		2.10	D	N=15 (2,2/2,3,4,6)					
		3.00							
			N=50 (10,11/50 for 285mm)	3.00	83.46				
Crew: Dynamic Sampling UK Ltd		Logger: AT			Weather: Overcast.				
Equipment: Premier Tracker 110									
Reason for termination of borehole: Borehole terminated on SPT 'N' value refusal.									
Groundwater Remarks: No groundwater encountered during drilling.									
General Remarks:									
Hole Started: 23/04/2024		Hole Complete: 23/04/2024			Version: FINAL		Scale: 1:31		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP01 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 92.34		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451253 E 305400 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.25	ES					Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare chert. TOPSOIL		
	0.40	ES		0.35	91.99		1 Firm, medium strength, reddish brown mottled orangish brown and grey, very slightly gravelly sandy CLAY. Sand is fine ton coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS Stiff, high strength, red mottled reddish brown and grey, sandy CLAY with rare fine to medium mudstone gravel. Sand is fine to coarse. GUNTHORPE MEMBER Firm, medium strength red and grey mottled, sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular mudstone. GUNTHORPE MEMBER		
	0.70	D	HVP=102						
	0.70		HVP=106	0.50	91.84				
	0.70		HVP=108						
	0.90	D							
	1.10		HVP=42						
	1.10		HVP=50						
	1.10		HVP=58						
	1.70	D		1.65	90.69		Firm to stiff, medium to high strength, friable reddish brown, sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER		
2.40	D		2.25	90.09		Medium dense, pinkish grey, mottled light grey, slightly gravelly fine to coarse SAND. Gravel is fine to coarse, angular to sub-angular sandstone. GUNTHORPE MEMBER			
3.40	D		3.15	89.19		Firm to stiff, medium to high strength, friable, red occasionally mottled grey, slightly sandy CLAY. GUNTHORPE MEMBER			
3.90	D		3.90	88.44		End of Pit at 3.900m			
Date Excavated: 24/04/2024				Groundwater Observations:					
Date Backfilled: 24/04/2024				Slight seepage of perched water encountered from 2.50m depth.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60  2.90		Excavator reach limit achieved.			
General Remarks:									
Relative density is approximate and determined by observation only.				Version: FINAL			Scale: 1:25		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP02 Sheet 1 of 1			
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 76.64			
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451291 E 305204 N			
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.20	ES	HVP=64 HVP=74 HVP=78	0.25	76.39		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite. TOPSOIL		1	
	0.50	ES		0.70	75.94			Soft to firm, low to medium strength, orangish brown mottled light brown, slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, quartzite with rare chert and plant matter. RIVER TERRACE DEPOSITS		
	0.50	D						Firm, medium strength, reddish brown mottled reddish grey, sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS		
	0.50							Firm medium strength, red, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, mudstone. GUNTHORPE MEMBER		
	0.80							Firm medium strength, red, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, mudstone. GUNTHORPE MEMBER		
	1.20	D	HVP=64 HVP=68 HVP=72	1.10	75.54				2	
	1.20	D								
	1.20									
	2.10	D	HVP=102 HVP=86 HVP=94	2.55	74.09		Soft to firm, low to medium strength, slightly friable, slightly gravelly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded mudstone. GUNTHORPE MEMBER		3	
	2.10	D								
2.10	D									
3.40	D		3.80	72.84		Medium strength, light grey SANDSTONE. GUNTHORPE MEMBER		4		
3.90	D									
	D									
Date Excavated: 24/04/2024				Groundwater Observations:						
Date Backfilled: 24/04/2024				A rapid inflow of perched water encountered between 3.80m and 3.90m depth.						
Shoring: None.										
Stability: Stable to full depth.										
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:				
Logged by: JM.				0.60 		Excavator reach limit achieved.				
General Remarks:										
Relative density is approximate and determined by observation only.										
Version:				FINAL			Scale: 1:25			

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP03 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 77.43	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451238 E 305260 N	

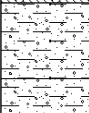
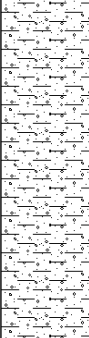
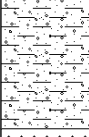
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.28	77.15		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare mudstone. TOPSOIL	1
	0.55	ES		0.60	76.83		Soft, low strength, orangish brown, slightly gravelly very sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	0.80	D					Loose to medium dense, orangish brown, slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	1.20 1.20 1.20 1.20	D	HVP=96 HVP=98 HVP=98	1.10	76.33		Firm to stiff, medium to high strength, very slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
				1.80	75.63		Firm to stiff, medium to high strength, red, slightly gravelly slightly sandy silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded, mudstone. GUNTHORPE MEMBER	2
	2.20 2.20 2.20 2.20	D	HVP=74 HVP=76 HVP=82				becoming friable below 2.5m begl.	
	3.20	D		3.40	74.03		End of Pit at 3.400m	3
								
								4
								

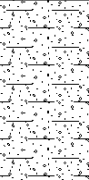
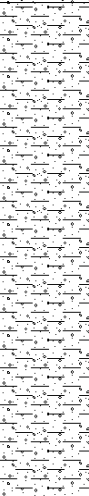
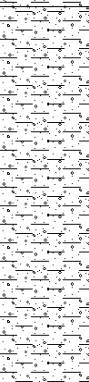
Date Excavated: 24/04/2024		Groundwater Observations:	
Date Backfilled: 24/04/2024		Damp strata encountered between 0.8m - 1.1m begl.	
Shoring: None.			
Stability: Collapse below 1.9m begl filling pit to 2.6m begl.			
Plant Used: JCB 3CX.		Reason for termination of Trial Pit:	
Logged by: JM		Collapse of sides from 1.9m begl.	
General Remarks:			

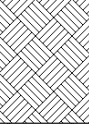
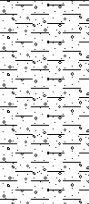
Relative density is approximate and determined by observation only.		Version: FINAL		Scale: 1:25	
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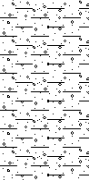
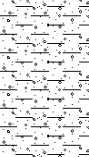
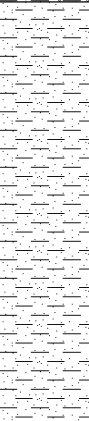
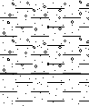
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP04 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 80.07		
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451221 E 305335 N		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.31	79.76		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare chert. TOPSOIL		
	0.45	ES		0.60	79.47		Firm, medium strength, orangish brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS		
	0.75	D					Firm, medium strength, reddish brown, slightly sandy CLAY with rare fine to coarse quartzite gravel. Sand is fine to coarse. RIVER TERRACE DEPOSITS		
	1.20 1.20 1.20 1.40	D	HVP=70 HVP=76 HVP=82	1.30 1.50	78.77 78.57		Firm, medium strength, light grey, slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular sandstone. GUNTHORPE MEMBER		
	1.90 1.90 1.90 1.90	D	HVP=45 HVP=48 HVP=50				Firm, medium strength, slightly friable red sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER		
	2.60	D					Becoming friable below 2.5m begl.		
	3.10	D					End of Pit at 3.900m		
					3.90	76.17			
	Date Excavated: 24/04/2024				Groundwater Observations:				
	Date Backfilled: 24/04/2024				No groundwater encountered during excavation.				
Shoring: None.				Trial Pit Dimensions (m): 0.60  2.90					
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Reason for termination of Trial Pit:					
Logged by: JM.				Excavator reach limit achieved.					
General Remarks:									
Relative density is approximate and determined by observation only.									
Version: FINAL				Scale: 1:25					

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP05 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 81.69		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451189 E 305340 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.24	81.45		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite. TOPSOIL		
	0.40	ES					Firm, medium strength, red locally mottled greyish green slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded mudstone.		
	0.55	D					GUNTHORPE MEMBER <i>becoming friable below 0.6m begl.</i>		
	1.50	D							
	2.50	D					band of firm, light greenish grey, slightly sandy gravelly CLAY with fine to coarse, angular sandstone gravel.		
3.30	D		3.80	77.89		End of Pit at 3.800m			
Date Excavated: 24/04/2024			Groundwater Observations:						
Date Backfilled: 24/04/2024			No groundwater encountered during excavation.						
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.			Trial Pit Dimensions (m):		Reason for termination of Trial Pit:				
Logged by: JM.			0.60  2.90		Excavator reach limit achieved.				
General Remarks:									
Relative density is approximate and determined by observation only.									
Version: FINAL			Scale: 1:25						

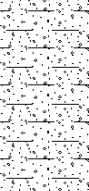
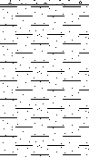
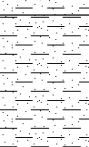
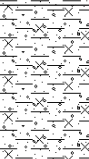
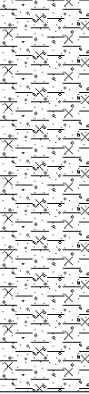
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP06 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 82.99	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451070 E 305419 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30	82.69		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite. TOPSOIL	
	0.50	ES		0.55	82.44		Firm, medium strength, greyish brown mottled orangish brown, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	0.90	D					Firm, medium strength, friable, red occasionally mottled grey, slightly sandy slightly gravelly slightly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded mudstone. GUNTHORPE MEMBER	
	1.80	D					medium strength, light grey mottled red SANDSTONE. GUNTHORPE MEMBER	
	2.20	D		2.20	80.79		band of weak, light grey weathered SANDSTONE between 2.20 - 2.30m begl.	
	2.60	D		2.60	80.39		End of Pit at 2.600m	
Date Excavated: 24/04/2024				Groundwater Observations:				
Date Backfilled: 24/04/2024				A rapid inflow of perched water encountered between 2.30m and 2.60m depth.				
Shoring: None.								
Stability: V								
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:		
Logged by: JM.				0.60  2.90		Groundwater struck, rapid water ingress.		
General Remarks:								
Relative density is approximate and determined by observation only.								
Version: FINAL				Scale: 1:25				

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP07 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 88.23		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451070 E 305407 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.30	87.93		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare sandstone. TOPSOIL		
	0.60	ES		0.90	87.33		Medium dense, orangish brown, slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS		
	1.10	D					Firm, medium strength, friable, red occasionally mottled grey, slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded mudstone and sandstone. GUNTHORPE MEMBER		
	2.60	D		2.55	85.68		Firm, medium strength, grey mottled red, slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse sub-angular weathered mudstone. GUNTHORPE MEMBER <i>becoming friable with coarse angular mudstone gravel below 2.8m begl.</i>		
	3.50	D		3.80	84.43		End of Pit at 3.800m		
Date Excavated: 24/04/2024				Groundwater Observations:					
Date Backfilled: 24/04/2024				No groundwater encountered during excavation.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60 					
General Remarks:									
Relative density is approximate and determined by observation only.									
Version: FINAL									
Scale: 1:25									

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP08 Sheet 1 of 1					
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 85.08					
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451106 E 305364 N				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description					
	Depth	Type	Results									
	0.20	ES	HVP=78 HVP=82 HVP=86	0.41	84.67		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite with rare mudstone. TOPSOIL					
	0.60	ES		1.10	83.98		Firm, medium strength, reddish brown mottled greyish brown slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-rounded quartzite. RIVER TERRACE DEPOSITS					
	0.60						D	HVP=102 HVP=110	1.30	83.78	Stiff, high strength, friable, light grey occasionally mottled red, slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	0.60										Firm, medium strength, friable, reddish brown slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	1.20	D	2.80	3.80	81.28		becoming very gravelly with fine to coarse, angular gravel of mudstone below 2.6m begl.					
	1.20						D	3.50	3.90	81.18	Medium strength, light grey SANDSTONE. GUNTHORPE MEMBER	
	1.20										End of Pit at 3.900m	
	1.50	D										
	2.80	D										
	3.50	D										
3.90	D											
Date Excavated: 25/04/2024				Groundwater Observations:								
Date Backfilled: 25/04/2024				No groundwater encountered during excavation.								
Shoring: None.												
Stability: Stable to full depth.												
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:						
Logged by: JM.				0.60 		Excavator reach limit achieved.						
General Remarks:												
Relative density is approximate and determined by observation only.				Version: FINAL			Scale: 1:25					

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP09 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 82.49	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451166 E 305329 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	1.10 1.10 1.10 3.80 3.80 3.80		HVP=62 HVP=74 HVP=76 HVP=88 HVP=90 HVP=94	0.32	82.17		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare mudstone. TOPSOIL	
				0.95	81.54		Firm, medium strength, slightly friable, reddish brown, slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite with rare quartzite cobbles. RIVER TERRACE DEPOSITS	
				1.50	80.99		Firm, medium strength, slightly friable, reddish brown mottled, light greenish grey slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-rounded to sub-angular mudstone. GUNTHORPE MEMBER	
				2.90	79.59		Firm, medium strength, slightly friable, red, slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
				3.15	79.34		Firm, medium strength, very slightly gravelly, slightly sandy CLAY with rare mudstone lithorelics. Sand is fine to coarse. Gravel is fine to medium, sub-angular weak mudstone. GUNTHORPE MEMBER	
				3.90	78.59		Firm to stiff, medium to high strength, slightly friable, red, slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
				End of Pit at 3.900m				
Date Excavated: 25/04/2024			Groundwater Observations:					
Date Backfilled: 25/04/2024			No groundwater encountered during excavation.					
Shoring: None.								
Stability: Stable to full depth.								
Plant Used: JCB 3CX.			Trial Pit Dimensions (m):			Reason for termination of Trial Pit:		
Logged by: JM.			0.60  2.90			Excavator reach limit achieved.		
General Remarks:								
Relative density is approximate and determined by observation only.								
Version:			FINAL			Scale: 1:25		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP10 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 79.35	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451209 E 305265 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.32	79.03		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite. TOPSOIL	
	0.60	ES					Firm, medium strength, orangish brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	0.70		HVP=48					
	0.70		HVP=52					
	0.70		HVP=56	0.90	78.45		Stiff, high strength, reddish brown, slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	1.10	D						
	1.20		HVP=78					
	1.20		HVP=82					
	1.20		HVP=82					
	1.60	D		1.50	77.85		Loose, reddish brown, slightly sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded mudstone and sandstone. GUNTHORPE MEMBER	
				1.80	77.55		Firm to stiff, medium to high strength strength, red slightly silty slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	2.20		HVP=86					
	2.20		HVP=88					
	2.20		HVP=94					
	2.80	D					Firm, medium strength, light grey, slightly sandy, slightly gravelly silty CLAY. Sand os fine to coarse. GUNTHORPE MEMBER	
3.00	D							
3.10		HVP=54						
3.10		HVP=56						
3.10		HVP=58	3.40	75.95		band of firm, light grey, slightly sandy, slightly gravelly silty CLAY. Sand os fine to coarse.		
			3.50	75.85		End of Pit at 3.500m		
	3.80	D						
Date Excavated: 25/04/2024				Groundwater Observations:				
Date Backfilled: 25/04/2024				Moderate seepage of perched water encountered between 1.50m and 1.80m depth.				
Shoring: None.								
Stability: Total collapse from surface.								
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:		
Logged by: JM.				0.60 		Total collapse of pit up to the surface.		
				2.90				
General Remarks:								
Relative density is approximate and determined by observation only.								
Version: FINAL				Scale: 1:25				

