CCG-C-25-15322

GROUND INVESTIGATION REPORT FOR SITE AT

GLOVERS BROW, KIRKBY, L32 2AE

APRIL 2025

Prepared by:

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Signature	
	For and behalf of CC GEOTECHNICAL LTD
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1.0 INTRODUCTION

CC GEOTECHNICAL LTD (*CCG*) was commissioned by *ARCADIA MAINTENANCE LTD (The Client)* to carry out an intrusive ground investigation in connection with the proposed construction of a mixed use two-storey block, located off Glovers Brow, Kirkby L32 2AE.

It is understood that the proposed development is to comprise 3nr commercial units and a Bistro on the ground floor, and 7nr apartments on the 1st floor. Architectural plans are given in Appendix A.

This report should be read in conjunction with the Notes on Limitations, given in Appendix D.

2.0 SITE DATA

2.1 Site Location

The proposed development is to be located within a residential / high street setting, adjacent to rail sidings off Glovers Brow, Kirkby L32 2AE. A site location plan is shown on *CCG* Site Location Plan 15322-1 contained in Appendix A. 4.0

The Ordnance Survey coordinates for the approximate centre of the works area is 340330E, 399325N.

2.2 Documented Geology

The geology of the site was researched by reference to BGS records and may be summarised as hereunder:

Table 1: Documented Geology

Drift Deposits	Till, Devensian - Diamicton. Sedimentary superficial deposit formed during the Quaternary period.
Solid Geology	Wilmslow Sandstone Formation - Sandstone. Sedimentary bedrock formed during the Triassic period.

3.0 SCOPE OF THE INVESTIGATION

The fieldwork was planned and carried out in accordance with BS10175:2011+A2:2017 and BS5930:2015+A1:2020, insofar as they related to the scope of the investigation.

The investigation comprised the sinking of 6nr boreholes (WS1 to WS6) by light dynamic sampling methods, to depths of up to 6mbgl.

The locations of the boreholes are as annotated on *CCG* Drawing 15322-2 presented in Appendix A.

The borehole logs annotated with sampling details and insitu testing are given in Appendix B.

4.0 OBSERVED GROUND CONDITIONS

4.1 Stratigraphy

The observed stratigraphy is as summarised hereunder:

Table 2: Observed Stratigraphy

Description	Typical Base of stratum mbgl
Granular MADE GROUND deposits largely comprising brown very gravelly slightly silty SAND. Gravel includes brick, concrete, cinders, limestone and sandstone	Varying thicknesses from 0.7m (WS1) to 5.2mbgl (WS5)
Firm slightly gravelly slightly sandy silty CLAY	Present at shallow depth in WS1 and WS2 Absent or at depth in remaining boreholes
Weathered SANDSTONE	Proven to 6.0mbgl

4.2 Groundwater

Groundwater was not recorded during the borehole sinking.

5.0 SOIL GEOTECHNICAL TESTING

The following programme of geotechnical testing was undertaken at the UKAS accredited laboratory of *CCG:*

- Determination of Liquid & Plastic Limits in accordance with BS 1377: Part 2: 1990
- Analyse soils for pH and water-soluble sulphate content

The results of the soil classification testing are presented in Appendix C.

6.1 Foundation Recommendations

6.1.1 Proposed Development

It is understood that the proposed development is to comprise a two-storey mixed use (commercial / residential) block. Architectural plans are given in Appendix A. The precise location within site has not been advised.

Based on the observed ground conditions, that show thick made ground deposits extending to 5.2mbgl, it is recommended that a piled foundation solution be adopted.

6.1.2 Foundations

The ground investigation has shown the site to be underlain by a varying thickness of made ground comprising of gravels of brick, concrete, sandstone,

ceramics, cinders, plastics in a matrix of sand. These deposits vary in thickness from 0.75m in the northern part of the site (WS1) to 5.3m in the southern part (WS4, WS5, WS6). In the central part of the site as represented by WS2 and WS3, these deposits are up to 4.4m deep.

Sandstone bedrock was encountered in all boreholes – at 2.4mbgl in the northern part of the site deepening to 5.5mbgl in the southern part.

