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Preliminary Geotechnical Appraisal

Proposed School Extension

Our Lady of Lourdes RC Primary School, Bury

October 2023



Project Details

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A	October 2023	First Issue	FQ	DH	SCD



Table of Contents

1	Introduction	1
1.1	Scheme Outline	1
1.2	Brief	1
1.3	Definition of Scope	1
1.4	Limitations	1
2	Site Setting	2
2.1	Site Description	2
2.2	Anticipated Geology	2
2.3	Coal mining	3
2.4	Radon	3
3	Ground Investigation	4
3.1	Objectives	4
3.2	Fieldwork summary	4
3.3	Ground Conditions	4
3.4	Existing Foundation Arrangement	5
3.5	Sampling	5
3.6	In-situ Testing	5
3.7	Investigation Constraints	5
4	Laboratory testing	6
4.1	Overview	6
4.2	Geotechnical Testing	6
5	Preliminary Geotechnical Discussion	7
5.1	Scheme Overview	7
5.2	Geotechnical Parameters	7
5.3	Spread Foundations	7
5.4	Aggressiveness Of The Ground To Buried Concrete	8
5.5	Constructability	9
6	Recommendations for further works	10
Appendix A	Drawings	
Appendix B	Exploratory Hole Logs: Foundation Pits	
Appendix C	In Situ Test Results	
Appendix D	Geotechnical Laboratory Test Results	

Drawing Register

Title	Produced by	Date	Reference
Exploratory Hole Location Plan	Soiltechnics	October 2023	D-STV6181-001
Phase 2 – Development Plan	SDA Consulting	May 2023	2517_SDA_P_07

List of Tables

Table 1-A:	Definition of Investigation Scope	1
Table 2-A:	Summary of anticipated geology at the site	2
Table 3-A:	Summary of fieldwork undertaken	4
Table 3-B:	Summary of foundation arrangements	5
Table 3-C:	Summary of field testing undertaken	5
Table 3-D:	Table of site restrictions	5
Table 4-A:	Summary of geotechnical laboratory testing	6
Table 5-A:	Summary of characteristic geotechnical parameters – Devensian Till Deposits	7
Table 5-B:	Summary of foundation ultimate limit state analyses	8
Table 5-C:	Key geotechnical variables used in settlement analyses	8
Table 5-D:	SLS bearing resistance to ensure total settlement to <25mm	8
Table 5-F:	Summary of the aggressiveness of the ground to buried concrete	8

List of Figures

Figure 2-A:	Aerial photograph and approximate site boundary (red) and extension (orange)	2
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1 Introduction

1.1 Scheme Outline

- 1.1.1 The scheme comprises a single storey extension to the southeast of the existing school buildings. A proposed development plan is presented in Appendix A.
- 1.1.2 The report is based on the project proposals and information outlined above; should the scheme change then it will be necessary to review the conclusions and recommendations presented in this report.

1.2 Brief

- 1.2.1 This report has been prepared following instructions received from SDA Consulting Limited, on behalf of our mutual client, Our Lady of Lourdes RC Primary School. The overall brief of works is to:
- i) Undertake ground investigation at the site to establish existing foundation arrangements along the perimeter of the school building where the proposed extension adjoins.
 - ii) Determine geotechnical parameters and provide a preliminary geotechnical appraisal for the scheme.

1.3 Definition of Scope

- 1.3.1 The phasing and scope of the ground investigation works is broadly defined by the following documents.

Title	Document Reference	Publisher	Investigation Scope
Code of practice for ground investigations	BS 5930: 2015	British Standards Institution	Phase 2: Preliminary geotechnical investigation
Eurocode 7 — Geotechnical design Part 2: Ground investigation and Testing	BS EN 1997-2: 2007	British Standards Institution	Preliminary Investigation

Table 1-A: Definition of Investigation Scope

1.4 Limitations

- 1.4.1 Soiltechnics disclaims any responsibility to our Client and others in respect of any matters outside the scope of this report. This report has been prepared with reasonable skill, care and diligence in accordance with the terms of our contract, taking account of the resources, investigations and testing devoted to it by agreement with our Client. This report is confidential to our Client and Soiltechnics accepts no responsibility of whatsoever nature to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

2 Site Setting

2.1 Site Description

- 2.1.1 The proposed development lies within the grounds of Our Lady of Lourdes RC Primary School, approximately 2.3km northwest of the Bury town centre. The post code for the site is BL8 1YA and the site is accessed from Rudgwick Drive, which lies adjacent to the schools western boundary.
- 2.1.2 The area of the extension is located in south-eastern part of the school, which comprises of children's activity areas, open space and perimeter access routes. A retaining wall some is also present in the footprint of the proposed extension.
- 2.1.3 An aerial image showing the approximate wider site boundary is presented below. A Site Plan is provided within Appendix A.



Figure 2-A: Aerial photograph and approximate site boundary (red) and extension (orange)

2.2 Anticipated Geology

- 2.2.1 Based on a review of available records, the site is anticipated to be underlain by Devensian Till Deposits overlying Pennine Lower Coal Measures Formation.
- 2.2.2 Due to the previous development of the school, Soiltechnics anticipate that shallow Made Ground is likely to be present locally.
- 2.2.3 A summary of the anticipated geology underlying the site is summarised as follows:

Stratum	Bedrock / superficial	Anticipated thickness (m)	Typical description
Devensian Till	Superficial	>15	Clays and sands
Pennine Lower Coal Measures Formation	Bedrock	720	Mudstone, Sandstone and Siltstone with coal seams

Table 2-A: Summary of anticipated geology at the site

2.3 Coal mining

- 2.3.1 The site is located within a Coal Mining Reporting Area, but outside of a Development High Risk Area. On review of online Coal Authority data, the site is not considered to be at a significant instability or subsidence risk from historical coal mining legacy in the area.

2.4 Radon

- 2.4.1 The site is in an area where the above ground radon Affected Area status is classed as an Intermediated Probability Radon Area. Therefore, basic radon protective measures are required in new buildings.

3 Ground Investigation

3.1 Objectives

- 3.1.1 The ground investigation scope and location of exploratory holes was determined by the client, based on the overall brief outlined in Section 1.
- 3.1.2 The objectives of the fieldwork were to:
- i) Prove existing foundation arrangements and establish ground and groundwater conditions at each location.
 - ii) Obtain samples for subsequent laboratory testing.

3.2 Fieldwork summary

- 3.2.1 Fieldwork was undertaken on 29th August 2023.
- 3.2.2 A summary of the works completed is set out in the table below, with the of the exploratory logs presented in Appendix B.

Exploratory Hole Logs	Method	Qty	Final Depth Range (mm bgl)	Comments
Appendix B	Foundation Pit	1	850	TP01 Trial pit terminated upon proving base of foundation.
		2	450 – 500	TP02 Terminated at 500mm depth due to groundwater entering at 400mm depth, obscuring possible presence of utilities which were located in the area. TP03 Terminated at 400mm depth due to groundwater entering at 350mm depth, obscuring possible presence of utilities which were located in the area.
		1	1000	TP04 Trial pit terminated at 600mm due to groundwater ingress and side collapse, with further probing using breaker bar to >1000mm depth.

Table 3-A: Summary of fieldwork undertaken

- 3.2.3 All soils encountered were described in accordance with BS EN ISO 14688 “Identification and Classification of soil”.

3.3 Ground Conditions

- 3.3.1 Surfacing comprised asphalt (80mm thick) at TP01 and TP02 and paving slabs (80mm to 100mm thick) at TP03 and TP04.
- 3.3.2 Made Ground was encountered at all locations and comprised brownish grey and black gravel of brick, limestone, mortar, asphalt, and concrete to depths between 150mm and 500mm.
- 3.3.3 Devensian Till deposits were encountered below Made Ground comprising soft to firm sandy gravelly clay.

3.4 Existing Foundation Arrangement

3.4.1 Records of the foundation pits are presented in Appendix B and are summarised below.

Foundation Pit	Findings
TP01	Brick wall extended to 390mm bgl, located directly on a concrete foundation which projects 650mm from the brick wall at the top of the foundation. The foundation was 350mm thick and tapers to a width of 450mm at the base. Base depth was 740mm bgl and founded on the Devensian Till.
TP02	Unable to determine foundation arrangements due to groundwater ingress.
TP03	
TP04	Brick wall sits directly on concrete (wall?) below surface level. Although the concrete footing could not be visually exposed beyond 600mm due to water ingress, a breaker bar was advanced to a depth of 850mm bgl at which point a horizontal obstruction projecting ~250mm from the wall was noted. The breaker bar was then driven at an angle to intersect the underside of the obstruction – the obstruction was noted to be approximately 100-200mm in thickness. This is likely to represent the projection of a concrete strip foundation, founded on the Devensian Till.

Table 3-B: Summary of foundation arrangements

3.5 Sampling

3.5.1 During the fieldwork, sampling of soil, rock and groundwater for geotechnical purposes has been undertaken in accordance with BS EN ISO 22475-1 “Geotechnical Investigation and testing – sampling by drilling and excavation and groundwater measurements”.

3.5.2 Various sampling and sub-sampling methodologies have been adopted as appropriate, with the primary aim of obtaining the highest quality sample class practicable.

3.5.3 Untested geotechnical samples will be held for a period of 4 weeks from the date of the first report issue, after which they will be disposed of.

3.6 In-situ Testing

3.6.1 The following table summarises the field testing carried out. The results are summarised on individual exploratory hole logs where appropriate and detailed within the Appendices indicated.

Tests	Qty	Applicable standard / guidance	Location of Results
Pocket penetrometer	6	Manufacturer’s instructions	Included within logs Detailed in Appendix C.

Table 3-C: Summary of field testing undertaken

3.7 Investigation Constraints

3.7.1 The table below outlines restrictions and constraints to the investigation methods which limited the design of the original scope of work.

Detail	Impact
Groundwater encountered in TP02 to TP04	Unable to determine foundation arrangements as groundwater restricted visual assessment of pit progress.

Table 3-D Table of site restrictions

4 Laboratory testing

4.1 Overview

- 4.1.1 Samples obtained from exploratory holes were sent to independent accredited laboratories for geotechnical and chemical testing.