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP11 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 81.44		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451158 E 305270 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.32	81.12		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite.		
	0.60	ES					TOPSOIL		
							Medium dense, orangish brown, clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS		
				1.00	80.44		Firm, medium strength, friable, reddish brown, sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER		
	1.70	D		1.55	79.89		Stiff, high strength, red slightly sandy CLAY. Sand is fine to medium. GUNTHORPE MEMBER		
	2.20	D		2.00	79.44		Soft, low strength, red, slightly sandy, slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular mudstone. GUNTHORPE MEMBER		
	3.30	D							
				3.80	77.64		End of Pit at 3.800m		
Date Excavated: 25/04/2024				Groundwater Observations:					
Date Backfilled: 25/04/2024				No groundwater encountered during excavation.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60 		Excavator reach limit achieved.			
General Remarks:									
Relative density is approximate and determined by observation only.									
Version: FINAL									
Scale: 1:25									

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP12 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 81.27	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 451099 E 305213 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.31	80.96		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare chert.	
	0.45	ES		0.60	80.67		TOPSOIL	
							Medium dense, light brown mottled orangish brown and greyish brown, slightly gravelly clayey fine to coarse SAND. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	1.10	D					Medium dense, orange clayey gravelly fine to coarse SAND. Gravel is fine to coarse, sub-rounded quartzite and mudstone. RIVER TERRACE DEPOSITS	
	1.80	D		1.60	79.67		Stiff, high strength, reddish brown, sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	2.30	D		2.10	79.17		Soft to firm, low to medium strength, reddish brown, slightly sandy silty CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
							becoming friable below 2.8m begl.	
	3.30	D					becoming slightly gravelly with fine to coarse, sub-angular mudstone gravel, below 3.1m begl.	
				3.80	77.47		End of Pit at 3.800m	
	Date Excavated: 25/04/2024			Groundwater Observations:				
Date Backfilled: 25/04/2024			Moderate seepage of perched water encountered between 3.10m and 3.80m depth.					
Shoring: None.								
Stability: Stable to full depth.								
Plant Used: JCB 3CX.			Trial Pit Dimensions (m):			Reason for termination of Trial Pit:		
Logged by: JM.			0.60  2.90			Excavator reach limit achieved.		
General Remarks:								
Relative density is approximate and determined by observation only.								
Version:			FINAL			Scale: 1:25		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP13 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 85.98		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451024 E 305305 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES	HVP=108 HVP=112 HVP=114	0.32	85.66		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite. TOPSOIL		
	0.40	ES					Firm, medium strength, light brown mottled orangish brown, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS		
	0.80 0.80 0.80	D		HVP=38 HVP=43 HVP=44	1.00	84.98		Soft, low strength, orangish red occasionally mottled grey, sandy silty CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	1.40 1.40 1.40 1.40								
	2.50		D						
	3.20	D		3.10	82.88		Soft, low strength, reddish brown light grey, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-angular sandstone and mudstone. GUNTHORPE MEMBER		
				3.80	82.18		End of Pit at 3.800m		
	Date Excavated: 25/04/2024				Groundwater Observations:				
	Date Backfilled: 25/04/2024				No groundwater encountered during excavation.				
	Shoring: None.				Trial Pit Dimensions (m): 0.60  2.90				
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Reason for termination of Trial Pit:					
Logged by: JM.				Excavator reach limit achieved.					
General Remarks:									
Relative density is approximate and determined by observation only.									
Version: FINAL				Scale: 1:25					

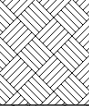
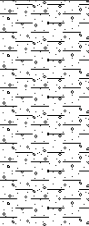
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP14 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 89.79	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 450925 E 305314 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.32	89.47		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite, mudstone and rare chert.	
	0.50	ES					TOPSOIL Medium dense, light brown, slightly gravelly clayey fine to coarse SAND. Gravel is fine to coarse, sub-rounded quartzite. RIVER TERRACE DEPOSITS	
	1.10	D		0.90	88.89		Stiff, high strength, reddish brown, slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	2.30	D		1.90	87.89		Firm to stiff, medium to high strength, reddish brown mottled light grey slightly silty slightly sandy CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	3.50	D		3.40	86.39		Firm to stiff, medium to high strength, reddish brown mottled light grey slightly gravelly slightly silty slightly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular weak mudstone and sandstone. GUNTHORPE MEMBER	
				3.70	86.09		End of Pit at 3.700m	
Date Excavated: 25/04/2024				Groundwater Observations:				
Date Backfilled: 25/04/2024				No groundwater encountered during excavation.				
Shoring: None.								
Stability: Stable to full depth.								
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:		
Logged by: JM.				0.60  2.90		Excavator reach limit achieved.		
General Remarks:								
Relative density is approximate and determined by observation only.								
Version: FINAL				Scale: 1:25				

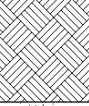
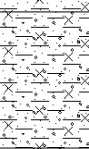
		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No TP15 Sheet 1 of 1	
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 83.20	
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 450984 E 305194 N	

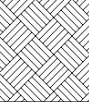
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.29	82.91		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite, mudstone and rare chert.	
	0.40	ES		0.60	82.60		TOPSOIL Soft to firm, low to medium strength, light brown mottled orangish brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-rounded mudstone and quartzite.	
	0.80	D		1.20	82.00		RIVER TERRACE DEPOSITS Firm, medium strength, reddish brown, slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular mudstone.	1
	1.30 1.30 1.30		HVP=108 HVP=110 HVP=116				Stiff, high strength, reddish brown, slightly sandy silty CLAY. Sand is fine to coarse. GUNTHORPE MEMBER	
	1.80	D						2
	2.40 2.40 2.40 2.60	D	HVP=78 HVP=82 HVP=92				<i>becoming firm to stiff below 2.3m begl.</i> <i>band of light grey, slightly sandy slightly gravelly clay with fine to medium sandstone gravel between 2.4m - 2.5m begl.</i>	
								3
							<i>becoming friable below 3.0m begl.</i>	
	3.50	D		3.80	79.40			4
								
								
							End of Pit at 3.800m	

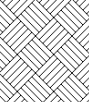
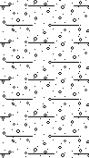
Date Excavated: 25/04/2024		Groundwater Observations:	
Date Backfilled: 25/04/2024		No groundwater encountered during excavation.	
Shoring: None.			
Stability: Stable to full depth.			
Plant Used: JCB 3CX.		Reason for termination of Trial Pit:	
Logged by: JM.		Excavator reach limit achieved.	
General Remarks:			

Relative density is approximate and determined by observation only.		Version: FINAL	Scale: 1:25
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		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No SA01 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 93.34		
Client: Gladman Developments Ltd					GRM Project Ref: P10567		Coordinates 450904 E 305380 N		
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.35	92.99		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare mudstone.		
	0.40	ES					TOPSOIL Firm, medium strength, reddish brown mottled orangish brown and grey, very slightly gravelly, sandy CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular quartzite and mudstone. RIVER TERRACE DEPOSITS		
					1.10	92.24			
								End of Pit at 1.100m	
Date Excavated: 24/04/2024			Groundwater Observations:						
Date Backfilled: 24/04/2024			No groundwater encountered during excavation.						
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.			Trial Pit Dimensions (m):		Reason for termination of Trial Pit:				
Logged by: JM.			0.60  1.90		Target depth achieved.				
General Remarks: Soakaway Pit.									
Relative density is approximate and determined by observation only.				Version: FINAL		Scale: 1:25			

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No SA02 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 83.03		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451107 E 305285 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.34	82.69		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to medium, sub-angular to sub-rounded quartzite, mudstone and rare chert. TOPSOIL		
	0.40	ES					Soft, low strength, orange, sandy silty CLAY. Sand is fine to coarse. RIVER TERRACE DEPOSITS		
	1.00	D		0.65	82.38		Firm, medium strength, reddish brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and mudstone. RIVER TERRACE DEPOSITS		
				1.10	81.93		End of Pit at 1.100m		
Date Excavated: 24/04/2024				Groundwater Observations:					
Date Backfilled: 24/04/2024				No groundwater encountered during excavation.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60  1.80					
General Remarks: Soakaway Pit.									
Relative density is approximate and determined by observation only.				Version: FINAL			Scale: 1:25		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No SA03 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 78.27		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 450948 E 305217 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.25	ES		0.34	77.93		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and rare chert.		
	0.50	ES					TOPSOIL Firm, medium strength, orangish brown mottled light brown, slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to sub-rounded quartzite and chert. RIVER TERRACE DEPOSITS		
	1.00	D		0.90 1.10	77.37 77.17		Medium dense, reddish brown mottled orangish brown and grey, clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub- rounded quartzite. RIVER TERRACE DEPOSITS		
			End of Pit at 1.100m						
Date Excavated: 24/04/2024				Groundwater Observations:					
Date Backfilled: 24/04/2024				No groundwater encountered during excavation.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: JCB 3CX.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60  2.90					
General Remarks: Soakaway Pit.									
Relative density is approximate and determined by observation only.				Version: FINAL			Scale: 1:25		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Trial Pit Log			Trial Pit No HTP01 Sheet 1 of 1		
Site Name: Desford Lane, Ratby, Leicestershire							Ground Level (mAOD) 79.69		
Client: Gladman Developments Ltd					GRM Project Ref: P10567			Coordinates 451035 E 305103 N	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20	ES		0.35	79.34		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and mudstone. TOPSOIL		
	0.60	ES					Medium dense, light brown, clayey sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite and mudstone. RIVER TERRACE DEPOSITS		
				0.90	78.79		End of Pit at 0.900m		
Date Excavated: 25/04/2024				Groundwater Observations:					
Date Backfilled: 26/04/2024				No groundwater encountered during excavation.					
Shoring: None.									
Stability: Stable to full depth.									
Plant Used: Hand dug.				Trial Pit Dimensions (m):		Reason for termination of Trial Pit:			
Logged by: JM.				0.60  1.00					
General Remarks: Hand-dug pit only.									
Relative density is approximate and determined by observation only.				Version: FINAL			Scale: 1:25		

Trial Pit Log

Trial Pit No

HTP02

Sheet 1 of 1

Site Name: Desford Lane, Ratby, Leicestershire

Ground Level (mAOD)

78.57

Client: Gladman Developments Ltd

GRM Project Ref: P10567

Coordinates

451090

E

305113

N

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES		0.35	78.22		Dark brown, slightly silty slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded quartzite, chert and rare mudstone.
	0.40	ES					TOPSOIL Medium dense, light brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse, sub-angular to sub-rounded, mudstone and quartzite.
				0.70	77.87		RIVER TERRACE DEPOSITS End of Pit at 0.700m

Date Excavated: 25/04/2024

Date Backfilled: 25/04/2024

Shoring: None.

Stability:	Stable to full depth.
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Plant Used: Hand dug.

Logged by: JM.

Groundwater Observations:

No groundwater encountered during excavation.

Trial Pit Dimensions (m):

0.60

1.00

Reason for termination of Trial Pit:

Target depth achieved.

General Remarks:	Hand-dug pit only.
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A P P E N D I X G

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



A P P E N D I X H

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In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	10567
Client	Gladman Developments Ltd
Date	16/05/2024
Weather	Light rain
Atmospheric Pressure (mb)	995
Pressure Trend	Steady
Equipment	Gas Data GFM436
Operator	Liam Press

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	0.2	0.2	20.3	20.3	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	2.3	2.3	17.4	17.4	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	3.0	3.0	17.9	17.9	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	1.7	1.7	15.2	15.2	0.1	0.1	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	4.4	4.4	17.3	17.3	0.1	0.1	Not Recorded	
WS16	1.0	5.0	NS	0.0	0.0	1.6	1.6	2.0	19.5	0.0	0.0	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	1.7	1.7	19.3	19.3	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	0.0	0.0	3.5	3.5	15.8	15.8	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
3.5	3.6
1.0	3.6
1.9	2.5
3.1	3.4
2.2	3.5
1.5	4.5
0.9	2.5
2.0	3.4

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D.	Not Detected
N.R.	Not Recorded
PID	Photo-Ionising Detector
%	By volume

Ground Material Key

NS	Natural Strata
----	----------------

Key

	Threshold gas concentration exceeded
	Response Zone Flooded



In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	P10567
Client	Gladman Developments Ltd
Date	23/05/2024
Weather	Windy
Atmospheric Pressure (mb)	1004
Pressure Trend	Steady
Equipment	Gas Data GFM436
Operator	James Wardle

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	0.6	0.6	19.3	19.3	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	1.1	1.1	18.8	18.8	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	0.6	0.6	19.6	19.6	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	0.4	0.4	20.0	20.0	0.0	0.0	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	1.9	1.9	18.3	18.3	0.0	0.0	Not Recorded	
WS16	1.0	5.0	NS	0.0	0.0	0.8	0.8	20.0	20.0	0.0	0.0	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	1.3	1.3	17.6	17.6	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	0.0	0.0	0.4	0.4	20.2	20.2	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
3.3	3.5
1.0	3.5
1.7	2.5
3.0	3.3
2.1	3.5
0.9	4.5
0.5	2.5
1.3	3.3

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

NS Natural Strata

Key

Response Zone Flooded



In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	P10567
Client	Gladman Developments Ltd
Date	04/06/2024
Weather	Cloudy
Atmospheric Pressure (mb)	1007
Pressure Trend	Falling
Equipment	Gas Data GFM436
Operator	James Wardle

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	1.2	1.2	18.4	18.4	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	2.0	2.0	17.8	17.8	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	3.8	3.8	16.7	16.7	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	1.7	1.7	14.4	14.4	0.0	0.0	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	5.6	5.6	14.0	14.0	0.0	0.0	Not Recorded	
WS16	1.0	5.0	NS	0.0	0.0	2.7	2.7	17.2	17.2	0.0	0.0	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	1.5	1.5	18.5	18.5	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	0.0	0.0	3.2	3.2	14.6	14.6	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	3.5
1.0	3.6
2.0	2.5
3.2	3.5
2.6	3.5
1.1	4.5
0.9	2.4
2.1	3.3

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D.	Not Detected
N.R.	Not Recorded
PID	Photo-Ionising Detector
%	By volume

Ground Material Key

NS	Natural Strata
----	----------------

Key

	Threshold gas concentration exceeded
	Response Zone Flooded



In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	P10567
Client	Gladman Developments Ltd
Date	14/06/2024
Weather	Mostly Cloudy
Atmospheric Pressure (mb)	998
Pressure Trend	Steady
Equipment	Gas Data GFM436
Operator	James Wardle

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	0.6	0.6	18.0	18.0	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	2.3	2.3	17.7	17.7	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	4.0	4.0	16.2	16.2	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	2.1	2.1	14.0	14.0	0.0	0.0	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	7.1	7.1	13.2	13.2	0.0	0.0	Not Recorded	
WS16	1.0	5.0	NS	0.0	0.0	3.0	3.0	17.1	17.1	0.0	0.0	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	1.6	1.6	19.3	19.3	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	0.0	0.0	6.2	6.2	13.1	13.1	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	3.5
1.0	3.5
1.9	2.5
2.9	3.5
2.6	3.5
1.0	4.5
0.8	2.3
2.1	3.3

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D.	Not Detected
N.R.	Not Recorded
PID	Photo-Ionising Detector
%	By volume

a	Methane => 1% v/v
b	Carbon Dioxide =>5% v/v
MG	Made Ground
NS	Natural Strata

Ground Material Key

NS Natural Strata

Key

	Threshold gas concentration exceeded
	Response Zone Flooded



In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	P10567
Client	Gladman Developments Ltd
Date	24/06/2024
Weather	Mostly Cloudy
Atmospheric Pressure (mb)	1008
Pressure Trend	Falling
Equipment	Gas Data GFM436
Operator	Liam Press

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	0.1	0.1	20.1	20.1	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	1.9	1.9	20.0	20.0	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	0.5	0.5	20.9	20.9	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	1.9	1.9	16.6	16.6	0.0	0.0	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	3.3	3.3	18.3	18.3	0.0	0.0	Not Recorded	
WS16	1.0	5.0	NS	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	1.0	1.0	20.5	20.5	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	3.6
1.1	3.5
2.2	2.6
3.3	3.6
3.0	3.5
N.R.	N.R.
1.0	2.4
N.R.	N.R.