In these conditions, a piled foundation is recommended. It is recommended that steel cased bottom driven cast in-situ displacement piles be the adopted pile solution with piles being driven to `set` calculated to conform to the engineer`s specified loadings. Piles would carry a notional 500mm x 450mm reinforced concrete ground beam.

For the purposes of preliminary design, the structural carrying capacity of bottom driven piles may be taken as:

Table 2: Pile Carrying Capacity

Pile Diameter (mm)	SWL (kN)
150	130
220	240

Piling contractors must be required to confirm these estimates and/or provide estimates for their own proposed piles, in isolation and in groups as required by the design layout.

6.1.3 Ground Slabs

A fully suspended beam and block ground floor must be adopted.

6.2 Groundwater Management

Whilst groundwater was not encountered in the investigation, seasonal and weather variations may influence the ground conditions, and prudent contractors would allow for some pumping to develop and maintain dry working conditions.

6.3 Excavations

Excavations may be undertaken by light hydraulic excavators. However, side support will be required for excavations in excess of 1.2mbgl.

6.4 Concrete Specification

The data obtained in the investigations was assessed against the guidance given in BRE Special Digest 1: 2005, as summarised hereunder:

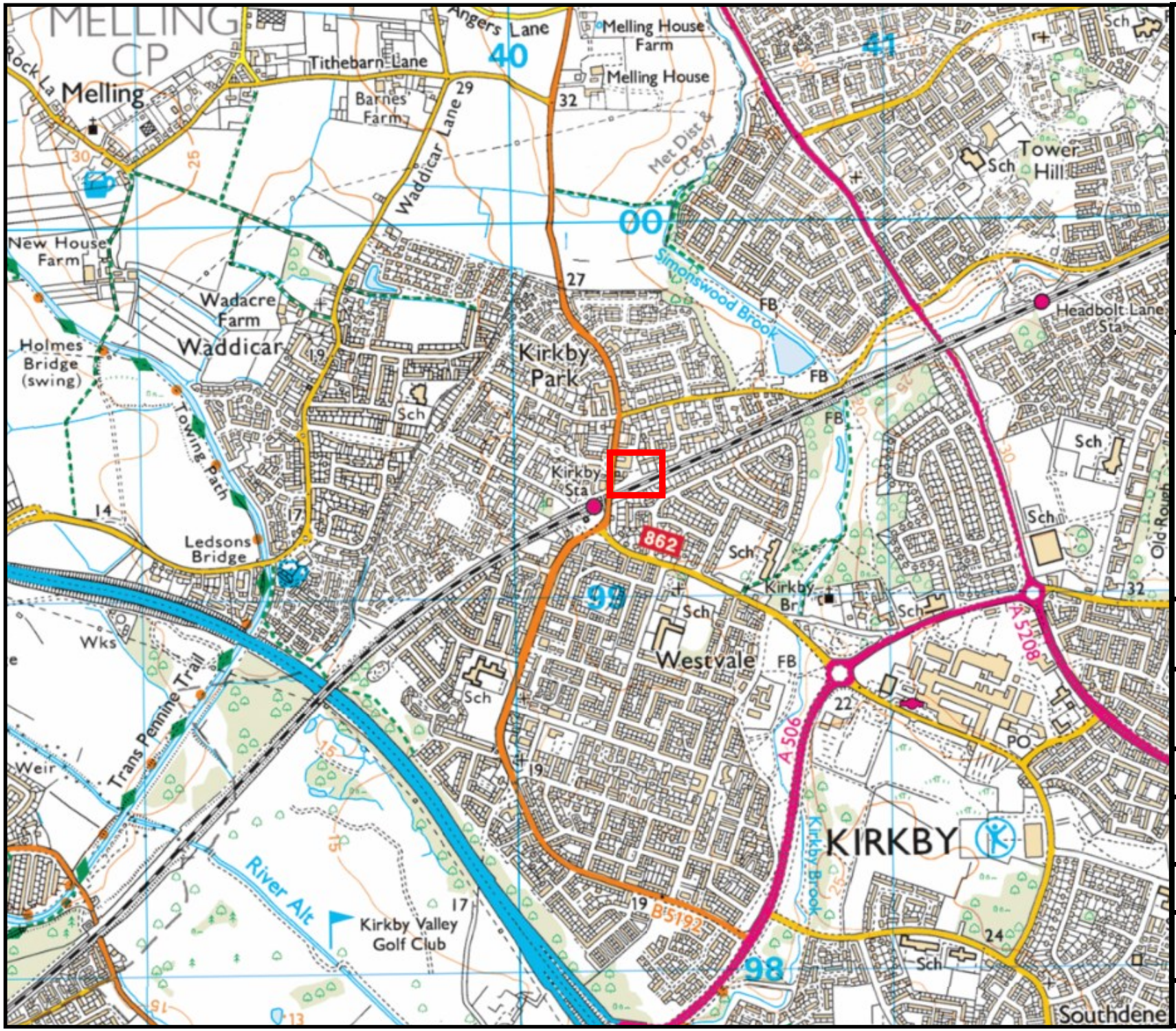
Table 3: Concrete Specification

Site Context	Brownfield
Water Table	Mobile
Highest Water-Soluble Sulphate Result mg/kg	1100mg/l
Lowest pH result	7.7
Intended Working Life	100 years

Based on the above, concrete in contact with the ground should be specified on a Sulphate Class of DS-2, an ACEC Class of AC-1s, and a Design Chemical Classification of DC-1.

APPENDIX A

DRAWINGS



CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
Arcadia

Project:
Glovers Brow, Kirkby

Title:
Site Location Plan

Scale:	Issue:
NTS	1
Drawn by:	Date:
DO	14/04/25
Project No.	Drawing No.
CCG-C-25-15322	15322-1

CC GEOTECHNICAL LIMITED

Notes:

Approx. Site boundary

Dynamic Sample Borehole (WS1-WS6)

CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

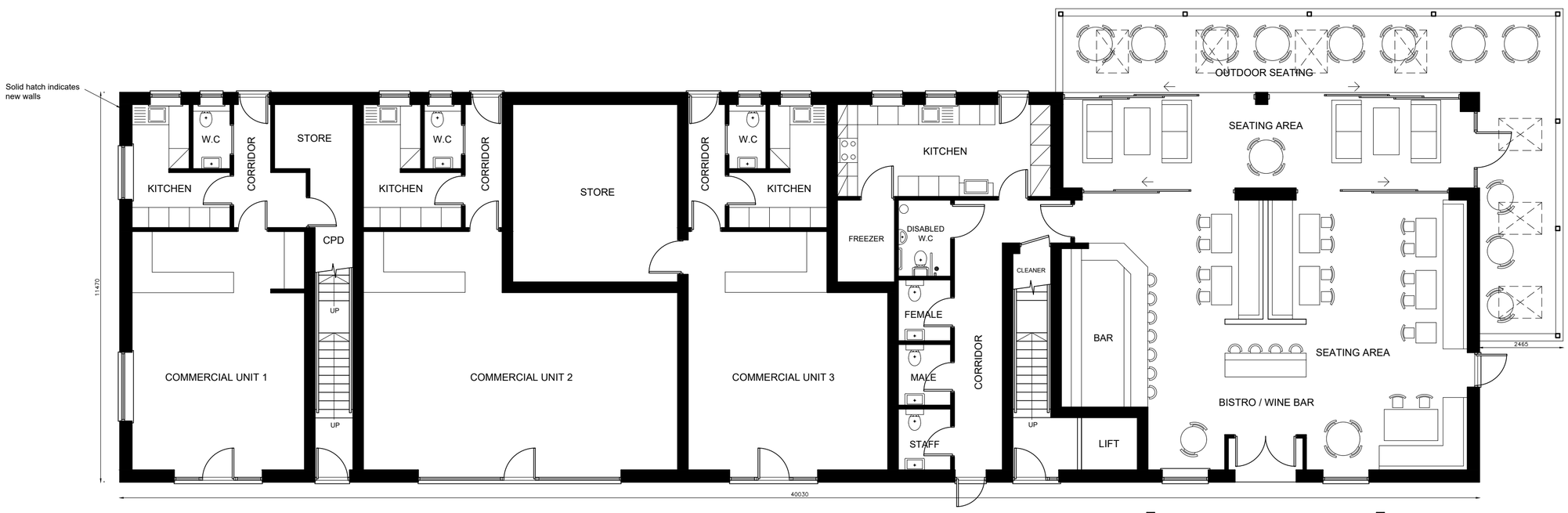
Client:
Arcadia

Project:
Glovers Brow, Kirkby

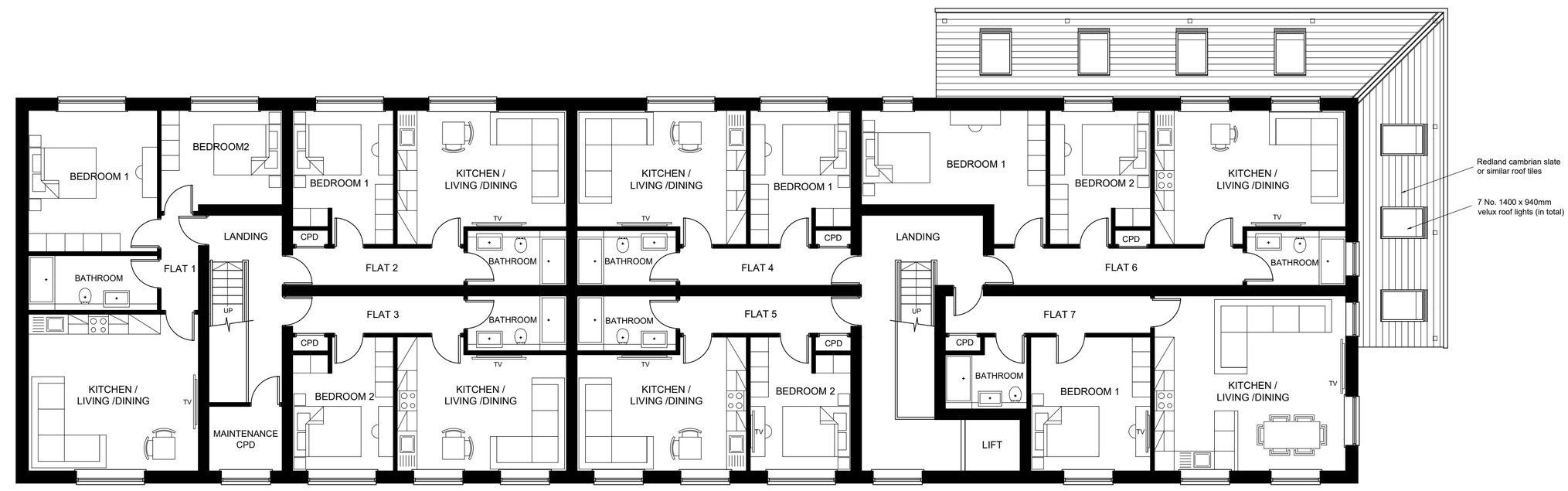
Title:
Site Investigation Plan

Scale:	Issue:
NTS	1
Drawn by:	Date:
DO	14/04/25
Project No.	Drawing No.
CCG-C-25-15322	15322-2