4.2 Geotechnical Testing

- 4.2.1 The geotechnical testing schedule was prepared by Soiltechnics using a targeted and judgemental approach, based upon the scheme proposals and our initial understanding of the ground conditions.
- 4.2.2 Geotechnical laboratory test results are presented in Appendix D, and the total number of geotechnical tests undertaken is summarised below:

Qty	Test
3	Moisture content
3	Atterberg limits
2	Particle size distribution (coarse)
4	BRE SD1 Suite C

Table 4-A: Summary of geotechnical laboratory testing

5 Preliminary Geotechnical Discussion

5.1 Scheme Overview

- 5.1.1 The following assessments are made on the investigatory data presented in the preceding sections of this report and are made with reference to the specific nature of the development. Should scheme proposals change then it is recommended that the validity of the conclusions of this report in relation to the revised scheme are checked.
- 5.1.2 It should be noted that the following geotechnical assessment is derived from limited field testing (insitu shear strength and field descriptions) and limited depth coverage of soils supporting existing foundations. As such as the below assessment is preliminary only and should be relied upon at the designer's own risk.
- 5.1.3 The scheme comprises a single storey extension to the southeast of the existing school building.

5.2 Geotechnical Parameters

- 5.2.1 Characteristic values of geotechnical parameters have been derived, in accordance with Eurocode 7. The following tables present the recommended characteristic values for the strata encountered:

Variable	Characteristic value	Derivation
Weight density above water table, γ_b (kN/m ³)	18	BS8004:2015 Figure 1
Weight density below water table, γ_{sat} (kN/m ³)	18	BS8004:2015 Figure 2
Undrained shear strength, c_u (kN/m ²)	40	Pocket penetrometer testing
Undrained deformation modulus, E_u (MN/m ²)	20	$E_u/c_u = 500$ from Jamiolkowski et al (1979)

Table 5-A: Summary of characteristic geotechnical parameters – Devensian Till Deposits

5.3 Spread Foundations

- 5.3.1 The soils underlying the proposed foundations are of low volume change potential when classified in accordance with NHBC Standards, Chapter 4.2. Accordingly, and in isolation of other considerations affecting foundation depth, foundations should be founded at a minimum depth of 0.75m BGL to penetrate the zone of shrinkage and swelling caused by seasonal wetting and drying.
- 5.3.2 It is understood that the exiting foundations will be utilised for the proposed extension. The fieldwork suggested the existing foundations are likely to comprise the following:
- TP01 – 450-600mm projection from wall recorded therefore assume 1200mm wide foundation at 0.74m depth.
 - TP04 – 250mm projection from wall recorded therefore assume 900mm wide foundation at 1.00m depth.
- 5.3.3 Made Ground was encountered across the site. However, where proven the existing foundations had fully penetrated through the Made Ground and were located directly on the natural soils of the Devensian Till deposits.
- 5.3.4 Ultimate limit state analyses (bearing capacity) have been undertaken in accordance with the approach outlined in Annex D of Eurocode 7 to derive the following design bearing resistances:

Type/Hole ID	Width (m)	Founding depth (mm BGL)	Founding stratum	Bearing resistance	
				Combination 1	Combination 2
Strip/TP01	1.2	0.74	Devensian Till Deposits	260 kNm ²	190 kNm ²
Strip/TP04	0.9	1.00	Devensian Till Deposits	255 kNm ²	185 kNm ²

Table 5-B: Summary of foundation ultimate limit state analyses

- 5.3.5 Serviceability limit state (SLS) has been assessed by undertaking settlement analyses in accordance with the approach outlined in Annex F of Eurocode 7 and adopting the following variables:

Devensian Till Deposits	Variable	Value adopted	Derivation
Devensian Till Deposits	Coefficient of volume compressibility, m_v (m ² /MN)	0.3	Literature/field observations
	Geological factor, μ_g	0.5	Literature

Table 5-C: Key geotechnical variables used in settlement analyses

- 5.3.6 The proposed loads are not known at this stage. Accordingly, the maximum bearing pressures have been derived to ensure settlement is less than 25mm, which is typically adopted as a maximum tolerable limit. The following table summarises the results.

Type/Hole ID	Width (m)	SLS bearing resistance
Strip/TP01	1.2	150kNm ²
Strip/TP04	0.9	185kNm ²

Table 5-D: SLS bearing resistance to ensure total settlement to <25mm

- 5.3.7 It is likely settlement of existing foundations will have been substantially achieved since construction therefore differential settlement could occur between the new and existing structures. This should be accommodated for in the design, for example with the use of movement joints, where new structures adjoin existing.

- 5.3.8 It should be noted that foundation design is iterative. Accordingly, a final check of ultimate and serviceability limit states should be undertaken following confirmation of foundation size and loads.

5.4 Aggressiveness Of The Ground To Buried Concrete

- 5.4.1 The aggressiveness of the ground with respect to buried concrete has been assessed in accordance with Building Research Establishment Special Digest 1: Concrete in Aggressive Ground Third Edition (2005).

- 5.4.2 The site is interpreted to be a brownfield site where pyrite is not likely to be present.

- 5.4.3 Laboratory testing has been undertaken on soil samples obtained from the investigation works.

- 5.4.4 The classification of the strata is tabulated below:

Stratum	Disturbed / Undisturbed	Design sulphate class	Aggressive chemical environment for concrete class
Made Ground	N/A	DS-1	AC-1
Devensian Till	N/A	DS-1	AC-1

Table 5-E: Summary of the aggressiveness of the ground to buried concrete

5.5 Constructability

- 5.5.1 Under most standard contracts it is the responsibility of the Contractor to design, construct and maintain temporary works. Accordingly, the following discussion is provided for information only.
- 5.5.2 Perched groundwater located above impermeable deposits of Till is anticipated to be encountered during excavations to form spread foundations. Inflow rates are anticipated to be relatively fast and may cause instability of the excavation sides. It is possible that groundwater can be controlled via conventional sump pumping techniques. It is likely that dewatering will be required to control groundwater and therefore maintain stability of the excavation.
- 5.5.3 In the event that a soft area is located in the course of foundation excavations then excavation should continue to locate stiffer/denser soils.

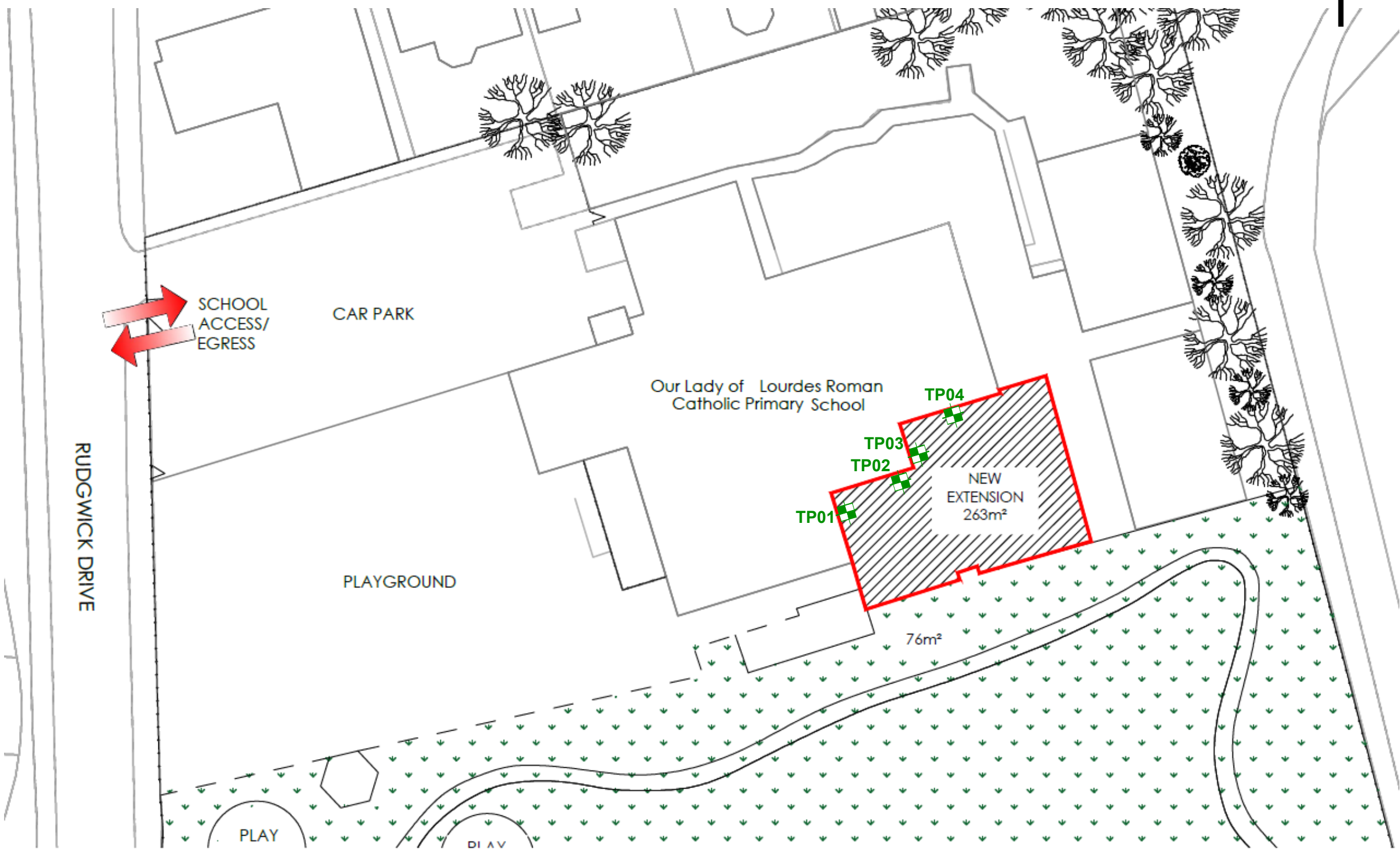
6 Recommendations for further works

6.1.1 No further works are recommended.

Appendix A Drawings

Legend

 Hand Dug Pit



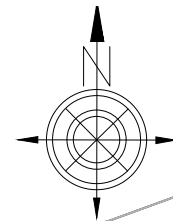
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STV6181	Our Lady of Lourdes, Bury
Drawing Number	Date
D-STV6181-001	06/10/2023
Drawn by	Checked by
DH	SCD

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- NOTES
1. DO NOT SCALE FROM THIS DRAWING.
 2. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL RELEVANT ARCHITECTURAL, ELECTRICAL, MECHANICAL AND STRUCTURAL DRAWINGS.