Notes				Ground Material Key	
L.E.L.	Lower Explosive Limit (100% L.E.L. = 5% Flammable Gas)			NS	Natural Strata
N.D.	Not Detected	a	Methane => 1% v/v		
N.R.	Not Recorded	b	Carbon Dioxide => 5% v/v		
PID	Photo-Ionising Detector	MG	Made Ground		
%	By volume	NS	Natural Strata		
				Key	
					Response Zone Flooded

Comments

ws16,ws21 not located



In-Situ Gas Monitoring Results

Project Name	Desford Lane, Ratby, Leicestershire
Project Number	P10567
Client	Gladman Developments Ltd
Date	02/07/2024
Weather	Mostly Cloudy
Atmospheric Pressure (mb)	1007
Pressure Trend	Steady
Equipment	Gas Data GFM436
Operator	Liam Press

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS02	1.0	4.0	NS	0.0	0.0	0.1	0.1	19.9	19.9	0.0	0.0	Not Recorded	
WS05	1.0	4.0	NS	0.0	0.0	1.5	1.5	20.1	20.1	0.0	0.0	Not Recorded	
WS07	1.0	3.0	NS	0.0	0.0	1.9	1.9	19.7	19.7	0.0	0.0	Not Recorded	
WS11	1.0	3.0	NS	0.0	0.0	2.4	2.4	17.6	17.6	0.1	0.1	Not Recorded	
WS12	1.0	4.0	NS	0.0	0.0	2.2	2.2	18.8	18.8	0.0	0.0	Not Recorded	
WS16	1.0	5.0	NS	0.0	0.0	2.2	2.2	19.6	19.6	0.0	0.0	Not Recorded	
WS17	1.0	2.6	NS	0.0	0.0	0.8	0.8	20.4	20.4	0.0	0.0	Not Recorded	
WS21	1.0	4.0	NS	0.0	0.0	2.1	2.1	19.4	19.4	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	3.5
1.1	3.5
2.3	2.5
3.4	3.5
3.0	3.5
1.4	4.5
1.0	2.4
2.3	3.4

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

NS Natural Strata

Key

Response Zone Flooded



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4161



7 - 11 Harding Street
Leicester
LE1 4DH

GRM Development Solutions

Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

Analytical Test Report: L24/03759/GRM - 24-44590

Your Project Reference: **Desford Lane, Ratby P10567**

Your Order Number: P10567

Samples Received / Instructed: 26/04/2024 / 29/04/2024

Report Issue Number: 1

Sample Tested: 29/04 to 10/05/2024

Samples Analysed: 32 soil samples

Report issued: 10/05/2024

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:**General**

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Asbestos

Please note: Where further analysis is required samples identified as containing asbestos are screened and tested on an as received basis. No correction is made for moisture content and these results are not covered by our accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

WAC Testing

Samples were leached in accordance with BS EN 12457-2: 2002.

Eluate Results are reported as L/S 10. These results have been calculated in accordance with BS EN 12457-2:2002.

Comparative values are taken from the Council Decision Annex - CRITERIA AND PROCEDURES FOR THE ACCEPTANCE OF WASTE AT LANDFILLS, (2003/33/EC).

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited, subUKAS - Subcontracted to a laboratory UKAS accredited for this test, subMCERTS - Subcontracted to a laboratory MCERTS accredited for this test

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of Issue: 01.05.2024

Issued by: J. Gane

Issue No: 4

Rev No: 8



7 - 11 Harding Street
Leicester
LE1 4DH

L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359641	359642	359643	359644	359645	359646
Client Sample ID			-	-	-	-	-	-
Client Sample Location			WS01	WS03	WS17	WS24	TP03	TP05
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.35	0.10	0.20	0.10	0.20	0.20
Depth - Bottom (m)			0.35	0.10	0.20	0.10	0.20	0.20
Date of Sampling			23/04/2024	22/04/2024	24/04/2024	23/04/2024	24/04/2024	24/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Clay	Sand	Clay	Clay	Clay	Clay
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	< 10	< 10	< 10	< 10	16	19
Cadmium	(mg/kg)	MCERTS	0.5	0.5	0.9	0.7	0.8	0.8
Chromium (Total)	(mg/kg)	UKAS	18	9.6	21	15	14	15
Copper	(mg/kg)	MCERTS	36	22	38	36	29	28
Lead	(mg/kg)	MCERTS	3.1	17	28	32	30	26
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	21	14	24	18	19	24
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	40	28	49	48	42	42
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	u	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	8.4	7.0	7.6	7.4	7.1	7.1
Sulphate (Water soluble as SO ₄)	(mg/l)	u	130	120	62	30	37	< 10
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.07	0.05	0.04	0.03
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.07	0.05	0.04	0.03
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	0.03	0.11	0.07	0.06	0.04
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.06	0.04	0.03	0.03
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.04	0.03	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	0.02	0.08	0.06	0.05	0.04
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	0.02	0.04	0.11	0.08	0.08	0.05
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.05	0.03	0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.04	0.05	0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	< 0.02	0.04	0.11	0.07	0.07	0.05
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	0.37	0.41	0.89	0.67	0.58	0.49
SOM (via TOC)	(%)	UKAS	< 1.7	2.4	4.7	3.8	3.4	3.3
Asbestos	-	UKAS	-	-	-	-	-	-
Pesticide Screen	(mg/kg)	u	-	-	Undetected <1mg/kg	-	-	Undetected <1mg/kg



7 - 11 Harding Street
Leicester
LE1 4DH

L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359647	359648	359649	359650	359651	359652
Client Sample ID			-	-	-	-	-	-
Client Sample Location			TP08	TP11	TP14	WS19	HIP01	HPTP02
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.20	0.20	0.20	0.10	0.20	0.20
Depth - Bottom (m)			0.20	0.20	0.20	0.10	0.20	0.20
Date of Sampling			24/04/2024	25/04/2024	25/04/2024	24/04/2024	25/04/2024	25/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	< 10	< 10	< 10	-	-	-
Cadmium	(mg/kg)	MCERTS	0.6	0.6	0.5	-	-	-
Chromium (Total)	(mg/kg)	UKAS	13	12	8.5	-	-	-
Copper	(mg/kg)	MCERTS	27	21	41	-	-	-
Lead	(mg/kg)	MCERTS	28	19	21	-	-	-
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	-	-	-
Nickel	(mg/kg)	MCERTS	17	15	12	-	-	-
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	-	-	-
Zinc	(mg/kg)	MCERTS	38	35	84	-	-	-
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	-	-	-
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	-	-	-
Chromium (Hexavalent)	u		< 1.0	< 1.0	< 1.0	-	-	-
pH	pH Units	MCERTS	7.0	7.2	5.9	-	-	-
Sulphate (Water soluble as SO ₄)	(mg/l)	u	< 10	21	11	-	-	-
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	-	-	-
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	-	-	-
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	-	-	-
Benzo (a) anthracene	(mg/kg)	MCERTS	0.02	0.03	0.03	-	-	-
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	0.04	0.03	-	-	-
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.03	0.06	0.04	-	-	-
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	0.03	0.02	-	-	-
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	-	-	-
Chrysene	(mg/kg)	MCERTS	0.02	0.05	0.04	-	-	-
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	-	-	-
Fluoranthene	(mg/kg)	MCERTS	0.04	0.06	0.06	-	-	-
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	-	-	-
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	0.02	< 0.02	-	-	-
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	-	-	-
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02	0.02	-	-	-
Pyrene	(mg/kg)	MCERTS	0.04	0.06	0.05	-	-	-
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	0.41	0.53	0.48	-	-	-
SOM (via TOC)	(%)	UKAS	2.4	< 1.7	2.1	-	-	-
Asbestos	-	UKAS	-	-	-	No asbestos detected	No asbestos detected	No asbestos detected
Pesticide Screen	(mg/kg)	u	-	-	Undetected <1mg/kg	-	-	-



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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359653	359654	359655	359656	359657	359658
Client Sample ID			-	-	-	-	-	-
Client Sample Location			WS03	WS04	WS06	WS07	WS08	WS10
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.90	1.20	0.70	0.80	0.50	0.85
Depth - Bottom (m)			0.90	1.20	0.70	0.80	0.50	0.80
Date of Sampling			22/04/2024	22/04/2024	25/04/2024	25/04/2024	24/04/2024	22/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	< 10	< 10	< 10	51	< 10	< 10
Cadmium	(mg/kg)	MCERTS	1.1	0.6	0.6	1.3	0.5	0.8
Chromium (Total)	(mg/kg)	UKAS	18	19	13	17	9.5	26
Copper	(mg/kg)	MCERTS	27	21	24	35	33	37
Lead	(mg/kg)	MCERTS	1.6	< 1.5	6.4	6.7	7.8	< 1.5
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	34	27	18	35	17	32
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	59	35	12	7.0	15	52
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	u		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	7.9	8.2	8.2	7.9	6.3	7.5
Sulphate (Water soluble as SO ₄)	(mg/l)	u	15	13	50	21	20	30
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32
SOM (via TOC)	(%)	UKAS	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Asbestos	-	UKAS	-	-	-	-	-	-
Pesticide Screen	(mg/kg)	u	-	-	-	-	-	-



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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359659	359660	359661	359662	359663	359664
Client Sample ID			-	-	-	-	-	-
Client Sample Location			WS15	WS20	WS22	WS25	TP01	TP02
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.75	1.00	0.95	0.90	0.40	0.50
Depth - Bottom (m)			0.75	1.00	0.95	0.90	0.40	0.50
Date of Sampling			25/04/2024	23/04/2024	24/04/2024	23/04/2024	24/04/2024	24/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	16	< 10	19	< 10	< 10	14
Cadmium	(mg/kg)	MCERTS	1.0	0.9	1.0	0.9	0.9	0.7
Chromium (Total)	(mg/kg)	UKAS	35	26	25	28	21	20
Copper	(mg/kg)	MCERTS	29	98	58	29	36	16
Lead	(mg/kg)	MCERTS	2.5	1.6	8.7	< 1.5	5.4	9.4
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	52	36	28	50	30	19
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	55	1100	410	31	12	38
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	u	u	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	7.9	8.0	8.1	8.0	7.2	7.9
Sulphate (Water soluble as SO ₄)	(mg/l)	u	56	24	< 10	11	< 10	13
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32
SOM (via TOC)	(%)	UKAS	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Asbestos	-	UKAS	-	-	-	-	-	-
Pesticide Screen	(mg/kg)	u	-	-	-	-	-	-



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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359665	359666	359667	359668	359669	359670
Client Sample ID			-	-	-	-	-	-
Client Sample Location			TP04	TP06	TP07	TP10	TP12	TP13
Client Sample Type			ES	ES	ES	ES	ES	ES
Client Sample Number			-	-	-	-	-	-
Depth - Top (m)			0.45	0.50	0.60	0.70	0.45	0.40
Depth - Bottom (m)			0.45	0.50	0.60	0.70	0.45	0.40
Date of Sampling			24/04/2024	24/04/2024	24/04/2024	25/04/2024	25/04/2024	25/04/2024
Time of Sampling			-	-	-	-	-	-
Sample Matrix			Clay	Clay	Clay	Clay	Clay	Clay
Determinant	Units	Accreditation						
Arsenic	(mg/kg)	MCERTS	12	< 10	< 10	12	< 10	< 10
Cadmium	(mg/kg)	MCERTS	0.8	0.6	0.4	0.7	0.6	0.7
Chromium (Total)	(mg/kg)	UKAS	15	18	14	18	12	16
Copper	(mg/kg)	MCERTS	21	16	110	21	18	22
Lead	(mg/kg)	MCERTS	10	7.3	< 1.5	11	13	5.2
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	24	21	16	21	17	19
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	7.9	5.6	25	21	26	21
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	u		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	8.3	7.9	7.3	7.6	7.9	6.7
Sulphate (Water soluble as SO ₄)	(mg/l)	u	22	11	< 10	16	23	62
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32	< 0.32
SOM (via TOC)	(%)	UKAS	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Asbestos	-	UKAS	-	-	-	-	-	-
Pesticide Screen	(mg/kg)	u	-	-	-	-	-	-



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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analytical Test Results - Solid

Lab Reference			359671	359672
Client Sample ID			-	-
Client Sample Location			TP14	HTP02
Client Sample Type			ES	ES
Client Sample Number			-	-
Depth - Top (m)			0.50	0.40
Depth - Bottom (m)			0.50	0.40
Date of Sampling			25/04/2024	25/04/2024
Time of Sampling			-	-
Sample Matrix			Sand	Clay
Determinant	Units	Accreditation		
Arsenic	(mg/kg)	MCERTS	< 10	< 10
Cadmium	(mg/kg)	MCERTS	0.7	0.5
Chromium (Total)	(mg/kg)	UKAS	9.3	9.5
Copper	(mg/kg)	MCERTS	31	16
Lead	(mg/kg)	MCERTS	8.2	13
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	15	13
Selenium	(mg/kg)	u	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	22	21
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0
pH	pH Units	MCERTS	6.7	7.0
Sulphate (Water soluble as SO ₄)	(mg/l)	u	< 10	48
Acenaphthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.02	< 0.02
Anthracene	(mg/kg)	UKAS	< 0.02	< 0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (a) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (b) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	< 0.02	< 0.02
Benzo (k) fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Chrysene	(mg/kg)	MCERTS	< 0.02	< 0.02
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.02	< 0.02
Fluoranthene	(mg/kg)	MCERTS	< 0.02	< 0.02
Fluorene	(mg/kg)	MCERTS	< 0.02	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Naphthalene	(mg/kg)	MCERTS	< 0.02	< 0.02
Phenanthrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Pyrene	(mg/kg)	MCERTS	< 0.02	< 0.02
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	< 0.32	< 0.32
SOM (via TOC)	(%)	UKAS	< 1.7	< 1.7
Asbestos	-	UKAS	-	-
Pesticide Screen	(mg/kg)	u	-	-



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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Certificate Of Analysis - WAC Suite

Lab Reference	359672
Client Sample ID	-
Client Sample Location	HTP02
Client Sample Type	ES
Client Sample Number	-
Depth - Top (m)	0.4
Depth - Bottom (m)	0.4
Date of Sampling	25/04/2024
Time of Sampling	-
Sample Description	Brown gravelly silty clay
Sample Matrix	Clay
Moisture Content (%)	14
Stone content (%)	< 0.1