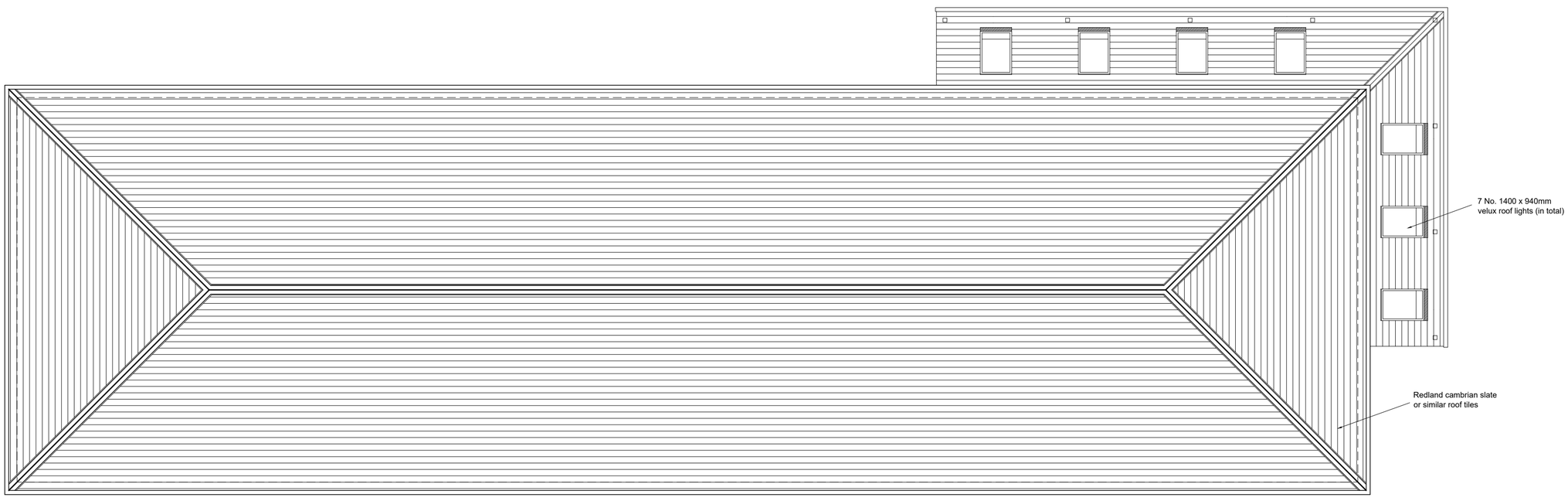
CC GEOTECHNICAL LIMITED



GROUND FLOOR PLAN



FIRST FLOOR PLAN



ROOF COVER PLAN

1:100 scale bar 0 1 2 3 4 5metres

PROPOSED PLANS

RJG
Architecture LTD
For All Your Architectural Design Requirements

Tel : 01744 419419
e-mail:- info@rjgarchitecture.co.uk

Project: Glovers Brow Development, Kirkby, Liverpool

Dwg Title: Proposed Plans

Dwg No: 01823/PRE/01

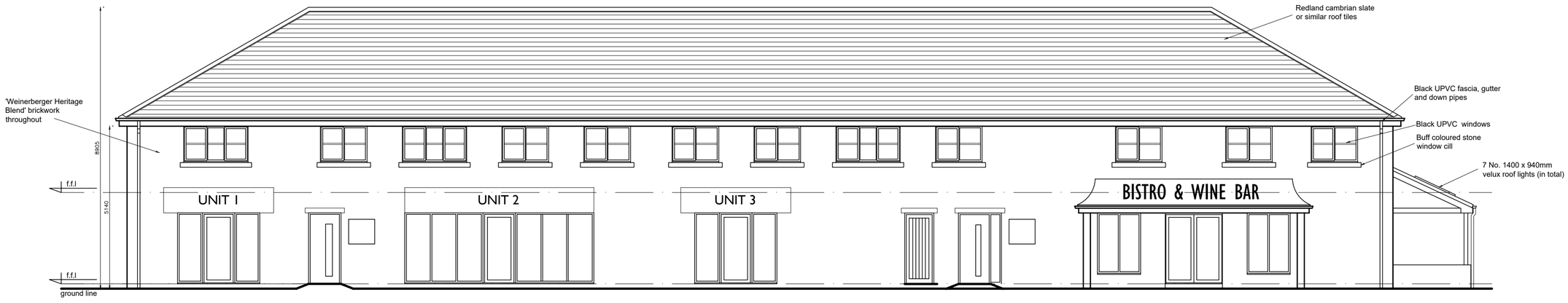
Rev:

1. Figured dimensions to be followed in preference to scale.
2. All dimensions to be checked on site.
3. This drawing remains the copyright of the architect and may not be copied without prior consent.