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS :-

	Hazard	Risk
Rev Description	By Date	Chkd Auth

sdaconsulting
construction consultants

SDA CONSULTING LLP
Second Floor, The Tower
Deva City Office Park
Trinity Way
Salford
M3 7BF
Tel: 0161 819 5252
w: www.sdaconsulting.co.uk

Drawing Status **PLANNING**

Project
PHASE 2 - DEVELOPMENT PLAN

Building Name
OUR LADY OF LOURDES RC PRIMARY SCHOOL

Sub Site Name
RUDGWICK DRIVE

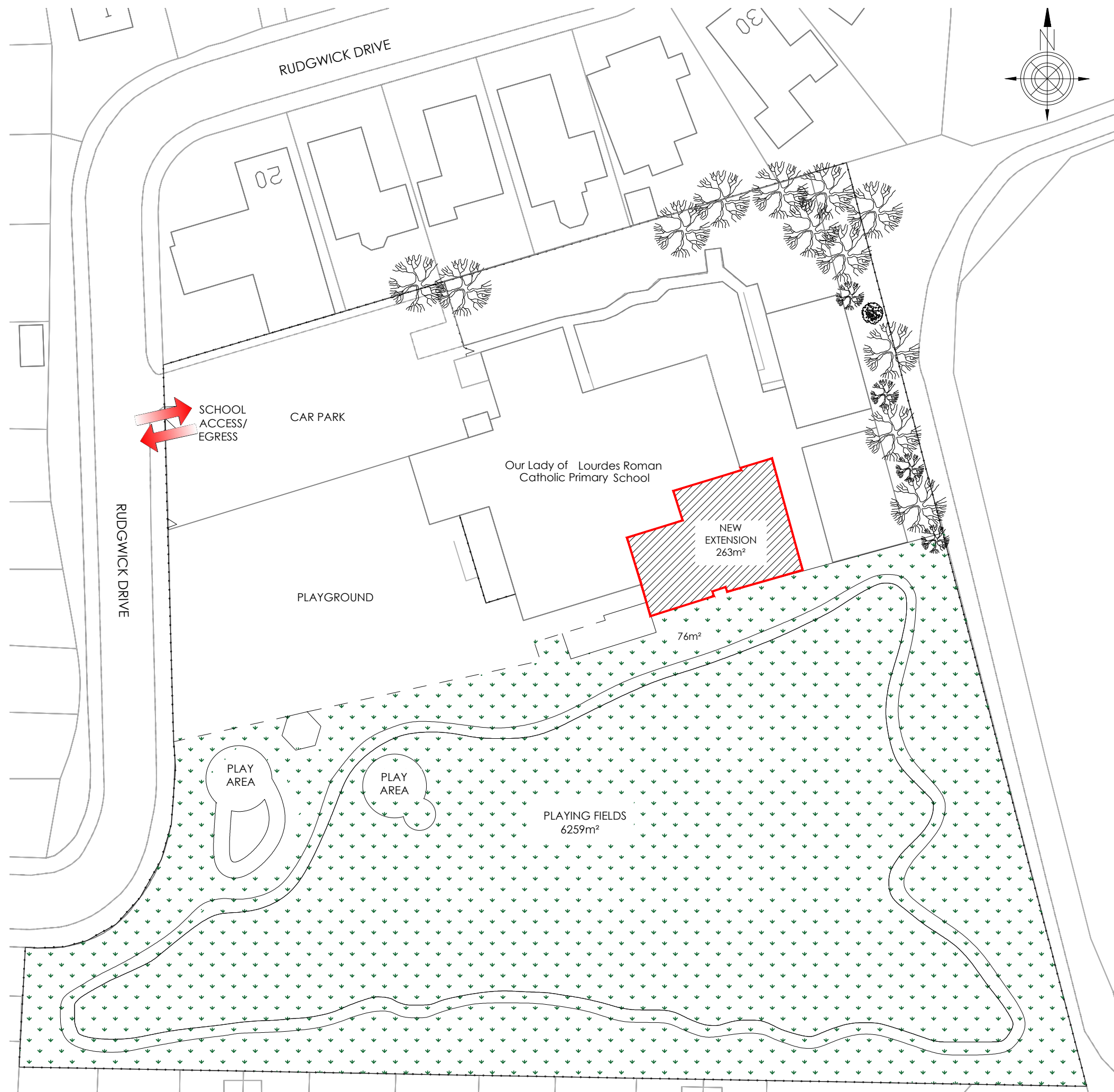
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BURY, BL8 1YA

Drawing Title

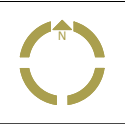
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SDA	JC	MI	
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Drawing No.	Revision
2517 SDA P 07	-

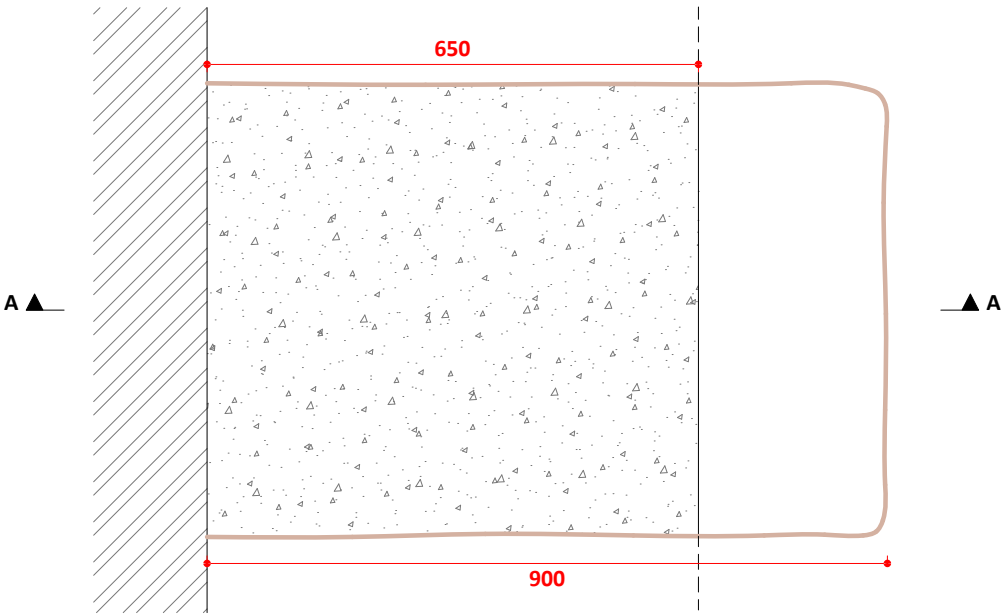
EXISTING FENCELINE TO LAND OWNED BY THE APPLICANT



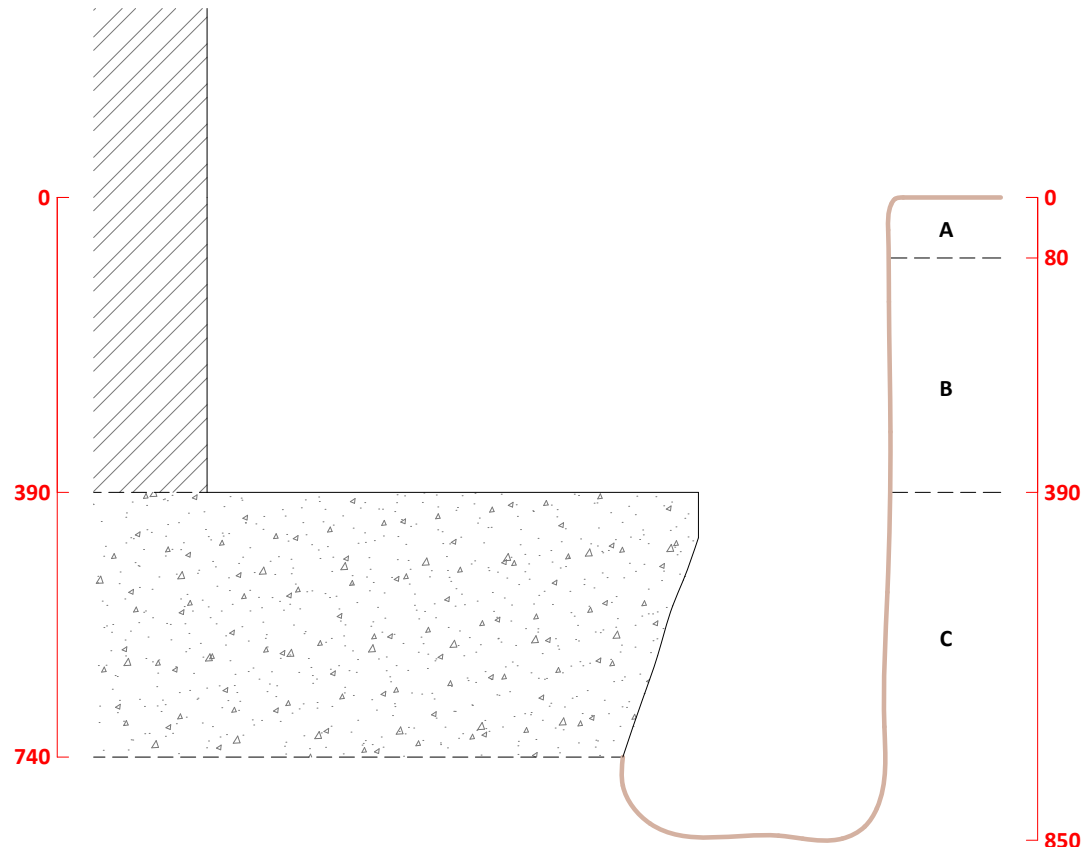
Appendix B Exploratory Hole Logs: Foundation Pits



Plan



Section A-A



Photographic records



Key

- A. ASPHALT.
- B. Brownish grey sandy clayey fine to coarse angular GRAVEL with medium cobble content of half and whole brick. Gravel is concrete, asphalt and brick. (MADE GROUND)
- C. Soft to firm brown slightly gravelly sandy CLAY. Gravel is fine to medium angular to subangular sandstone and quartzite. (DEVENSIAN TILL)