Determined Result	Inert Waste Landfill	Stable non reactive hazardous waste in a non hazardous landfill	Hazardous Waste Landfill
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Solid Analysis

Total Organic Carbon	%	MCERTS	< 1.0	3.0	5.0	6.0
Loss on Ignition	%	UKAS	-	-	-	10.0
BTEX	mg/kg	MCERTS	< 0.06	6.00	-	-
PCB's (7 Congeners)	mg/kg	u	< 0.028	1.00	-	-
Mineral Oil (>C ₁₀ to C ₄₀) [EH_1D_Total]	mg/kg	MCERTS	18	500	-	-
PAH	mg/kg	u	< 0.34	100	-	-
pH	units	MCERTS	-	-	> 6	-

Eluate Analysis

Arsenic	mg/kg	u	< 0.03	0.50	2	25
Barium	mg/kg	u	< 0.05	20	100	300
Cadmium	mg/kg	u	< 0.03	0.04	1	5
Chromium (total)	mg/kg	u	< 0.03	0.5	10	70
Copper	mg/kg	u	0.01	2.0	50	100
Mercury	mg/kg	u	< 0.01	0.01	0.2	2
Molybdenum	mg/kg	u	< 0.03	0.5	10.0	30
Nickel	mg/kg	u	< 0.03	0.4	10.0	40
Lead	mg/kg	u	< 0.05	0.5	10.0	50
Antimony	mg/kg	u	< 0.03	0.06	0.7	5
Selenium	mg/kg	u	< 0.01	0.1	0.5	7
Zinc	mg/kg	u	< 0.05	4	50	200
Chloride	mg/kg	u	2	800	15000	25000
Fluoride	mg/kg	u	3	10	150	500
Sulphate (as SO ₄)	mg/kg	u	35	1000	20000	50000
Total Dissolved Solids	mg/kg	u	110	4000	60000	100000
Phenol Index	mg/kg	u	< 1.0	1	-	-
Dissolved Organic Carbon	mg/kg	u	24.0	500	800	1000



4161



7 - 11 Harding Street
Leicester
LE1 4DH

L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
359641	-	WS01	ES	-	Light brown slightly gravelly slightly sandy silty clay	16	< 0.1	100
359642	-	WS03	ES	-	Brown slightly clayey silty sand	18	< 0.1	100
359643	-	WS17	ES	-	Brown slightly sandy silty clay	27	< 0.1	100
359644	-	WS24	ES	-	Brown slightly sandy silty clay	16	< 0.1	100
359645	-	TP03	ES	-	Brown slightly gravelly slightly sandy silty clay	16	< 0.1	100
359646	-	TP05	ES	-	Brown slightly sandy silty clay	22	< 0.1	100
359647	-	TP08	ES	-	Brown slightly gravelly very sandy silty clay	17	< 0.1	100
359648	-	TP11	ES	-	Brown slightly gravelly very sandy silty clay	13	< 0.1	100
359649	-	TP14	ES	-	Brown slightly gravelly very sandy silty clay	17	< 0.1	100
359653	-	WS03	ES	-	Red very sandy silty clay	16	< 0.1	100
359654	-	WS04	ES	-	Mottled greyish red very sandy silty clay	20	< 0.1	100
359655	-	WS06	ES	-	Brown slightly sandy silty clay	17	< 0.1	100
359656	-	WS07	ES	-	Brown slightly sandy silty clay	18	< 0.1	100
359657	-	WS08	ES	-	Red slightly gravelly very sandy silty clay	13	< 0.1	100
359658	-	WS10	ES	-	Red slightly sandy silty clay	23	< 0.1	100
359659	-	WS15	ES	-	Red slightly sandy silty clay	21	< 0.1	100
359660	-	WS20	ES	-	Red slightly sandy silty clay	23	< 0.1	100
359661	-	WS22	ES	-	Red slightly gravelly slightly sandy silty clay	13	< 0.1	100
359662	-	WS25	ES	-	Red slightly sandy silty clay	16	< 0.1	100
359663	-	TP01	ES	-	Red slightly sandy silty clay	20	< 0.1	100
359664	-	TP02	ES	-	Red slightly sandy silty clay	16	< 0.1	100
359665	-	TP04	ES	-	Red slightly sandy silty clay	14	< 0.1	100
359666	-	TP06	ES	-	Brown slightly sandy silty clay with frequent organic matter	15	< 0.1	100



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7 - 11 Harding Street
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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
359667	-	TP07	ES	-	Red very sandy silty clay	13	< 0.1	100
359668	-	TP10	ES	-	Brown slightly gravelly slightly sandy silty clay	14	< 0.1	100
359669	-	TP12	ES	-	Brown slightly gravelly very sandy silty clay	11	< 0.1	100
359670	-	TP13	ES	-	Brown slightly gravelly slightly sandy silty clay	17	< 0.1	100
359671	-	TP14	ES	-	Brown gravelly slightly sandy silty clay	13	< 0.1	100
359672	-	HTP02	ES	-	Brown gravelly silty clay	14	< 0.1	100



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7 - 11 Harding Street
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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
359641	-	WS01	ES	-	
359642	-	WS03	ES	-	
359643	-	WS17	ES	-	
359644	-	WS24	ES	-	
359645	-	TP03	ES	-	
359646	-	TP05	ES	-	
359647	-	TP08	ES	-	
359648	-	TP11	ES	-	
359649	-	TP14	ES	-	
359653	-	WS03	ES	-	
359654	-	WS04	ES	-	
359655	-	WS06	ES	-	
359656	-	WS07	ES	-	
359657	-	WS08	ES	-	
359658	-	WS10	ES	-	
359659	-	WS15	ES	-	
359660	-	WS20	ES	-	
359661	-	WS22	ES	-	
359662	-	WS25	ES	-	
359663	-	TP01	ES	-	
359664	-	TP02	ES	-	
359665	-	TP04	ES	-	
359666	-	TP06	ES	-	



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7 - 11 Harding Street
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LE1 4DH

L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
359667	-	TP07	ES	-	
359668	-	TP10	ES	-	
359669	-	TP12	ES	-	
359670	-	TP13	ES	-	
359671	-	TP14	ES	-	
359672	-	HTP02	ES	-	VPH/BTEX - Sample taken from container with headspace.

L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
PCB7S	MS - CL - PCB Soils	As received	Passing 10mm test sieve	Determination of PCB's (7 congeners) in soils via GC-MS
PAHASRDS	MS - CL - PAH (As Received)	As received	Passing 10mm test sieve	Determination of Polyaromatic hydrocarbons in soil via GC-MS
WACTOCS	MS - CL - TOC Eltra (WAC)	Air dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soil as part of a WAC test
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
TPHS	MS - CL - TPH (GC-FID)	As received	Passing 10mm test sieve	Determination of Total Petroleum Hydrocarbons in soil using GC-FID
WACSKALAR	MS - CL - Phenols by Skalar (WAC)	As received	BSEN:12457 Leaching	Determination of Total Phenols within leachate as part of a WAC test using a Skalar Segmented flow analyser
VPHS	MS - CL - VPH	As received	Passing 10mm test sieve	Determination of VPH in soils via Headspace-GC-MS
SKALARCNS	MS - CL - Cyanide by Skalar	As received	Passing 10mm test sieve	Determination of cyanide (total / free / complex) in soil using a Skalar segmented flow analyser
WACDOC	MS - CL - DOC (WAC)	As received	BSEN:12457 Leaching	Determination of dissolved organic carbon in a leachate as part of a WAC test
SKALARHCS	MS - CL - Hexavalent Chromium by Skalar	As received	Passing 10mm test sieve	Determination of hexavalent chromium in soil using Skalar segmented flow analyser
WACMETALS	MS - CL - ICP - Metals in Waters (WAC)	As received	BSEN:12457 Leaching	Determination of metals in a leachate as part of a WAC test via ICP
ICPMETS	MS - CL - ICP Metals	Air dried	Passing 10mm test sieve	Determination of metals in soils via ICP
WACPHS	MS - CL - pH in Soils (WAC)	As received	BSEN:12457 Leaching	Determination of pH in soils as part of a WAC test via pH probe
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
PESTS	MS - CL - Pesticides	As received	Passing 10mm test sieve	Determination of pesticides in soils via GC-MS, results based on as received analysis
WACANIONS	MS - CL - Anions by Aquakem (WAC)	As received	BSEN:12457 Leaching	Determination of sulphate, chloride and fluoride in a leachate as part of a WAC test using a Aquakem analyser
TDSL	MS-CL-Conductivity in Water(TDS by Calc)	As received	BSEN:12457 Leaching	Determination of total dissolved solids in leachates (by calculation)
SKALARPHS	MS - CL - Phenols by Skalar	As received	Passing 10mm test sieve	Determination of total phenols in soil using Skalar segmented flow analyser
ASB	MS - AS - Asbestos	-	-	Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures"



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7 - 11 Harding Street
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Project Reference - Desford Lane, Ratby P10567

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ENLEACHP	BS EN 12457-2	As Received	-	Leaching in accordance with BSEN 12457-2 (10:1 Ratio)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377LOI	BS1377 Loi	Oven dried	Passing 2mm test sieve	Testing was in accordance with BS 1377: Part 3: 2018 + A1 :2021 Clause 6. Determination of the mass loss on ignition. Some information required by BS1377: 2016: Part 1 has not been reported. This information is available on request.



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Project Reference - Desford Lane, Ratby P10567

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
359641	-	WS01	ES	-	MS - CL - pH in Soils	R
359642	-	WS03	ES	-	MS - CL - pH in Soils	RX
359643	-	WS17	ES	-	MS - CL - pH in Soils	R
359644	-	WS24	ES	-	MS - CL - pH in Soils	R
359645	-	TP03	ES	-	MS - CL - pH in Soils	R
359646	-	TP05	ES	-	MS - CL - pH in Soils	R
359647	-	TP08	ES	-	MS - CL - pH in Soils	R
359648	-	TP11	ES	-	MS - CL - pH in Soils	R
359649	-	TP14	ES	-	MS - CL - pH in Soils	R
359653	-	WS03	ES	-	MS - CL - pH in Soils	RX
359654	-	WS04	ES	-	MS - CL - pH in Soils	RX
359655	-	WS06	ES	-	MS - CL - pH in Soils	R
359656	-	WS07	ES	-	MS - CL - pH in Soils	R
359657	-	WS08	ES	-	MS - CL - pH in Soils	R
359658	-	WS10	ES	-	MS - CL - pH in Soils	RX
359659	-	WS15	ES	-	MS - CL - pH in Soils	R
359660	-	WS20	ES	-	MS - CL - pH in Soils	R
359661	-	WS22	ES	-	MS - CL - pH in Soils	R
359662	-	WS25	ES	-	MS - CL - pH in Soils	R
359663	-	TP01	ES	-	MS - CL - pH in Soils	R
359664	-	TP02	ES	-	MS - CL - pH in Soils	R
359665	-	TP04	ES	-	MS - CL - pH in Soils	R
359666	-	TP06	ES	-	MS - CL - pH in Soils	R
359667	-	TP07	ES	-	MS - CL - pH in Soils	R
359668	-	TP10	ES	-	MS - CL - pH in Soils	R
359669	-	TP12	ES	-	MS - CL - pH in Soils	R
359670	-	TP13	ES	-	MS - CL - pH in Soils	R



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Sample Deviations

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Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Sample(s) received with less than 96 hours for testing to commence/complete, any result formally classed as deviating will be marked with an X against the applicable test (i.e. RX)

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
359671	-	TP14	ES	-	MS - CL - pH in Soils	R
359672	-	HTP02	ES	-	MS - CL - VPH	RX
359672	-	HTP02	ES	-	MS - CL - pH in Soils	R
359672	-	HTP02	ES	-	MS - CL - pH in Soils (WAC)	R



7 - 11 Harding Street
Leicester
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L24/03759/GRM - 24-44590

Project Reference - Desford Lane, Ratby P10567

HWOL TPH Acronym Index

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



A P P E N D I X J

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

TEST REPORT

Client GRM Development Solutions Ltd

Address Laurus House
1st Avenue
Centrum 100
Burton-on-Trent
Staffordshire
DE14 2WH

Contract Desford Lane,
Ratby

Job Number MRN 24007/43

Date of Issue 17 May 2024

Page 1 of 11

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

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MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

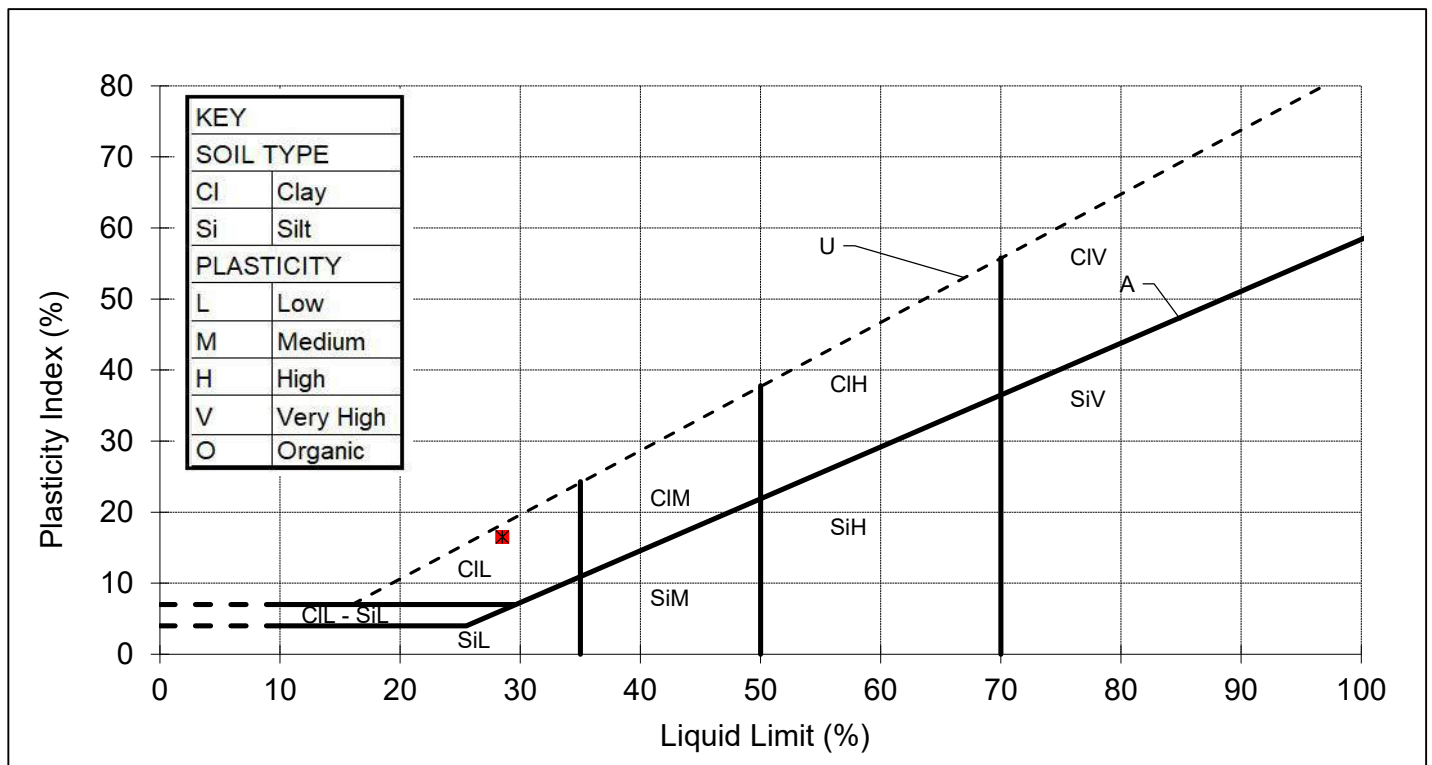
CLIENT	GRM Development Solutions Ltd		
SITE	Desford Lane, Ratby		
JOB NUMBER	MRN 24007/43		