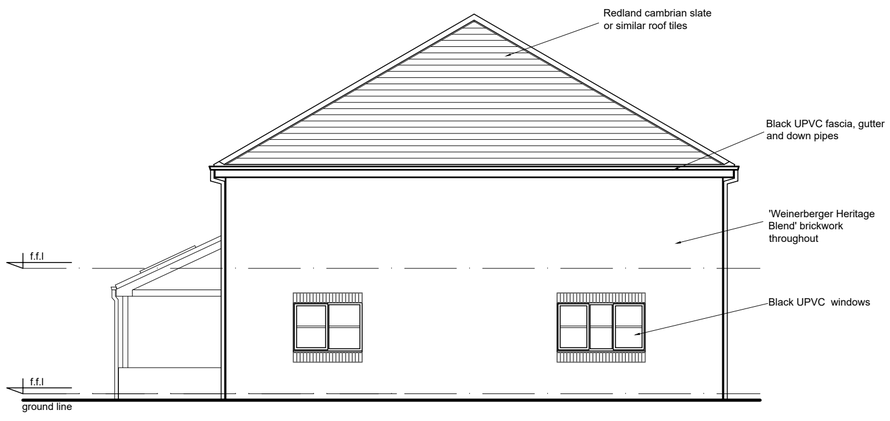
Drawn by: L.J

Scale @A1: 1:100

Date: Dec.'24



FRONT ELEVATION



LEFT SIDE ELEVATION

RIGHT SIDE ELEVATION

1:100 scale bar 0 1 2 3 4 5metres

PROPOSED ELEVATIONS

RJG
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For All Your Architectural Design Requirements
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Project
Glovers Brow Development
Kirkby
Liverpool

Dwg Title
Proposed Elevations

Dwg No 01823/PRE/02

Rev

1. Figured dimensions to be followed in preference to scale.
2. All dimensions to be checked on site.
3. This drawing remains the copyright of the architect and may not be copied without prior consent.

Drawn by L.J

Scale @A1 1:100

Date Dec.'24

APPENDIX B

BOREHOLE LOGS

Contract Name: Glover's Brow, Kirkby		Client: Arcadia		Borehole ID: **WS1**
Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig — Rig Crew: AR/CMC — Scale: 1:50
Weather: Dry	Termination: Refusal on rockhead		SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.30	B			(0.40) 0.40		Dark brown very sandy GRAVEL. Medium cobble content. Gravel and cobbles are sub-angular brick and concrete (MADE GROUND)		
0.60	B			(0.35) 0.75		Brownish grey very gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular concrete and sandstone (MADE GROUND)		
0.90	B			(0.35) 1.10		Brown silty gravelly fine to medium grained SAND. Gravel is fine to coarse sub-rounded sandstone		
1.00 - 2.00	U	SPT(S)N=4 (1,2/1,1,1,1) HVP=60 HVP=60		(1.10)		Soft becoming firm brown slightly sandy slightly gravelly silty CLAY		
2.00 - 2.60	U	SPT(S)N=41 (4,5/8,10,10,13)		2.20 (0.40) 2.60		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
		SPT(S)50 (25 for 50mm/50 for 100mm)				End of Borehole at 2.60m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dry

	Contract Name: Glover's Brow, Kirkby		Client: Arcadia		Borehole ID: **WS2**
	Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMC — Scale: 1:50
Weather: Dry	Termination: Refusal on rockhead			SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.30	B			(0.50)		Dark brown very gravelly silty SAND. Gravel is fine to coarse sub-angular brick, concrete and sandstone (MADE GROUND)		
				0.50				
0.80	B			(0.75)		Dark brown very clayey gravelly SAND. Gravel is fine to medium sub-angular brick and sandstone (MADE GROUND)		
1.00 - 2.00	U							
		SPT(S)N=8 (1,2/2,2,2,2)		1.25				
		HVP=40				Soft becoming firm brown sandy slightly gravelly silty CLAY with frequent pockets of sand. Gravel is fine to coarse sub-angular to sub-rounded sandstone		
2.00 - 3.00	U	SPT(S)N=10 (1,1/2,3,2,3)						
		HVP=50		(3.05)				
3.00 - 4.00	U	SPT(S)N=10 (2,2/2,3,2,3)						
		HVP=60						
4.00 - 4.40	U	SPT(S)50 (4,7/50 for 95mm)						
				4.30				
				4.40		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
						End of Borehole at 4.40m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dry