- Observed features
- Assumed features
- Excavation outline

- Brickwork
- Concrete

Notes

1. Trial pit sides remained upright and stable.
2. Dimensions shown in millimetres.
3. No groundwater encountered.

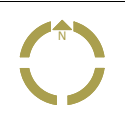
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- 0.55 - 0.6 (D)
- 0.2 (D)
- 0.7 - 0.8 (D)

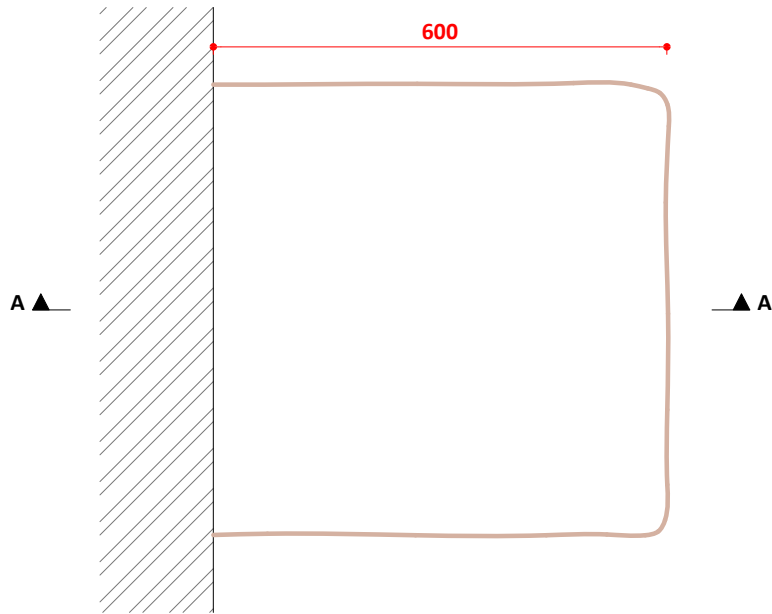
Pocket penetrometer testing

- 0.4m - 29kN/m²
- 0.55m - 33kN/m²
- 0.7m - 58kN/m²

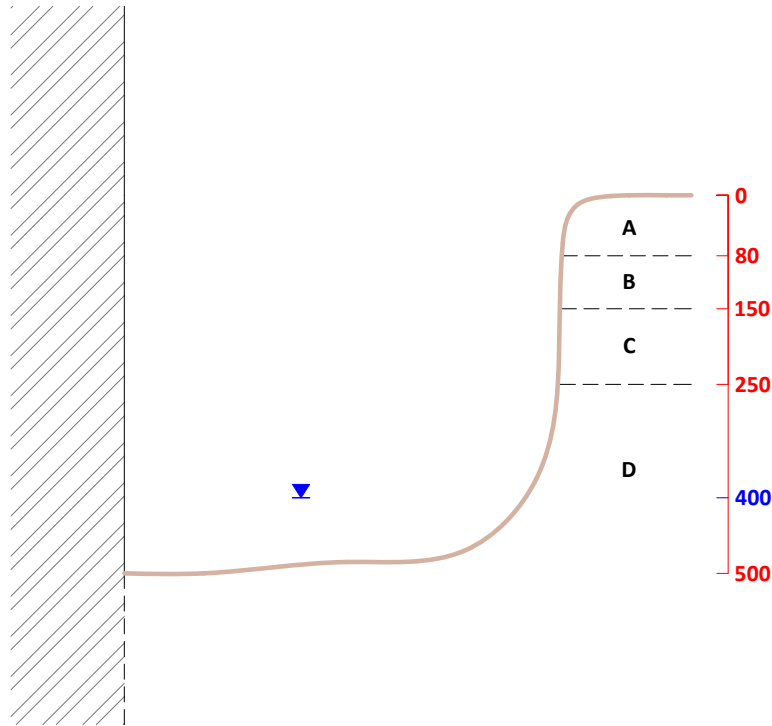
A	First issue	DH	KD	30.08.2023
REV	DESCRIPTION	LOGD	PREP	DATE
soiltechnics environmental ▪ geotechnical ▪ building fabric				
PROJECT Our Lady of Lourdes, Bury				
TITLE Trial pit record				
METHOD Hand tools		DATE OF WORKS 29.08.2023		
PROJECT NO. STV6181	SCALE AT A3 1:10	LOCATION REFERENCE TP01		



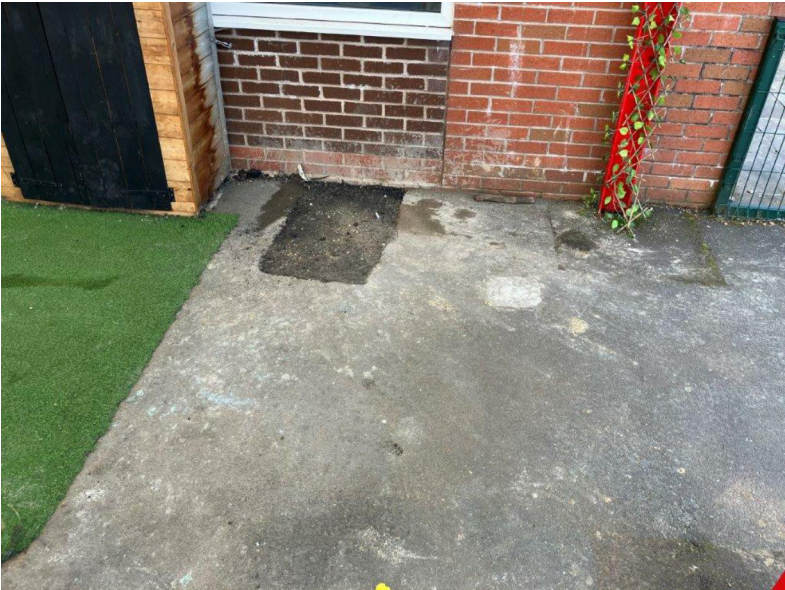
Plan



Section A-A



Photographic records



Key

- A. ASPHALT.
- B. Black fine to coarse angular GRAVEL of bituminous surfacing. (MADE GROUND)
- C. Greyish white fine to medium subangular GRAVEL of limestone. (MADE GROUND)
- D. Soft brown mottled grey slightly sandy gravelly CLAY. Gravel is fine to medium subangular sandstone and brick. (MADE GROUND)

- Observed features
- Assumed features
- Excavation outline
- Water level
- Brickwork

Notes

- Trial pit sides remained upright and stable.
- Dimensions shown in millimetres.
- Groundwater encountered at 0.5m depth, filling trial pit to 0.4m depth in 3 minutes.
- Trial pit terminated on H&S grounds due to groundwater ingress obscuring visual identification of potential services.

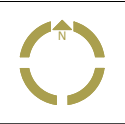
Samples - Disturbed (D) / Environmental (ES) / Bulk (B)

- 0.4 (D)

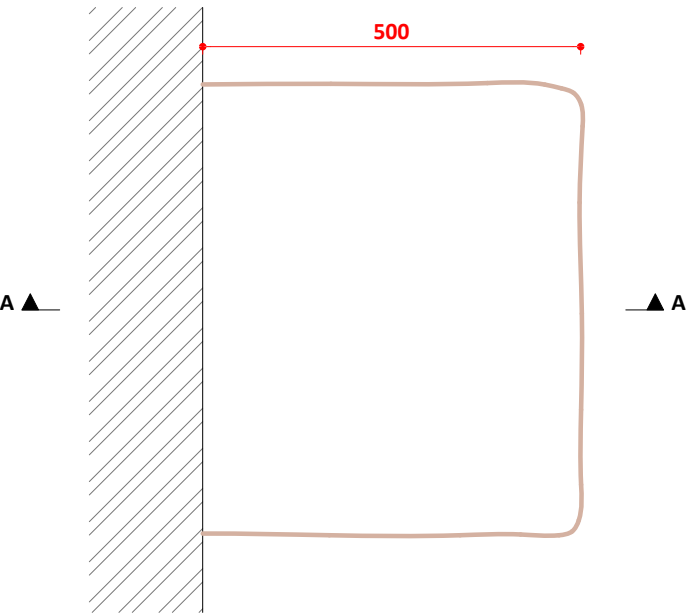
Pocket penetrometer testing

- 0.4m - 13kN/m²

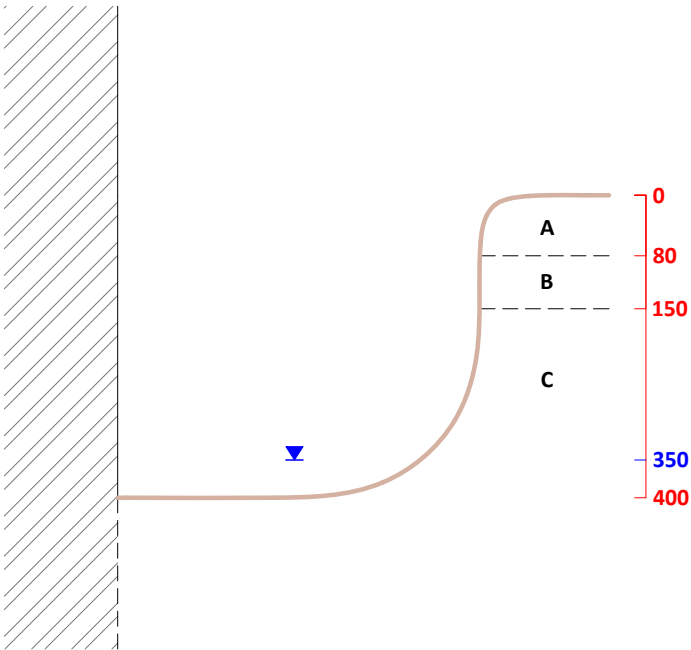
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PROJECT Our Lady of Lourdes, Bury				
TITLE Trial pit record				
METHOD Hand tools		DATE OF WORKS 29.08.2023		
PROJECT NO. STV6181	SCALE AT A3 1:10	LOCATION REFERENCE TP02		