SAMPLE LABEL	TP01 - 0.9	DATE SAMPLED	24-Apr-24
SAMPLE No.	467901	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	17.8	27.6	1.035	
Determination 2 (avg)	17.4	27.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23.1	29	12	17	87



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

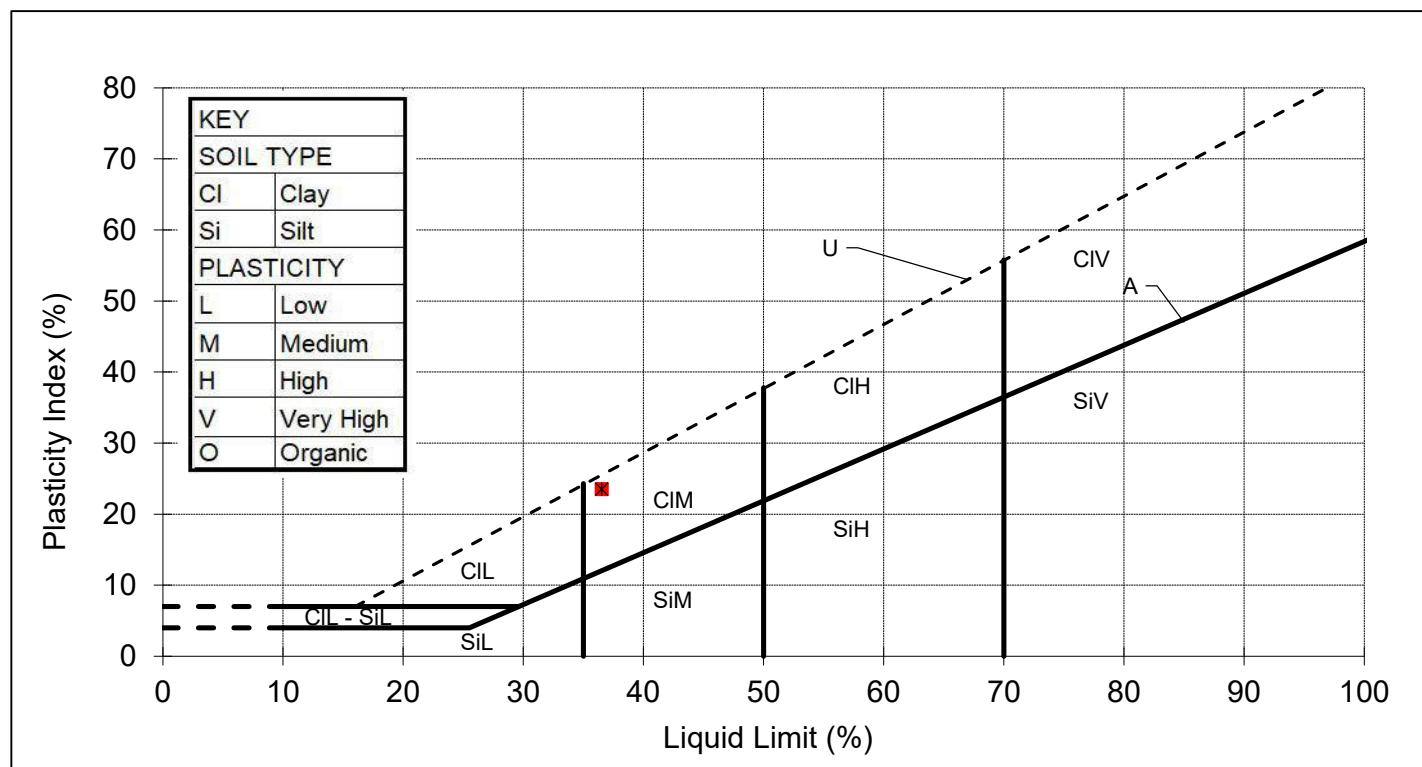
CLIENT	GRM Development Solutions Ltd
SITE	Desford Lane, Ratby
JOB NUMBER	MRN 24007/43

SAMPLE LABEL	TP03 - 1.2	DATE SAMPLED	24-Apr-24
SAMPLE No.	467902	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	16.8	35.0	1.045	
Determination 2 (avg)	16.6	34.9		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22.7	37	13	24	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

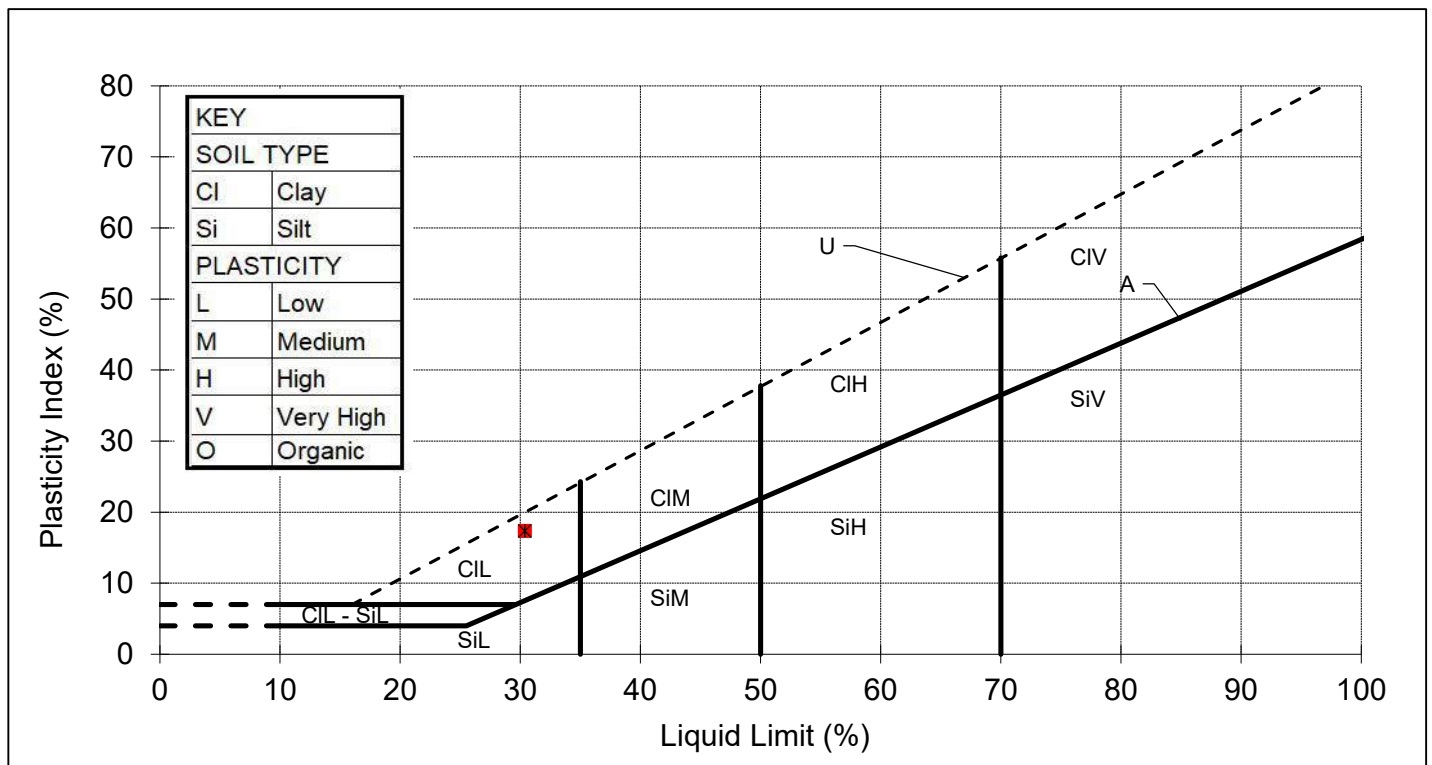
CLIENT	GRM Development Solutions Ltd		
SITE	Desford Lane, Ratby		
JOB NUMBER	MRN 24007/43		

SAMPLE LABEL	TP05 - 2.5	DATE SAMPLED	24-Apr-24
SAMPLE No.	467903	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.5	29.9	1.023	
Determination 2 (avg)	18.5	29.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
17.7	30	13	17	85



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

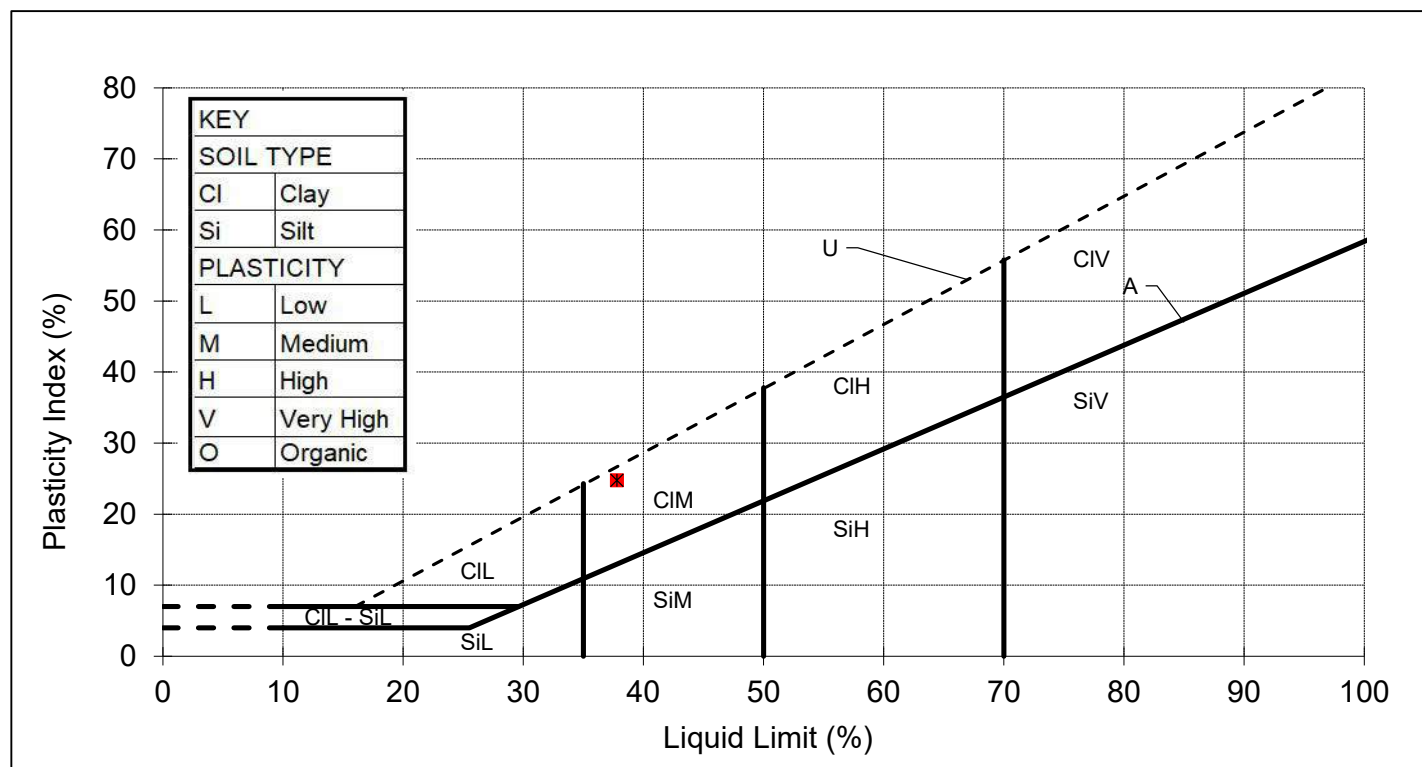
CLIENT	GRM Development Solutions Ltd
SITE	Desford Lane, Ratby
JOB NUMBER	MRN 24007/43

SAMPLE LABEL	TP08 - 1.5	DATE SAMPLED	24-Apr-24
SAMPLE No.	467904	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.9	37.0	1.020	
Determination 2 (avg)	19.1	37.1		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24.3	38	13	25	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

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TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

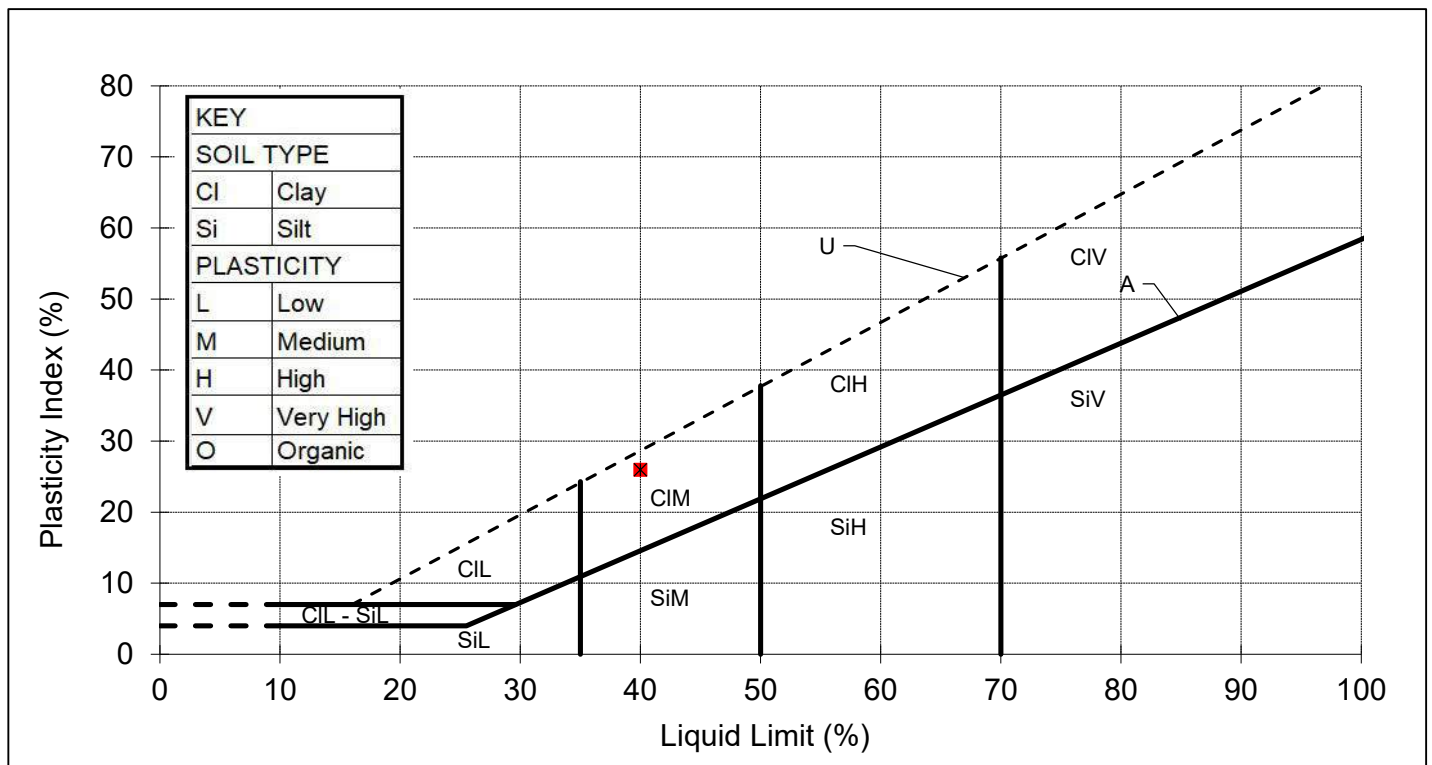
CLIENT	GRM Development Solutions Ltd		
SITE	Desford Lane, Ratby		
JOB NUMBER	MRN 24007/43		