CCG	Contract Name: Glover's Brow, Kirkby		Client: Arcadia		Borehole ID: **WS3**
	Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMC — Scale: 1:50
Weather: Dry	Termination: Refusal on rockhead		SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.40	B			(0.60)		Dark brown very gravelly silty SAND. Gravel is fine to coarse sub-angular brick, sandstone and concrete (MADE GROUND)		
0.90	B			0.60		Dark brown very gravelly silty SAND. Gravel is fine to coarse sub-angular brick, sandstone and ceramic (MADE GROUND)		
1.00 - 2.00	U	SPT(S)N=7 (1,1/2,1,2,2)		(1.65)				
2.00 - 3.00	U	SPT(S)N=11 (2,2/2,3,3,3)		2.25		Dark brown very sandy silty GRAVEL with occasional pockets of clay. Gravel is fine to coarse sub-angular concrete, brick and slag (MADE GROUND)		
3.00 - 4.00	U	SPT(S)N=12 (1,3/3,3,3,3)		(2.15)				
4.00 - 4.60	U	SPT(S)N=19 (2,4/4,4,5,6)		4.40		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
		SPT(S)50 (25 for 65mm/50 for 105mm)		4.60		End of Borehole at 4.60m		

1 2 3 4 5 6 7 8 9 10

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dr

CCG	Contract Name: Glover's Brow, Kirkby		Client: Arcadia		Borehole ID: **WS4**
	Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT
					Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMC
					Scale: 1:50

Weather: Dry | Termination: Refusal on rockhead | SPT Hammer: N/R, Energy Ratio: N/R

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.30	B			(1.15)		Dark brown silty gravelly SAND. Gravel is fine to coarse sub-angular ceramics and sandstone with inclusions of plastic (MADE GROUND)		
0.90	B							
1.00 - 2.00	U	SPT(S)N=5 (1,1/2,1,1,1)		1.15				
				(0.95)		Loose dark brown very sandy silty GRAVEL. Gravel is fine to coarse sub-angular brick and sandstone (MADE GROUND)		
2.00 - 3.00	U	SPT(S)N=6 (1,2/1,2,1,2)		2.10				
				(1.40)		Loose dark brown very sandy silty GRAVEL. Gravel is fine to coarse sub-angular brick, concrete, cinders and coal (MADE GROUND)		
3.00 - 4.00	U	SPT(S)N=8 (1,1/2,2,2,2)		3.50				
		HVP=40				Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-rounded sandstone		
4.00 - 5.00	U	SPT(S)N=11 (2,2/3,2,3,3)						
		HVP=40		(1.90)				
		HVP=60						
5.00 - 5.60	U	SPT(S)N=22 (2,3/4,4,6,8)						
				5.40				
		SPT(S)50 (25 for 55mm/50 for 105mm)		5.60		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
						End of Borehole at 5.60m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dry

Contract Name: Glover's Brow, Kirkby		Client: Arcadia		Borehole ID: **WS5**
Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT — Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig — Rig Crew: AR/CMC — Scale: 1:50
Weather: Dry	Termination: Refusal on rockhead		SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.40	B			(1.20)		Dark brown very gravelly silty SAND. Gravel is fine to coarse sub-angular sandstone and ceramic with inclusions of plastic (MADE GROUND)		
0.90	B							
1.00 - 2.00	U	SPT(S)N=7 (2,1/2,1,2,2)		1.20		Brown silty sandy GRAVEL with occasional pockets of clay. Gravel is fine to coarse sub-angular brick, concrete and sandstone (MADE GROUND)		
2.00 - 3.00	U	SPT(S)N=8 (2,1/2,2,2,2)						
3.00 - 4.00	U	SPT(S)N=10 (2,2/3,2,3,2)		(4.05)				
4.00 - 5.00	U	SPT(S)N=12 (1,3/2,4,3,3)						
5.00 - 5.60	U	SPT(S)N=13 (3,3/4,3,3,3)						
		SPT(S)50 (16,9/50 for 95mm)		5.25 (0.35) 5.60		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone. End of Borehole at 5.60m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Chiselling				Installation			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dry

Contract Name: Glover's Brow, Kirkby			Client: Arcadia		Borehole ID: **WS6**
Contract Number: CCG-C-25-15322	Date Started: 28/03/2025	Logged By: DO	Checked By: CB	Status: DRAFT	Sheet 1 of 1
Dynamic Sampling Borehole Log	Easting:	Northing:	Ground Level:	Plant Used: Dando Terrier Rig	Rig Crew: AR/CMC	Scale: 1:50
Weather: Dry	Termination: Refusal on rockhead			SPT Hammer: N/R, Energy Ratio: N/R	