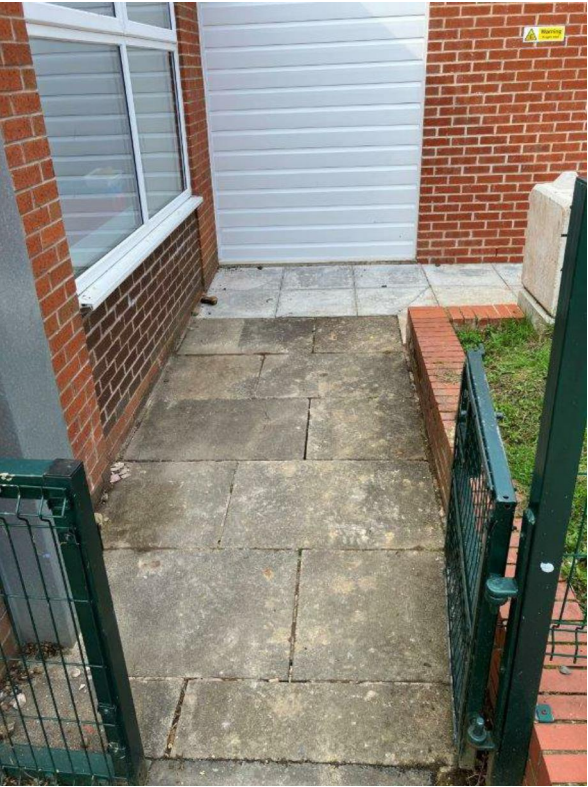
Plan



Section A-A



Photographic records



Key

- A. PAVING SLAB.
- B. Fine GRAVEL of mortar.
(MADE GROUND)
- C. Soft to firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular to subangular sandstone.
(DEVENSIAN TILL)

- Observed features
- - - Assumed features
- Excavation outline
- ▼ Water level
- Brickwork

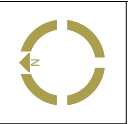
Notes

1. Trial pit sides remained upright and stable.
2. Dimensions shown in millimetres.
3. Groundwater encountered at 0.4m depth, filling trial pit to 0.35m depth in 1 minute.
4. Trial pit terminated on H&S grounds due to groundwater ingress obscuring visual identification of potential services.

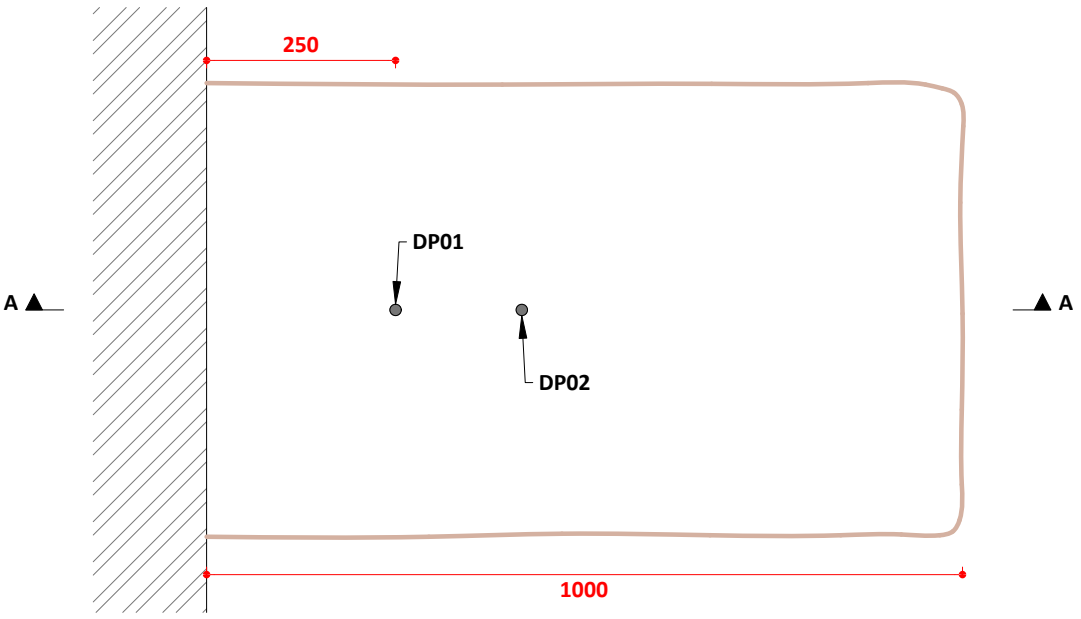
Pocket penetrometer testing

- 0.3m - 17kN/m²

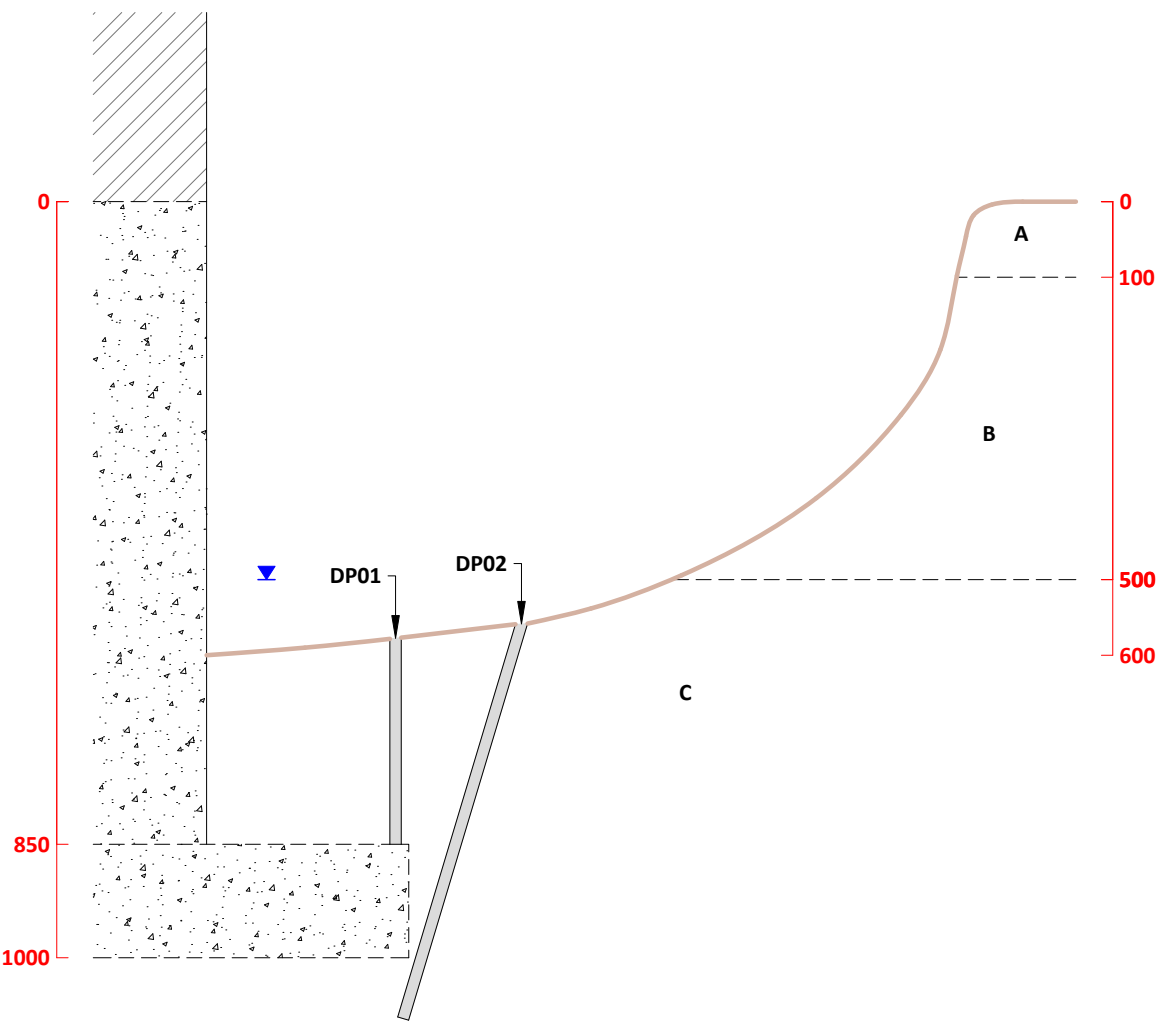
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METHOD Hand tools		DATE OF WORKS 29.08.2023		
PROJECT NO. STV6181	SCALE AT A3 1:10	LOCATION REFERENCE TP03		



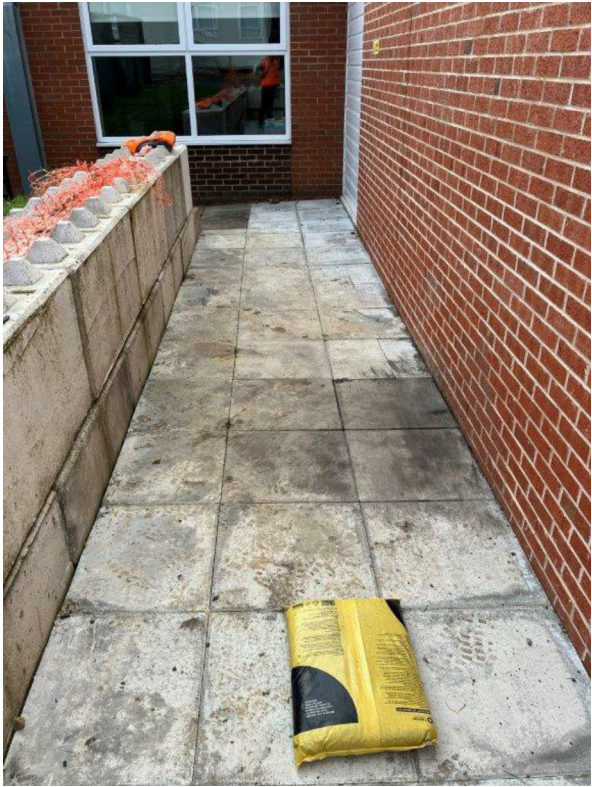
Plan



Section A-A



Photographic records



Key

- A. PAVING SLAB.
- B. Black fine to coarse angular GRAVEL of shale. (MADE GROUND)
- C. Soft to firm brown slightly sandy gravelly CLAY. Gravel is fine to coarse angular sandstone. (DEVENSIAN TILL)

- Observed features
- Assumed features
- Excavation outline
- Water level
- Drill probe (plan and section views)

- Brickwork
- Concrete

Notes

- Trial pit sides remained upright and stable.
- Dimensions shown in millimetres.
- Groundwater encountered at 0.5m depth, very fast ingress.