SAMPLE LABEL	WS11 - 1.2	DATE SAMPLED	23-Apr-24
SAMPLE No.	467905	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.8	40.2	1.005	
Determination 2 (avg)	19.7	39.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
21.9	40	14	26	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

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DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

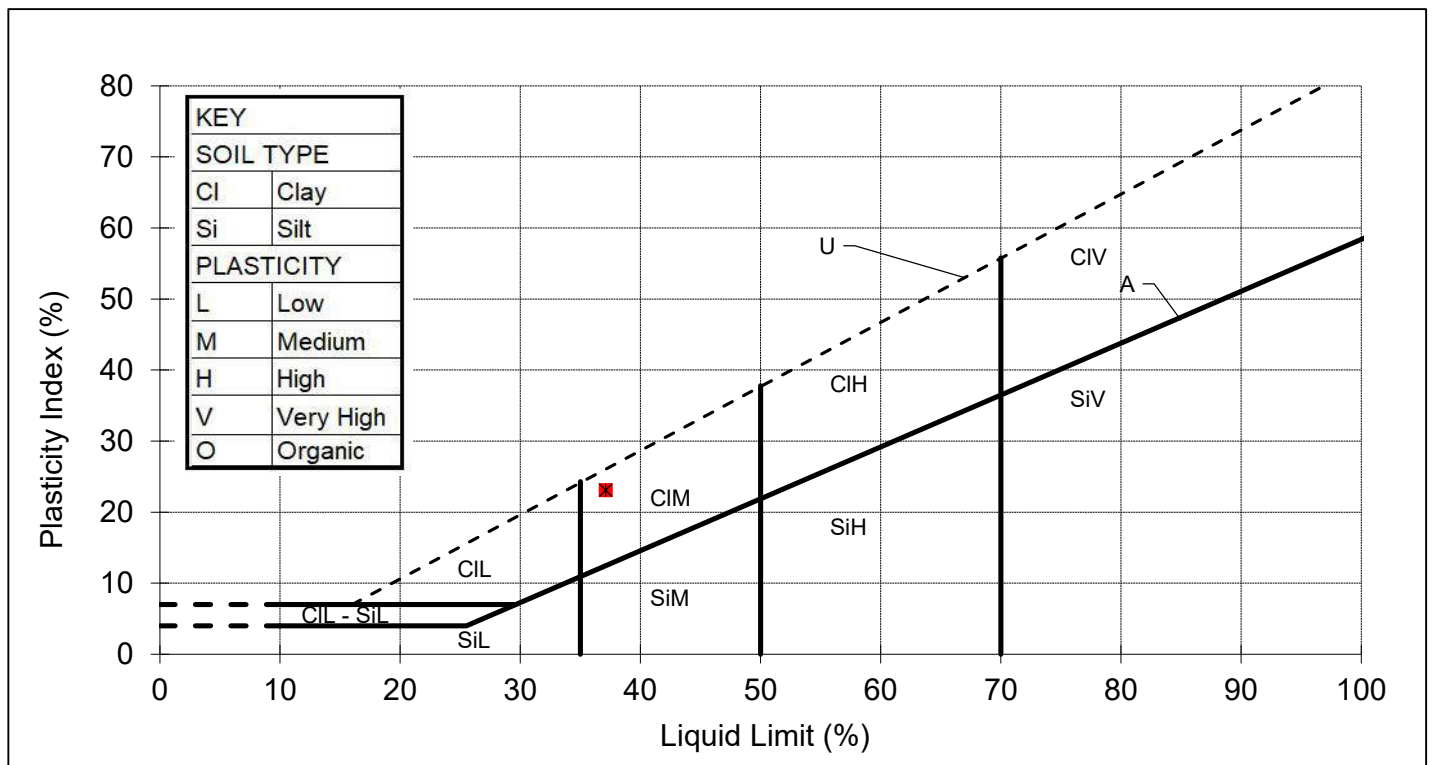
CLIENT	GRM Development Solutions Ltd		
SITE	Desford Lane, Ratby		
JOB NUMBER	MRN 24007/43		

SAMPLE LABEL	WS12 - 1.05	DATE SAMPLED	24-Apr-24
SAMPLE No.	467906	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	22.2	38.5	0.967	
Determination 2 (avg)	22.0	38.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.6	37	14	23	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

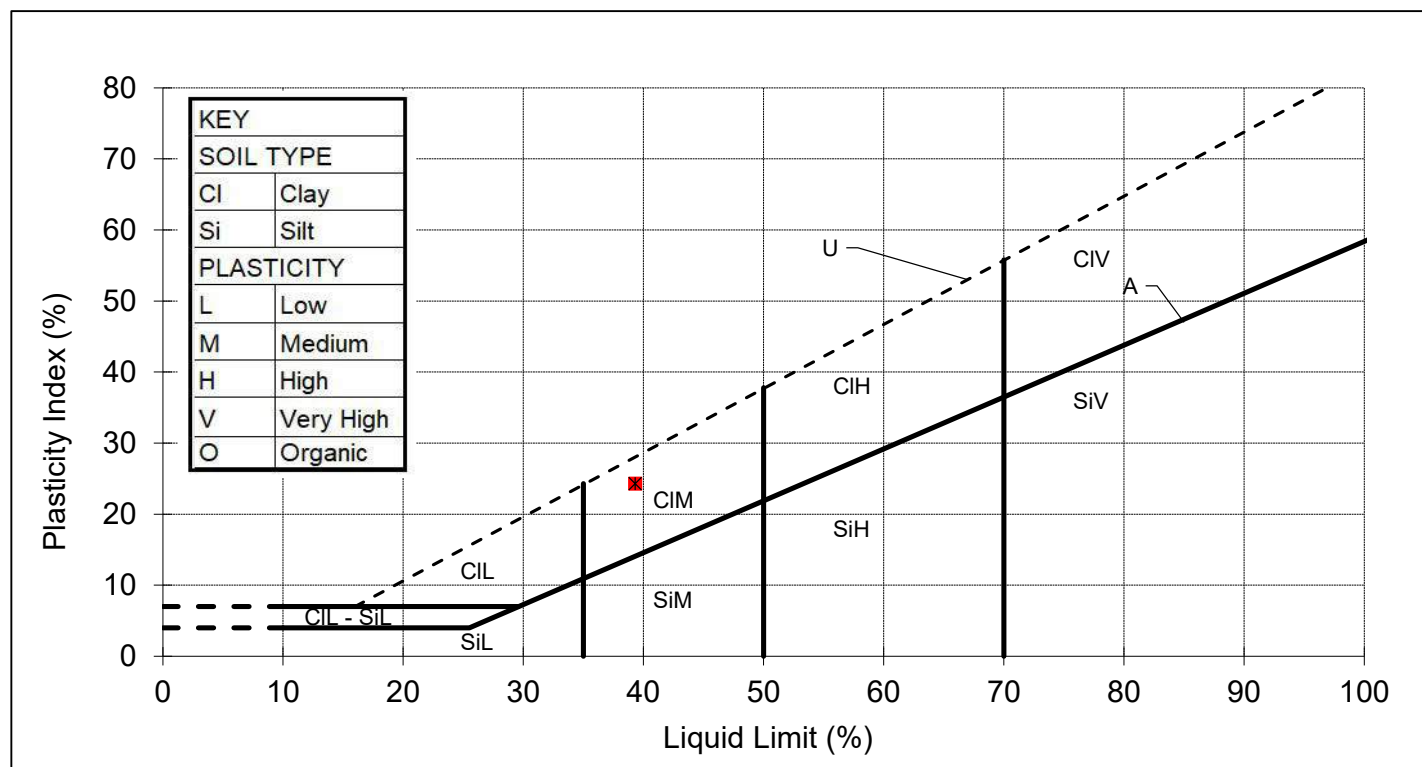
CLIENT	GRM Development Solutions Ltd
SITE	Desford Lane, Ratby
JOB NUMBER	MRN 24007/43

SAMPLE LABEL	WS16 - 2.1	DATE SAMPLED	25-Apr-24
SAMPLE No.	467907	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	21.2	40.0	0.983	
Determination 2 (avg)	21.0	40.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23.9	39	15	24	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

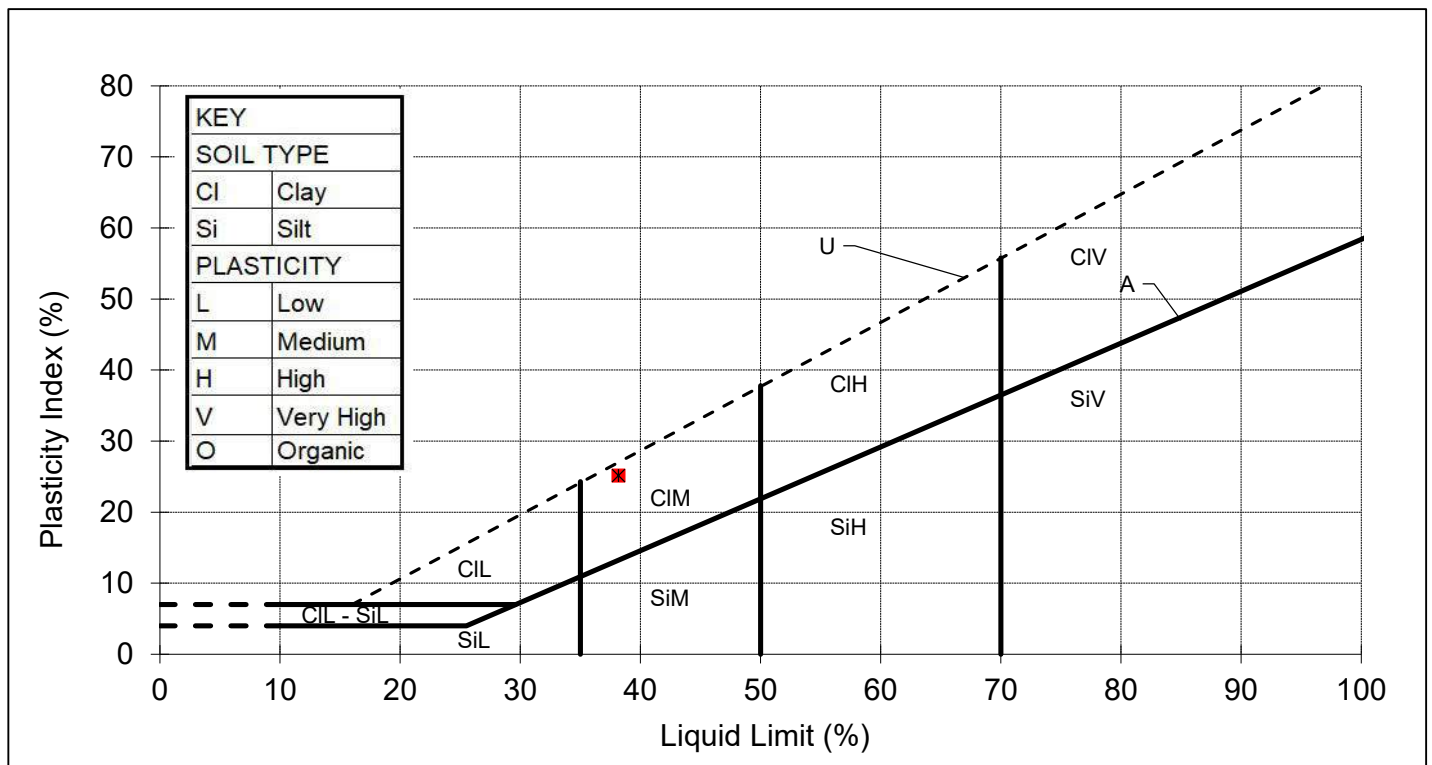
CLIENT	GRM Development Solutions Ltd		
SITE	Desford Lane, Ratby		
JOB NUMBER	MRN 24007/43		

SAMPLE LABEL	WS19 - 1.6	DATE SAMPLED	24-Apr-24
SAMPLE No.	467908	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.0	37.8	1.014	
Determination 2 (avg)	18.6	37.5		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.2	38	13	25	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

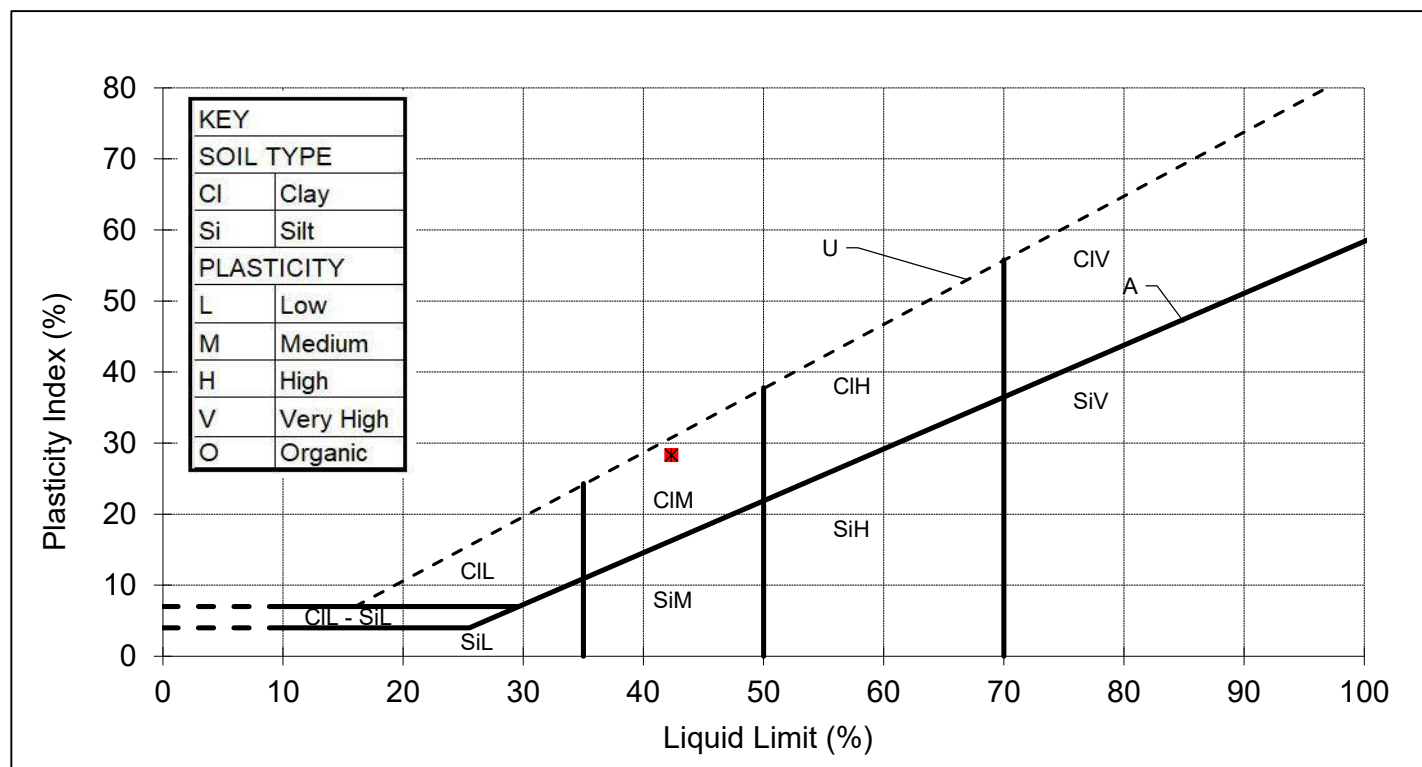
CLIENT	GRM Development Solutions Ltd
SITE	Desford Lane, Ratby
JOB NUMBER	MRN 24007/43

SAMPLE LABEL	WS22 - 2.6	DATE SAMPLED	24-Apr-24
SAMPLE No.	467909	DATE RECEIVED	03-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.6	41.8	1.026	
Determination 2 (avg)	18.5	40.7		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24.5	42	14	28	100



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24

MURRAY RIX
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE
DETERMINATION OF WATER-SOLUBLE SULPHATE IN SOIL
& DETERMINATION OF THE pH VALUE
BS 1377-3:2018+A1:2021, Cl. 7.3 & Cl. 12

CLIENT	GRM Development Solutions Ltd
SITE	Desford Lane, Ratby
JOB NUMBER	MRN 24007/43

DATE TESTED	07-May-24	DATE SAMPLED	23-24-Apr-24
SAMPLED BY	Client	DATE RECEIVED	03-May-24
PRE-TREATMENT	Air Dried	ADVISED SOURCE	Site Investigation Samples

Sample Number	Sample Label	Material	% Ret. 2mm	pH Value	Water Soluble Sulphate as SO ₄ (mg/l)
467901	TP01 - 0.9	Brown silty slightly sandy slightly gravelly CLAY	2	7.2	130
467902	TP03 - 1.2	Brown silty slightly sandy CLAY	0	7.0	180
467903	TP05 - 2.5	Brown silty slightly sandy CLAY	0	7.1	100
467905	WS11 - 1.2	Brown silty slightly sandy CLAY	0	7.1	130
467906	WS12 - 1.05	Brown silty slightly sandy CLAY	0	7.1	150
467907	WS16 - 2.1	Brown silty slightly sandy CLAY	0	7.0	90
467908	WS19 - 1.6	Brown silty slightly sandy CLAY	0	7.2	120
467910	TP03 - 0.8	Brown silty gravelly SAND	24	7.6	280
467911	WS18 - 1.5	Brown silty gravelly SAND	30	7.9	340

REMARKS

SIGNED



NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

17-May-24



A P P E N D I X K

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Residential with Plant Uptake		
CONTAMINANT	Metals and Inorganic Compounds		
^a Arsenic	37		
^a Cadmium	22		
^b Chromium III	910		
^a Chromium VI	21		
^a Lead	200		
^{b/c} Mercury	11		
^b Selenium	250		
^b Nickel	130		
^b Phenols	200		
^b Copper	2400		
^b Zinc	3700		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	0.20	0.41	0.87
^b Toluene	130	290	660
^b Ethylbenzene	47	110	260
^b <i>o</i> - xylene	60	140	330
^b <i>m</i> - xylene	59	140	320
^b <i>p</i> - xylene	56	130	310
Non Genotoxic PAHs			
^b Acenaphthene	210	510	1100
^b Acenaphthylene	170	420	920
^b Anthracene	2400	5400	11000
^b Fluoranthene	280	560	890
^b Fluorene	170	400	860
^b Naphthalene	2.3	5.6	13
^b Phenanthrene	95	220	440
^b Pyrene	620	1200	2000
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	5	5	5
ALIPHATIC HYDROCARBONS			
^b C5-C6	42	78	160
^b C6-C8	100	230	530
^b C8-C10	27	65	150
^b C10-C12	130	330	760
^b C12-C16	1100	2400	4300
^b C16-35	65000	92000	110000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	70	140	300
^b C7-8 (toluene)	130	290	660
^b C8-C10	34	83	190
^b C10-C12	74	180	380
^b C12-C16	140	330	660
^b C16-C21	260	540	930
^b C21-C35	1100	1500	1700

Notes

- C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071. Cadmium using lifetime exposure.
- LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- S4UL for Methyl Hg used.
- Atkins ATRISKsoil Value
- Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)
All values in mg/kg unless otherwise stated

GRM TAC 02-2024

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Residential without Plant Uptake		
CONTAMINANT	Metals and Inorganic Compounds		
^a Arsenic	40		
^a Cadmium	150		
^b Chromium III	910		
^a Chromium VI	21		
^a Lead	310		
^{b/c} Mercury	11		
^b Selenium	430		
^b Nickel	180		
^b Phenols	690		
^b Copper	7100		
^b Zinc	40000		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	0.89	1.64	3.3
^b Toluene	880	1900	3900
^b Ethylbenzene	83	190	440
^b <i>o</i> - xylene	88	210	480
^b <i>m</i> - xylene	82	190	450
^b <i>p</i> - xylene	79	180	430
Non Genotoxic PAHs			
^b Acenaphthene	3000	4700	6000
^b Acenaphthylene	2900	4600	6000
^b Anthracene	31000	35000	37000
^b Fluoranthene	1500	1600	1600
^b Fluorene	2800	3800	4500
^b Naphthalene	2.3	5.6	13
^b Phenanthrene	1300	1500	1500
^b Pyrene	3700	3800	3800
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	5.3	5.3	5.3
ALIPHATIC HYDROCARBONS			
^b C5-C6	42	78	160
^b C6-C8	100	230	530
^b C8-C10	27	65	150
^b C10-C12	130	330	770
^b C12-C16	1100	2400	4400
^b C16-35	65000	92000	110000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	370	690	1400
^b C7-8 (toluene)	860	1800	3900
^b C8-C10	47	110	270
^b C10-C12	250	590	1200
^b C12-C16	1800	2300	2500
^b C16-C21	1900	1900	1900
^b C21-C35			

Notes

- a C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071
- b LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- c S4UL for inorganic Hg used.
- d Atkins ATRISKsoil Value
- e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

All values in mg/kg unless otherwise stated

GRM TAC 02-2024

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Allotments		
CONTAMINANT	Metals and Inorganic Compounds		
^a Arsenic	49		
^a Cadmium	3.9		
^b Chromium III	18000		
^a Chromium VI	170		
^a Lead	80		
^{b/c} Mercury	11		
^b Selenium	88		
^b Nickel	53		
^b Phenols	42		
^b Copper	520		
^b Zinc	620		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	0.04	0.08	0.18
^b Toluene	22	51	120
^b Ethylbenzene	16	39	91
^b <i>o</i> - xylene	28	67	160
^b <i>m</i> - xylene	31	74	170
^b <i>p</i> - xylene	29	69	160
Non Genotoxic PAHs			
^b Acenaphthene	34	85	200
^b Acenaphthylene	28	69	160
^b Anthracene	380	950	2200
^b Fluoranthene	52	130	290
^b Fluorene	27	67	160
^b Naphthalene	4.1	10	24
^b Phenanthrene	15	38	90
^b Pyrene	110	270	620
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	5.7	5.7	5.7
ALIPHATIC HYDROCARBONS			
^b C5-C6	730	1700	3900
^b C6-C8	2300	5600	13000
^b C8-C10	320	770	1700
^b C10-C12	2200	4400	7300
^b C12-C16	11000	13000	13000
^b C16-35	260000	270000	270000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	13	27	57
^b C7-8 (toluene)	22	51	120
^b C8-C10	8.6	21	51
^b C10-C12	13	31	74
^b C12-C16	23	57	130
^b C16-C21	46	110	260
^b C21-C35	370	820	1600

Notes

- a C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071
- b LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- c S4UL for inorganic Hg used.
- d Atkins ATRISKsoil Value
- e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

All values in mg/kg unless otherwise stated

GRM TAC 02-2024

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Commercial Industrial		
CONTAMINANT	Metals and Inorganic Compounds		
a Arsenic	640		
a Cadmium	410		
b Chromium III	8600		
a Chromium VI	49		
a Lead	2330		
b/c Mercury	11		
b Selenium	12000		
b Nickel	980		
b Phenols	690		
b Copper	68000		
b Zinc	730000		
d Cyanide	280		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
a Benzene	27	50	98
b Toluene	56000	110000	180000
b Ethylbenzene	5700	13000	27000
b o - xylene	6600	15000	33000
b m - xylene	6200	14000	31000
b p - xylene	5900	14000	30000
Non Genotoxic PAHs			
b Acenaphthene	84000	97000	100000
b Acenaphthylene	83000	97000	100000
b Anthracene	520000	540000	540000
b Fluoranthene	23000	23000	23000
b Fluorene	63000	68000	71000
b Naphthalene	190	460	1100
b Phenanthrene	22000	22000	23000
b Pyrene	54000	54000	54000
Genotoxic PAHs			
a/e Benzo(a)pyrene	76	76	76
ALIPHATIC HYDROCARBONS			
b C5-C6	3200	5900	12000
b C6-C8	7800	17000	40000
b C8-C10	2000	4800	11000
b C10-C12	9700	23000	47000
b C12-C16	59000	82000	90000
b C16-35	1600000	1700000	1800000
AROMATIC HYDROCARBONS			
b C5-7 (benzene)	26000	46000	86000
b C7-8 (toluene)	56000	110000	180000
b C8-C10	3500	8100	17000
b C10-C12	16000	28000	34000
b C12-C16	36000	37000	38000
b C16-C21	28000	28000	28000
b C21-C35			

Notes

- a C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071
- b LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- c S4UL for inorganic Hg used.
- d Atkins ATRISKsoil Value
- e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

All values in mg/kg unless otherwise stated

GRM TAC 02-2024

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Public Open Space 1 (residential)		
CONTAMINANT	Metals and Inorganic Compounds		
^e Arsenic	79		
^e Cadmium	220		
^b Chromium III	1500		
^e Chromium VI	23		
^e Lead	630		
^{b/c} Mercury	11		
^b Selenium	1100		
^b Nickel	230		
^b Phenols	690		
^b Copper	12000		
^b Zinc	81000		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	142	142	143
^b Toluene	56000	56000	56000
^b Ethylbenzene	24000	24000	25000
^b <i>o</i> - xylene	41000	42000	43000
^b <i>m</i> - xylene	41000	42000	43000
^b <i>p</i> - xylene	41000	42000	43000
Non Genotoxic PAHs			
^b Acenaphthene	15000	15000	15000
^b Acenaphthylene	15000	15000	15000
^b Anthracene	74000	74000	74000
^b Fluoranthene	3100	3100	3100
^b Fluorene	9900	9900	9900
^b Naphthalene	4900	4900	4900
^b Phenanthrene	3100	3100	3100
^b Pyrene	7400	7400	7400
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	10	10	10
ALIPHATIC HYDROCARBONS			
^b C5-C6	570000	590000	600000
^b C6-C8	600000	610000	620000
^b C8-C10	13000	13000	13000
^b C10-C12	13000	13000	13000
^b C12-C16	13000	13000	13000
^b C16-35	250000	250000	250000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	56000	56000	56000
^b C7-8 (toluene)	56000	56000	56000
^b C8-C10	5000	5000	5000
^b C10-C12	5000	5000	5000
^b C12-C16	5100	5100	5000
^b C16-C21	3800	3800	3800
^b C21-C35			

Notes

- C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071
- LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- S4UL for inorganic Hg used.
- Atkins ATRISKsoil Value
- Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

All values in mg/kg unless otherwise stated

GRM TAC 02-2024

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Public Open Space 2 (park)		
CONTAMINANT	Metals and Inorganic Compounds		
^a Arsenic	168		
^a Cadmium	880		
^b Chromium III	33000		
^a Chromium VI	250		
^a Lead	1300		
^{b/c} Mercury	11		
^b Selenium	1800		
^b Nickel	800		
^b Phenols	690		
^b Copper	44000		
^b Zinc	170000		
^d Cyanide	34		
	Organic Compounds		
BTEX	1% SOM	2.5% SOM	6% SOM
^a Benzene	190	211	232
^b Toluene	87000	95000	100000
^b Ethylbenzene	17000	22000	27000
^b <i>o</i> - xylene	17000	24000	33000
^b <i>m</i> - xylene	17000	24000	32000
^b <i>p</i> - xylene	17000	23000	31000
Non Genotoxic PAHs			
^b Acenaphthene	29000	30000	30000
^b Acenaphthylene	29000	30000	30000
^b Anthracene	150000	150000	150000
^b Fluoranthene	6300	6300	6400
^b Fluorene	20000	20000	20000
^b Naphthalene	1200	1900	3000
^b Phenanthrene	6200	6200	6300
^b Pyrene	15000	15000	15000
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	21	21	21
ALIPHATIC HYDROCARBONS			
^b C5-C6	95000	130000	180000
^b C6-C8	150000	220000	320000
^b C8-C10	14000	18000	21000
^b C10-C12	21000	23000	24000
^b C12-C16	25000	25000	26000
^b C16-35	450000	480000	490000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	76000	84000	92000
^b C7-8 (toluene)	87000	95000	100000
^b C8-C10	7200	8500	9300
^b C10-C12	9200	9700	10000
^b C12-C16	10000	10000	10000
^b C16-C21	7600	7700	7800
^b C21-C35	7800	7800	7900

Notes

- a C4SL - SP1010 (2014) - Benzene (2.5% SOM) and Benzo(a)pyrene values (1% and 2.5% SOM) have been calculated using default C4SL parameters in CLEA v1.071
- b LQM/CIEH S4UL values (2015). Publication number S4UL3066.
- c S4UL for inorganic Hg used.
- d Atkins ATRISKsoil Value
- e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

All values in mg/kg unless otherwise stated

GRM TAC 02-2024

PAH Mixture Analysis



Contaminant Thresholds for Subsurface Water Pipes

Contaminant	Thresholds (mg/kg)
Corrosion	
Wrapped Steel	pH<7 Cond >400µS/cm
Wrapped Ductile Iron	pH<5 Cond >400µS/cm, he not neutral
Copper	pH<5 >8 and Eh +ve
Toxic Substances	
Chromium (total) (Cr)	Applies to above pipe materials
Organic Contaminants	
VOC's	0.5 PE/0.125 PVC
BTEX & MTBE	0.1 PE/0.03 PVC
SVOC	2 PE/1.4 PVC
Phenols	2 PE/0.4 PVC
Cresols & Chlorinated Phenols	2 PE/0.04 PVC
Mineral Oil C11-C20	10 PE
Mineral Oil C21 - C40	500
Ether/Ketone/Amines, Nitrobenzene/Aldehydes	0.5 PE/0.02-1 PVC

Notes.