Samples - Disturbed (D) / Environmental (ES) / Bulk (B)

- 0.5 - 0.6 (D)
- 0.3 (D)

Pocket penetrometer testing

- 0.5m - 38kN/m²

A	First issue	DH	KD	30.08.2023
REV	DESCRIPTION	LOGD	PREP	DATE
soiltechnics environmental ▪ geotechnical ▪ building fabric				
PROJECT Our Lady of Lourdes, Bury				
TITLE Trial pit record				
METHOD Hand tools		DATE OF WORKS 29.08.2023		
PROJECT NO. STV6181	SCALE AT A3 1:10	LOCATION REFERENCE TP04		

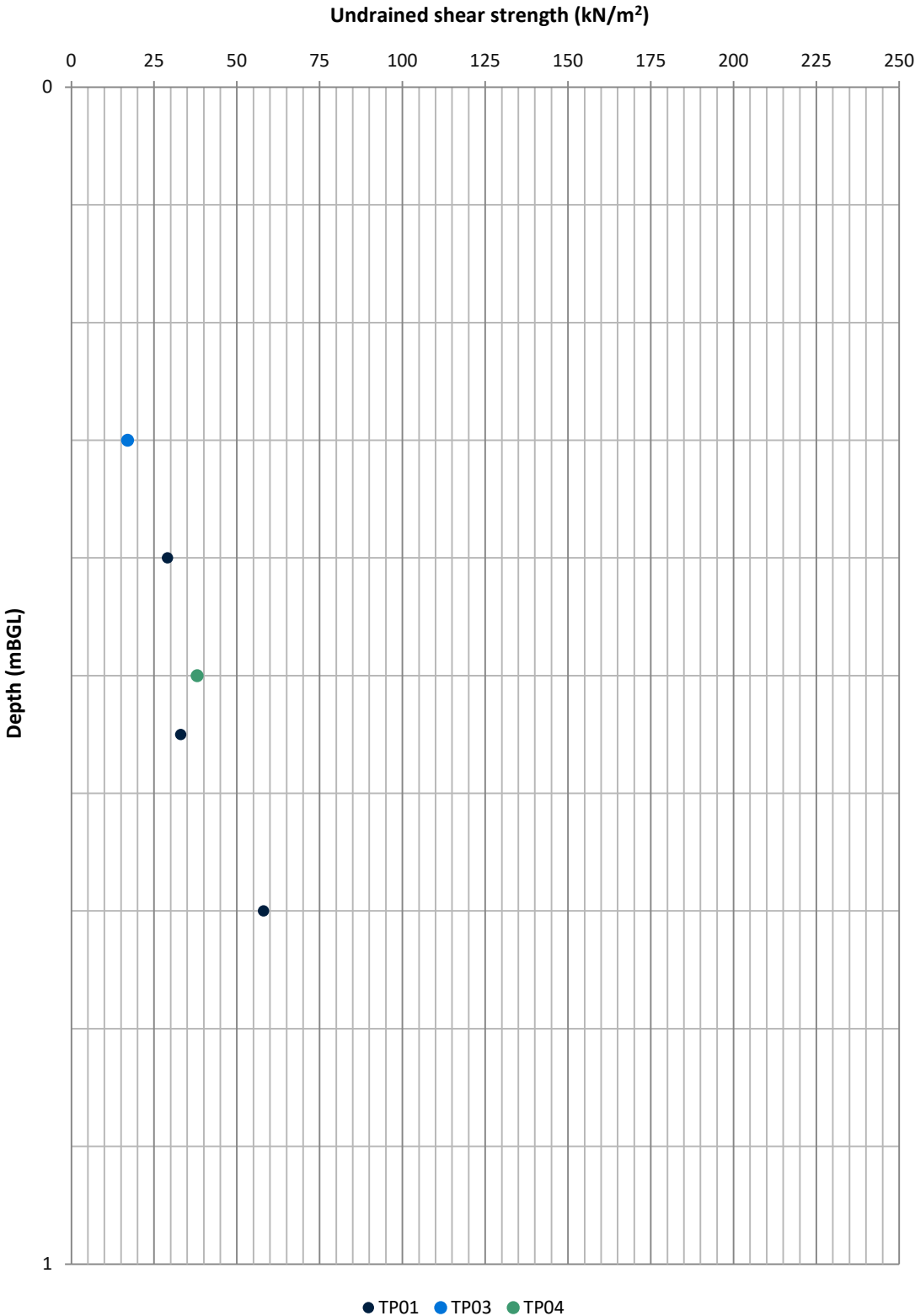
Appendix C In Situ Test Results

Table summarising Pocket Penetrometer results

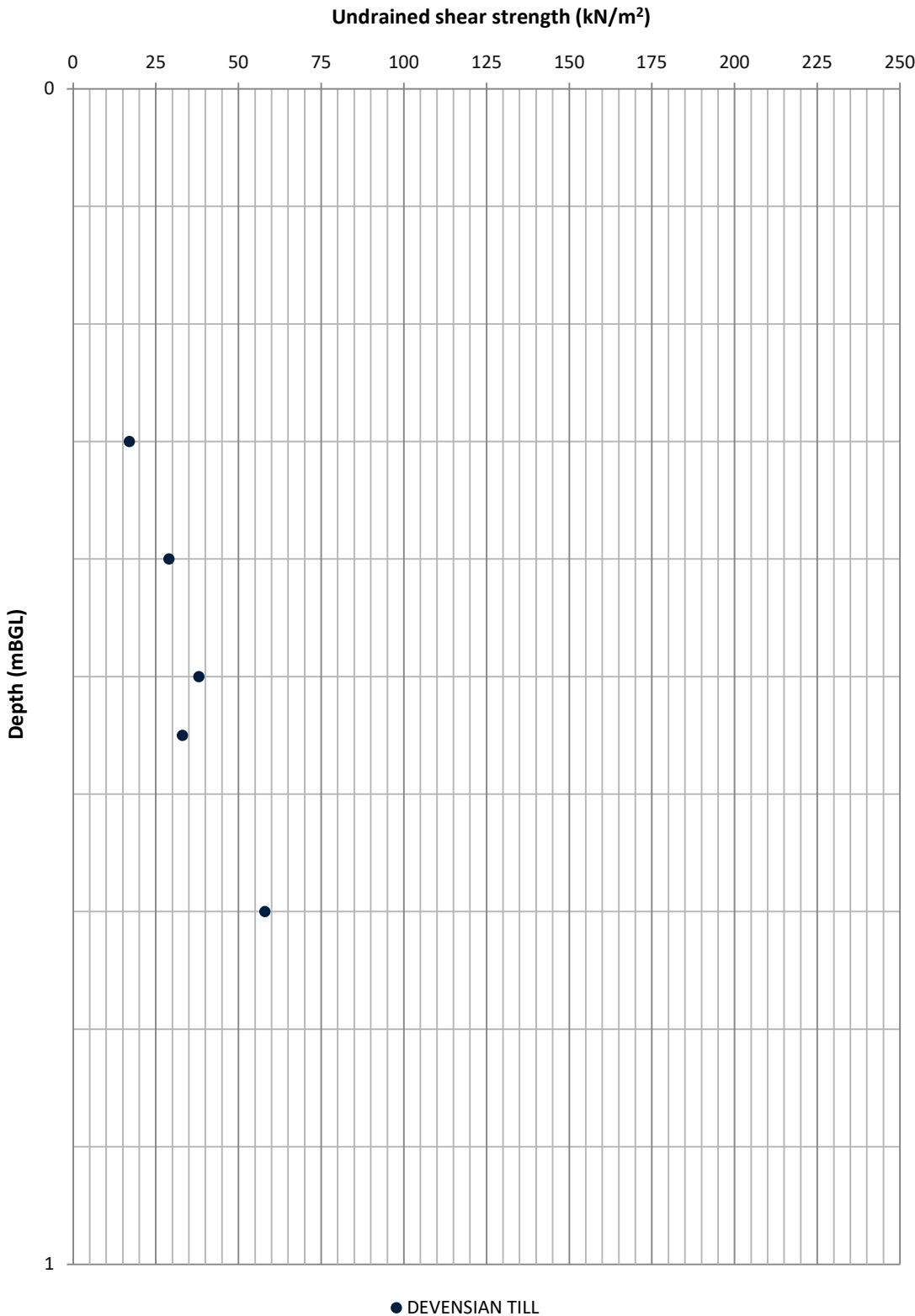
* Instrument limit reached.

Location	Start Depth (m)	Results 1-3	Average	Undrained Shear Strength (kN/m ²)
TP01	0.40	0.5/0.5/0.75	0.58	29
TP01	0.55	0.5/0.75/0.75	0.67	33
TP01	0.70	1/1.25/1.25	1.17	58
TP03	0.30	0.25/0.5/0.25	0.33	17
TP04	0.50	0.75/0.75	0.75	38

Plot summarising Pocket Penetrometer results versus depth filtered by location



Plot summarising Pocket Penetrometer results versus depth filtered by geology



Appendix D Geotechnical Laboratory Test Results



TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Admin
Site Address: Our Lady of Lourdes, Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

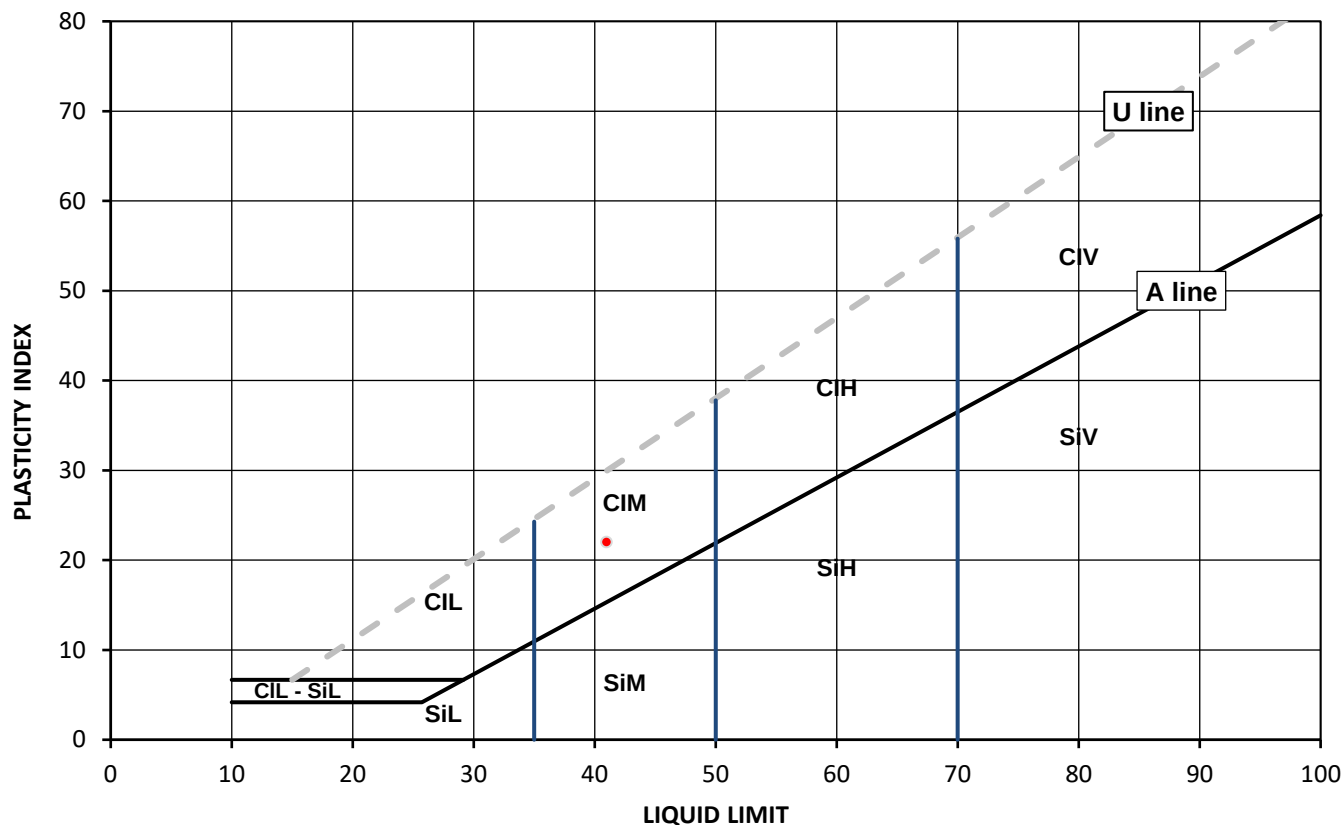
Test Results:

Laboratory Reference: 2796609
Hole No.: TP01
Sample Reference: TP010.553
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.55
Depth Base [m]: 0.60
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	41	19	22	83



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L Low	50 to 70
	M Medium	exceeding 70
	H High	
	V Very high	
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

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NN6 9PY

Contact: Admin
Site Address: Our Lady of Lourdes, Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

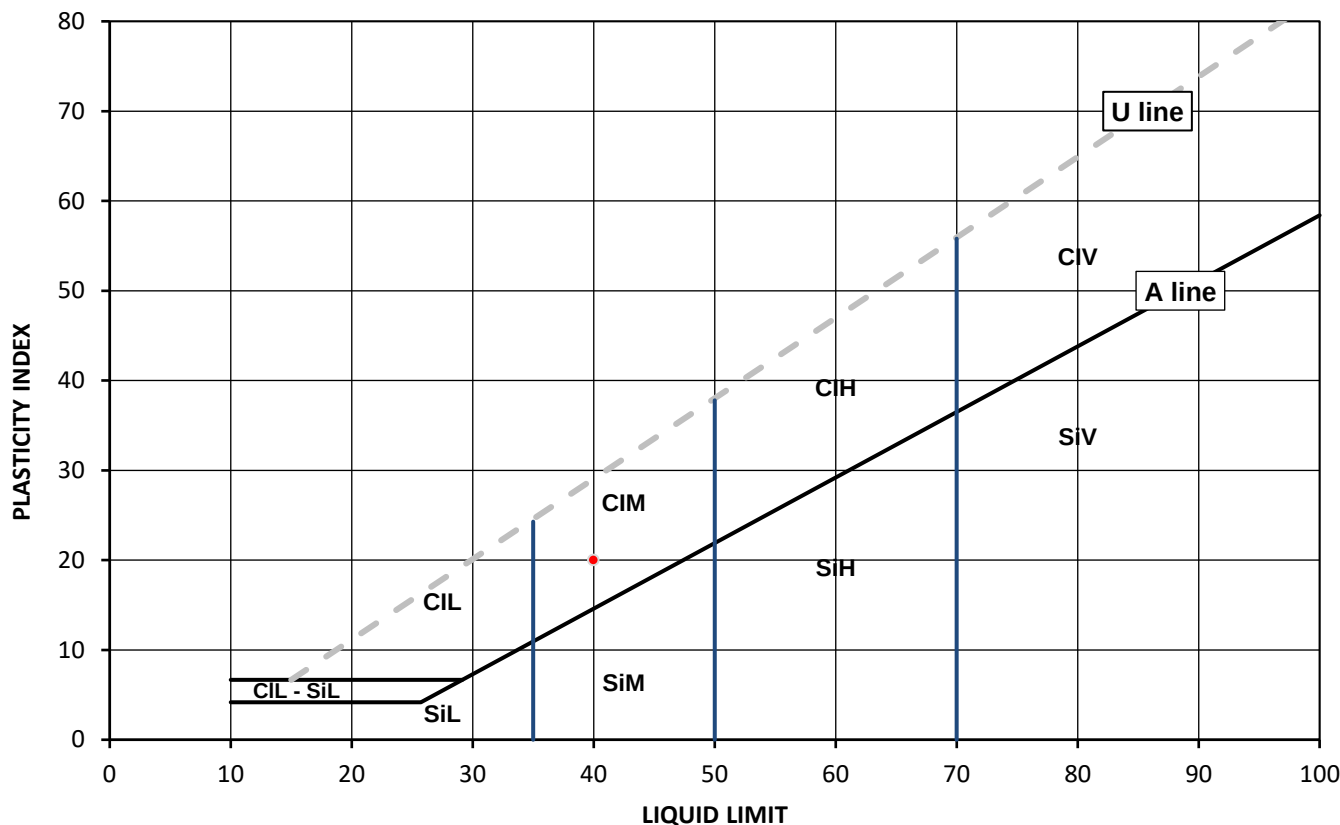
Test Results:

Laboratory Reference: 2796610
Hole No.: TP01
Sample Reference: TP010.704
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.70
Depth Base [m]: 0.80
Sample Type: D

Sample Preparation: Tested after washing to remove >425 µm

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
25	40	20	20	82



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Admin
Site Address: Our Lady of Lourdes, Bury

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

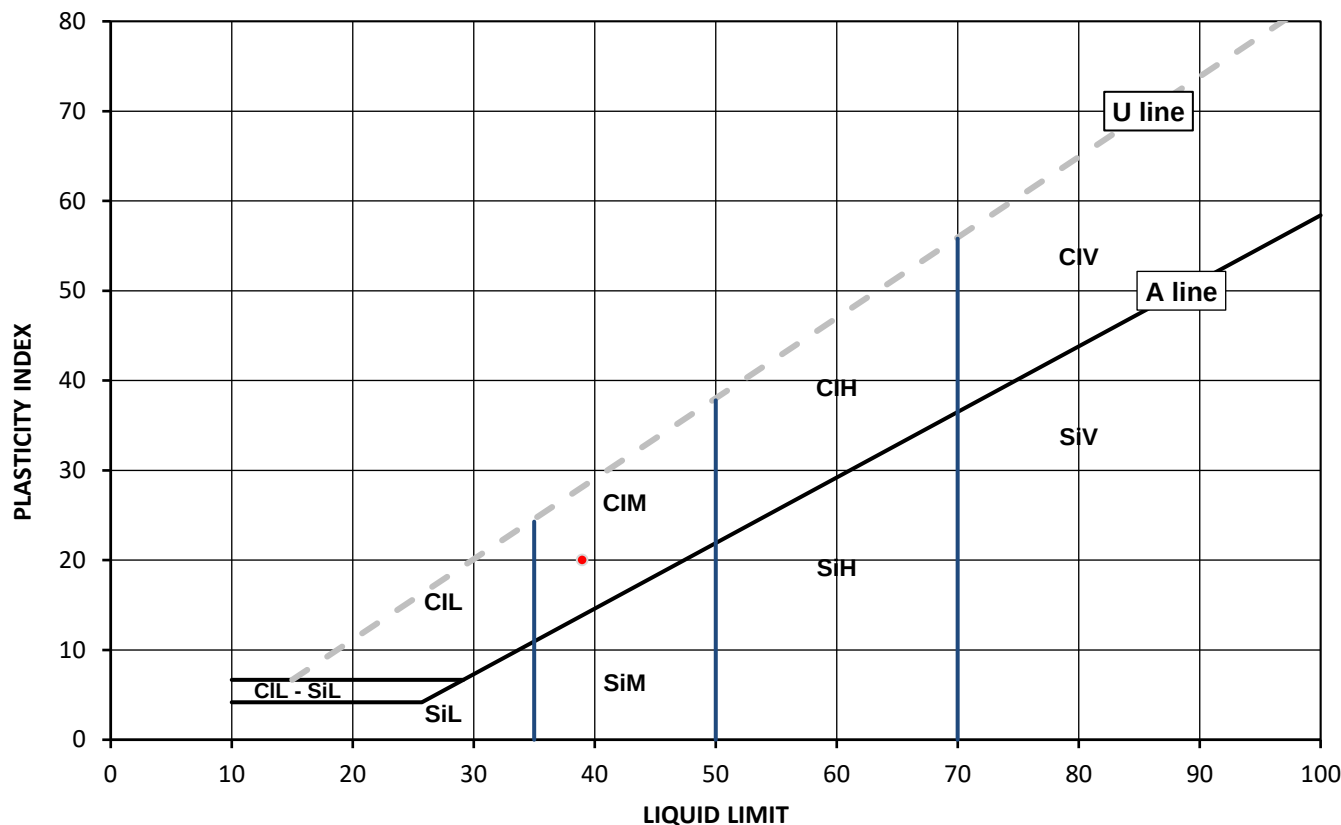
Test Results:

Laboratory Reference: 2796612
Hole No.: TP04
Sample Reference: TP040.502
Sample Description: Brown slightly gravelly sandy CLAY

Depth Top [m]: 0.50
Depth Base [m]: 0.60
Sample Type: D

Sample Preparation: Tested after >425 µm removed by hand

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
23	39	19	20	83



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	below 35
Si	Silt	35 to 50
	L	Low
	M	Medium
	H	High
	V	Very high
	O	Organic
		append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Katarzyna Koziel

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Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Admin
Site Address: Our Lady of Lourdes, Bury

Water Content by BS 1377-2:1990: Clause 3.2
Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5

Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
2796609	TP01	TP010.553	0.55	0.60	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	18		83	41	19	22						
2796610	TP01	TP010.704	0.70	0.80	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	25		82	40	20	20						
2796612	TP04	TP040.502	0.50	0.60	D	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	23		83	39	19	20						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Katarzyna
Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

4041

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Admin
Site Address: Our Lady of Lourdes, Bury

Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2796609	TP01	TP010.553	0.55	0.60	D	Brown slightly gravelly sandy CLAY		18	Sample was quartered, oven dried at 106.6 °C			
2796610	TP01	TP010.704	0.70	0.80	D	Brown slightly gravelly sandy CLAY		25	Sample was quartered, oven dried at 106.6 °C			
2796612	TP04	TP040.502	0.50	0.60	D	Brown slightly gravelly sandy CLAY		23	Sample was quartered, oven dried at 106.6 °C			

Comments:

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Signed:

Katarzyna Koziel

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd



4041

TEST CERTIFICATE**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Admin
Site Address: Our Lady of Lourdes, Bury

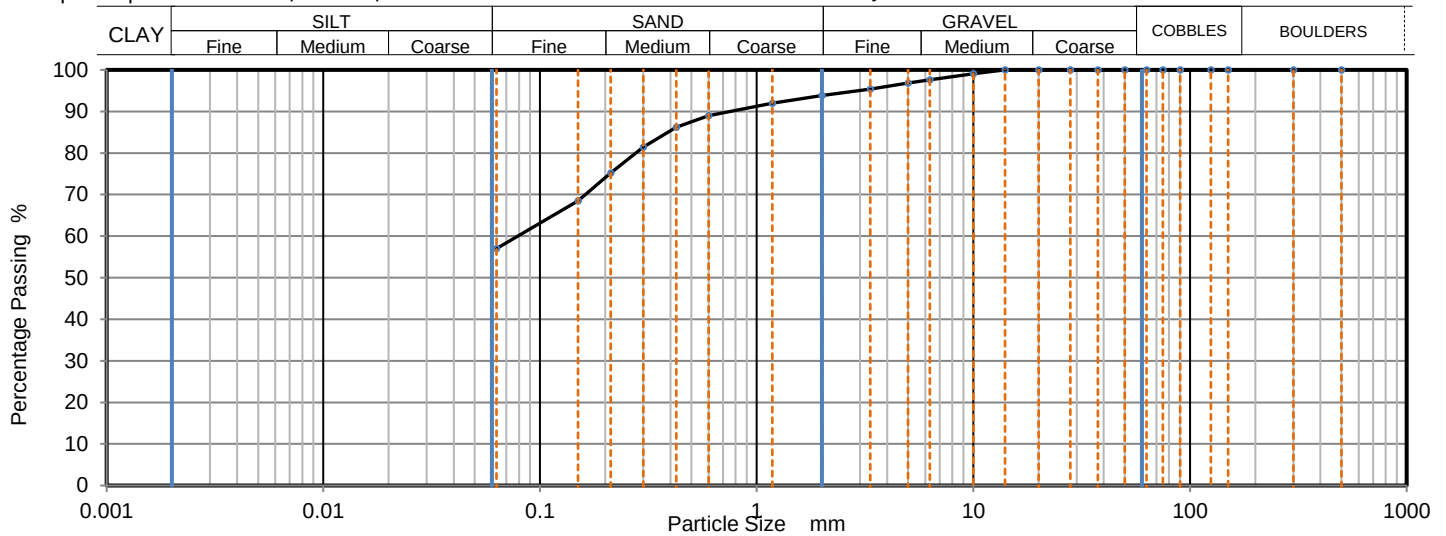
Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2796608
Hole No.: TP01
Sample Reference: TP010.402
Sample Description: Brown sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 107.4 °C and broken down by hand.

Depth Top [m]: 0.40
Depth Base [m]: 0.45
Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	98		
5	97		
3.35	95		
2	94		
1.18	92		
0.6	89		
0.425	86		
0.3	81		
0.212	75		
0.15	69		
0.063	57		

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	37
Fines <0.063mm	57

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	> 1.3
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:**Signed:**

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

TEST CERTIFICATE**DETERMINATION OF PARTICLE SIZE DISTRIBUTION**

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Environmental Science

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Admin
Site Address: Our Lady of Lourdes, Bury

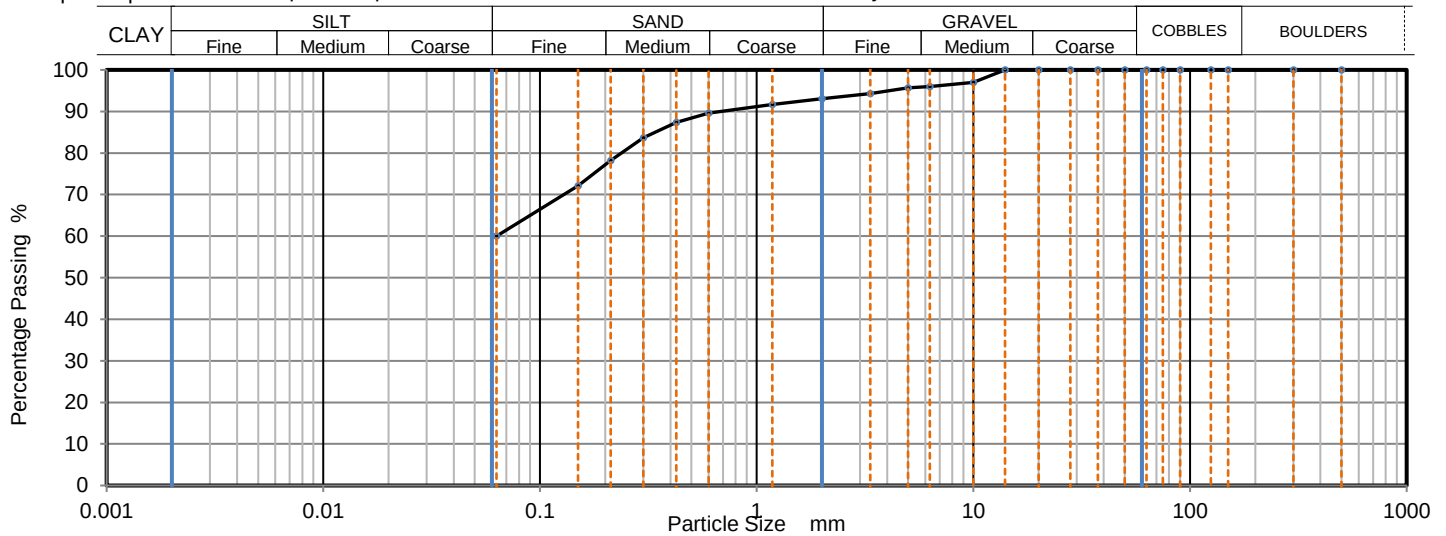
Client Reference: STV6181
Job Number: 23-53887-1
Date Sampled: 29/08/2023
Date Received: 31/08/2023
Date Tested: 11/09/2023
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 2796611
Hole No.: TP02
Sample Reference: TP020.401
Sample Description: Brown sandy CLAY
Sample Preparation: Sample was quartered, oven dried at 107.4 °C and broken down by hand.

Depth Top [m]: 0.40
Depth Base [m]: Not Given
Sample Type: D



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
150	100		
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	97		
6.3	96		
5	96		
3.35	94		
2	93		
1.18	92		
0.6	90		
0.425	87		
0.3	84		
0.212	78		
0.15	72		
0.063	61		

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	33
Fines <0.063mm	61

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	N/A
Curvature Coefficient	

Uniformity and Curvature Coefficient calculated in accordance with BS EN ISO 14688-2:2018

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:**Signed:**

Katarzyna Koziel
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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**Admin**

Soiltechnics Limited
Cedar Barn
White Lodge
Walgrave
Northampton
NN6 9PY

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

e: admin@soiltechnics.net

Analytical Report Number : 23-53890

Project / Site name:	Our Lady of Lourdes, Bury	Samples received on:	31/08/2023
Your job number:	STV6181	Samples instructed on/ Analysis started on:	31/08/2023
Your order number:	POR016316	Analysis completed by:	12/09/2023
Report Issue Number:	1	Report issued on:	12/09/2023
Samples Analysed:	4 soil samples		

Signed: _____

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-53890
 Project / Site name: Our Lady of Lourdes, Bury
 Your Order No: POR016316

Lab Sample Number				2796625	2796626	2796627	2796628
Sample Reference				TP01	TP01	TP04	TP04
Sample Number				TP010.201	TP010.704	TP040.301	TP040.502
Depth (m)				0.20	0.70-0.80	0.30	0.50-0.60
Date Sampled				29/08/2023	29/08/2023	29/08/2023	29/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.8	16	5.6	18
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	7.7	9.3	6.8
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0566	0.0192	0.137	0.0949
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	56.6	19.2	137	94.9
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	1.6	2.6	7	1.8
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	7	5.9	7.1	23
Magnesium (leachate equivalent)	mg/l	2.5	NONE	3.5	2.9	3.6	12

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-53890

Project / Site name: Our Lady of Lourdes, Bury

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2796625	TP01	TP010.201	0.2	Brown gravelly sand with clinker.
2796626	TP01	TP010.704	0.70-0.80	Brown clay.
2796627	TP04	TP040.301	0.3	Brown gravelly sand.
2796628	TP04	TP040.502	0.50-0.60	Brown clay.

Analytical Report Number : 23-53890

Project / Site name: Our Lady of Lourdes, Bury

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.