It is not recommended that water pipes should be laid in sites where these substances are identified or suspected
Local Utility Companies should be consulted prior to pipe specifications being finalised.

Ref: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites. UKWIR Ref. No. 10/WM/03/21. 2010.



A P P E N D I X L

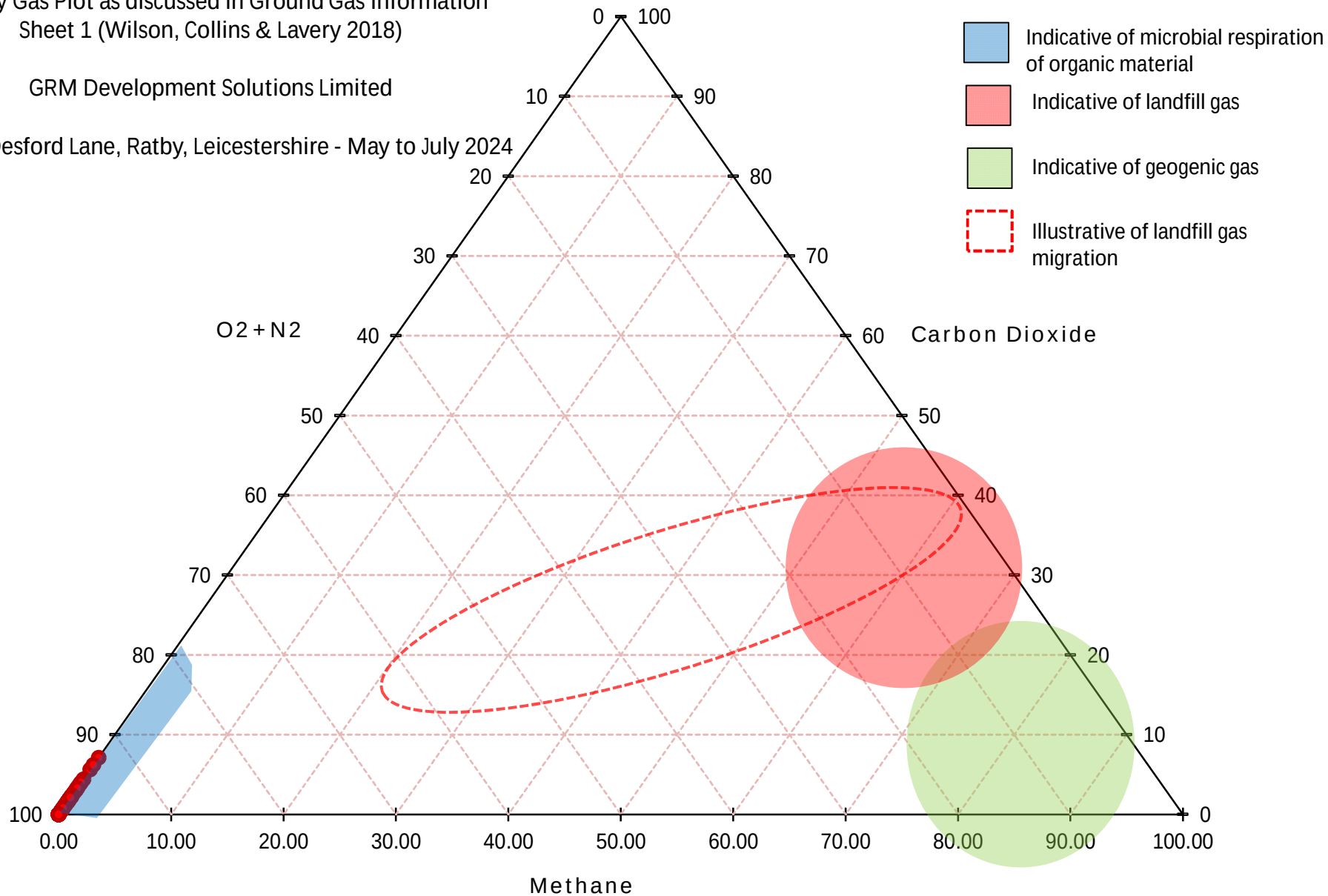
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Ternary Gas Plot as discussed in Ground Gas Information
Sheet 1 (Wilson, Collins & Lavery 2018)

GRM Development Solutions Limited

P10567 Desford Lane, Ratby, Leicestershire - May to July 2024





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Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



MT8QK-P0CXB-J5WRP

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

P10567 Desford Lane, Ratby - Topsoil

Description/Comments

Project

P10567

Site

Desford Lane, Ratby

Classified by

Name: **George Salloway**
Date: **21 May 2024 15:47 GMT**
Telephone: **01283 551 249**

Company: **GRM Development Solutions Ltd**
Laurus House
First Avenue
Burton on Trent
DE14 2WH

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification
Most recent 3 year Refresher

Date

06 Dec 2018
07 Dec 2021

Next 3 year Refresher due by Dec 2024

Purpose of classification

2 - Material Characterisation

Address of the waste

Desford Lane, Ratby, Leicestershire, LE6 0JN

Post Code **LE6 0JN**

SIC for the process giving rise to the waste

41202 Construction of domestic buildings

Description of industry/producer giving rise to the waste

Construction of new residential houses.

Description of the specific process, sub-process and/or activity that created the waste

Excavation of soils / topsoil, in preparation for new buildings.

Description of the waste

Topsoil and underlying natural strata.



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.35	Non Hazardous		3
2	WS03	0.1	Non Hazardous		5
3	WS17	0.2	Non Hazardous		7
4	WS24	0.1	Non Hazardous		9
5	TP03	0.2	Non Hazardous		11
6	TP05	0.2	Non Hazardous		13
7	TP08	0.2	Non Hazardous		15
8	TP11	0.2	Non Hazardous		17
9	TP14	0.2	Non Hazardous		19

Related documents

#	Name	Description
1	GRM Validation Suite - WM3 V1.2.GB	waste stream template used to create this Job

Report

Created by: George Salloway

Created date: 21 May 2024 15:47 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	21
Appendix B: Rationale for selection of metal species	22
Appendix C: Version	22



Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



4MFMI-8SE5B-F5Y3X

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

P10567 Desford Lane, Ratby (Natural Strata)

Description/Comments

Project

P10567

Site

Desford Lane, Ratby

Classified by

Name: **George Salloway**
Date: **21 May 2024 15:54 GMT**
Telephone: **01283 551 249**

Company: **GRM Development Solutions Ltd**
Laurus House
First Avenue
Burton on Trent
DE14 2WH

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HazWasteOnline™ Certification:

CERTIFIED

Course

Hazardous Waste Classification
Most recent 3 year Refresher

Date

06 Dec 2018
07 Dec 2021

Next 3 year Refresher due by Dec 2024

Purpose of classification

2 - Material Characterisation

Address of the waste

Desford Lane, Ratby, Leicestershire, LE6 0JN

Post Code **LE6 0JN**

SIC for the process giving rise to the waste

41202 Construction of domestic buildings

Description of industry/producer giving rise to the waste

Construction of new residential houses.

Description of the specific process, sub-process and/or activity that created the waste

Excavation of soils / topsoil, in preparation for new buildings.

Description of the waste

Natural strata.



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS03	0.9	Non Hazardous		3
2	WS04	1.2	Non Hazardous		5
3	WS06	0.7	Non Hazardous		7
4	WS07	0.8	Non Hazardous		9
5	WS08	0.5	Non Hazardous		11
6	WS10	0.8	Non Hazardous		13
7	WS15	0.75	Non Hazardous		15
8	WS20	1	Non Hazardous		17
9	WS22	0.95	Non Hazardous		19
10	WS25	0.9	Non Hazardous		21
11	TP01	0.4	Non Hazardous		23
12	TP02	0.5	Non Hazardous		25
13	TP04	0.45	Non Hazardous		27
14	TP06	0.5	Non Hazardous		29
15	TP07	0.6	Non Hazardous		31
16	TP10	0.7	Non Hazardous		33
17	TP12	0.45	Non Hazardous		35
18	TP13	0.4	Non Hazardous		37
19	TP14	0.5	Non Hazardous		39
20	HTP02	0.4	Non Hazardous		41

Related documents

#	Name	Description
1	GRM Validation Suite - WM3 V1.2.GB	waste stream template used to create this Job

Report

Created by: George Salloway

Created date: 21 May 2024 15:54 GMT

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Appendix A: Classifier defined and non GB MCL determinands	43
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Appendix C: Version	44



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NOTES:
Minimum foundation depth of 0.9m begl
for cohesive strata (with ABP of
110kN/m²) will be applicable for the
northern half of the development area.
Shaded area confirms presence of shallow
granular strata or soft strata within the
southern half of development area.

CLIENT:	Gladman Developments Ltd	PROJECT No:	P10567	DATE:	April 2024	DESIGN/DRAWN:	RHC	 GRM Development Solutions Ltd Tel: 01283 551 249 mail@grm-uk.comwww.grm-uk.com
PROJECT:	Desford Lane, Ratby, Leicestershire	DRAWING NUMBER:	Figure 5	ISSUE:	Final			
TITLE:	Foundation Zoning Plan	© GRM Development Solutions Ltd © Crown Copyright. AL 100014100						



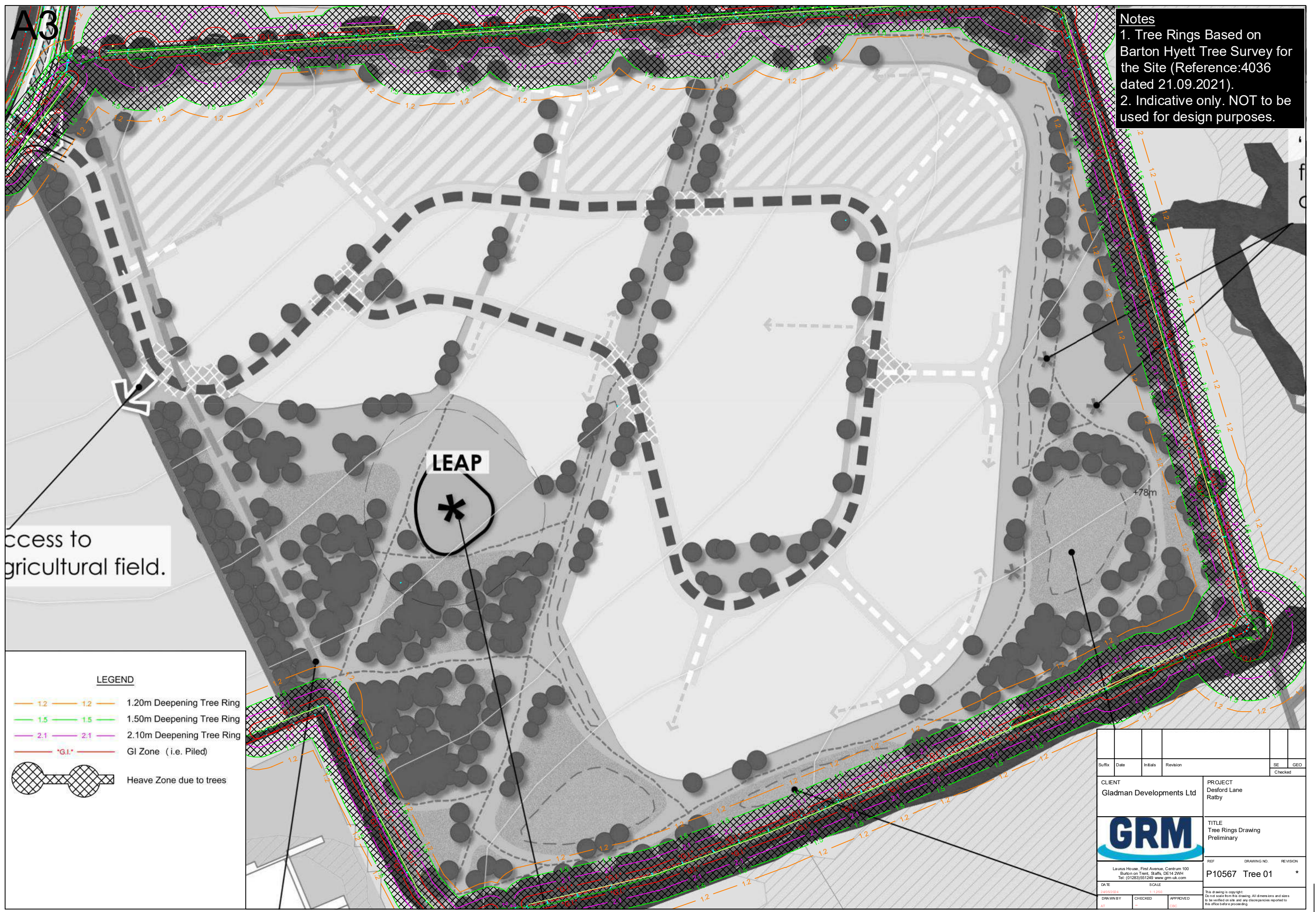
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A3

Notes
1. Tree Rings Based on Barton Hyett Tree Survey for the Site (Reference:4036 dated 21.09.2021).
2. Indicative only. NOT to be used for design purposes.



LEGEND

- 1.2 1.2 1.20m Deepening Tree Ring
- 1.5 1.5 1.50m Deepening Tree Ring
- 2.1 2.1 2.10m Deepening Tree Ring
- *G.I.* GI Zone (i.e. Piled)
- Heave Zone due to trees

Suffix	Date	Initials	Revision	SE	GEO
				Checked	
CLIENT Gladman Developments Ltd				PROJECT Desford Lane Ratby	
				TITLE Tree Rings Drawing Preliminary	
Laureus House, First Avenue, Centrum 100 Burton on Trent, Staffs, DE14 2WH Tel: (01283) 551549 www.grm-uk.com				REF	DRAWING NO.
DATE 28/05/2024				P10567 Tree 01	
DRAWN BY AT				CHECKED -	APPROVED CIC
SCALE 1:1250				This drawing is copyright. Do not scale from this drawing. All dimensions and sizes to be verified on site and any discrepancies reported to this office before proceeding.	



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Our experience spans a wide range of sectors including private residential, social housing, healthcare, education, commercial, and industrial. Our sole aim is to maximise the potential of the site and thereby the commercial return for our clients.

Land Appraisal

Phase I Desk Studies | Phase II Site Investigations
Soakaway Testing | Specialist Land Surveys

Environmental

Preliminary Risk Assessments | Detailed Quantitative Risk Assessments
Ground Gas Assessments | Material Management Plans
Environmental Impact Assessments & Reports
Remediation Strategies & Validation | Due Diligence Audits

Geotechnical

Geotechnical Investigations | Earthworks | Slope Stability
Retaining Wall Design | Ground Stability | Vibration Assessments
Value Engineering

Design

Budget Foundation Schedules | Detailed Foundation Design
Structural Design | Structural Surveys

Mining

Coal Mining Risk Assessments | Coal Mining Investigations | Treatment of
Mine Workings | Mine Shafts | Subsidence | Mineral Resource Assessments

Site Services

Foundation Inspections | Gas Membrane Verification
Remediation Validation | Structural Inspections

We also work with key partners to deliver a range of other support services and surveys including topographical, ecology, tree, archaeological, flood risk, and utilities.

Please contact us for an informal discussion on how we can save both time and money on your development project:

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