Samples & In Situ Testing			Strata Details				Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
				0.60 (0.60)		Dark brown very sandy GRAVEL. Gravel is fine to coarse sub-angular brick, concrete, sandstone and ceramic (MADE GROUND)		
0.30	B			1.20 (0.60)		Dark brown very gravelly silty SAND. Gravel is fine to coarse sub-angular brick and sandstone with inclusions of plastic (MADE GROUND)		
0.80	B							
1.00 - 2.00	U	SPT(S)N=8 (2,1/2,2,2,2)						
				2.40 (1.20)		Brown very sandy GRAVEL. Gravel is fine to coarse sub-angular brick, sandstone and cinders (MADE GROUND)		
2.00 - 3.00	U	SPT(S)N=10 (1,2/3,2,2,3)						
				3.40 (1.00)		Brown slightly sandy slightly gravelly silty CLAY with frequent pockets of sandy gravel. Gravel is fine to coarse sub-angular brick and sandstone (MADE GROUND)		
3.00 - 4.00	U	SPT(S)N=13 (1,3/3,3,4,3)						
				4.60 (1.20)		Brown very sandy silty GRAVEL with frequent pockets of clay. Gravel is fine to coarse sub-angular brick, sandstone and cinders (MADE GROUND)		
4.00 - 5.00	U	SPT(S)N=12 (2,3/3,3,3,3)						
				5.00 (0.40)		Black gravelly SAND. Gravel is fine to medium sub-angular to sub-rounded cinders and coal (MADE GROUND)		
5.00 - 6.00	U	SPT(S)N=15 (3,4/3,4,4,4)		5.30 (0.30)		Dark brown sandy GRAVEL. Gravel is fine to medium sub-angular brick and sandstone (MADE GROUND)		
		HVP=50		5.50		Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-rounded sandstone		
				6.00 (0.50)		Weathered SANDSTONE, recovered as reddish brown gravelly slightly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone		
		SPT(S)50 (25 for 140mm/50 for 125mm)				End of Borehole at 6.00m		

Start & End of Shift Observations					Borehole Diameter		Casing Diameter	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)

Remarks:
1 hour hand excavating 1.20mbgl service avoidance pit

Chiselling			
From (m)	To (m)	Duration	Remarks

Installation			
Top (m)	Base (m)	Type	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
			0		Dry

APPENDIX C

SOIL LABORATORY TEST DATA

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CC GEOTECHNICAL LTD
Consulting Geoenvironmental and Geotechnical Engineers

LABORATORY REPORT

CONTRACT NUMBER: CCG-C-25-15322

CONTRACT TITLE: GLOVERS BROW, KIRKBY

CLIENT: ARCADIA

DATE RECEIVED: 31/03/25
DATE COMMENCED: 31/03/25
DATE COMPLETED: 03/04/25
REPORT DATE: 03/04/25

Test Description	Qty
Determination of Moisture Content BS 1377-2:1990 (a)	3
Determination of Liquid & Plastic Limits BS 1377-2:1990 (a)	3

Notes: Observations and interpretations are not accredited by UKAS
All testing undertaken at laboratory permanent facilities
# denotes non-accredited test
a denotes UKAS accredited test
s denotes test undertaken by approved subcontractor
Test results only relate to the samples tested

Approved Signatories: Chris Bolan (Managing Director) – Daniel Kerfoot (Laboratory Manager)

SUMMARY OF LABORATORY SOIL TEST RESULTS

BH / TP / WS Number	Sample Type	Depth From (m)	Depth To (m)	Moisture Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Shear Strength (kN/m²)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Soil Classification	UKAS accredited test (Y/N)	Description / Test Method Samples described in accordance with BS EN ISO 14688-2 2004
WS1	WS	1.50	1.50	19	-	-	-	32	16	16	88	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
WS2	WS	1.80	1.80	18	-	-	-	26	15	11	71	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)
WS4	WS	3.60	3.60	19	-	-	-	30	15	15	86	CL	Y	Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium subrounded sandstone. (BS1377Pt2:3.2,4.4,5)

SITE: GLOVERS BROW, KIRKBY (CCG-C-25-15322) DATE: 03.04.25

CLIENT: ARCADIA

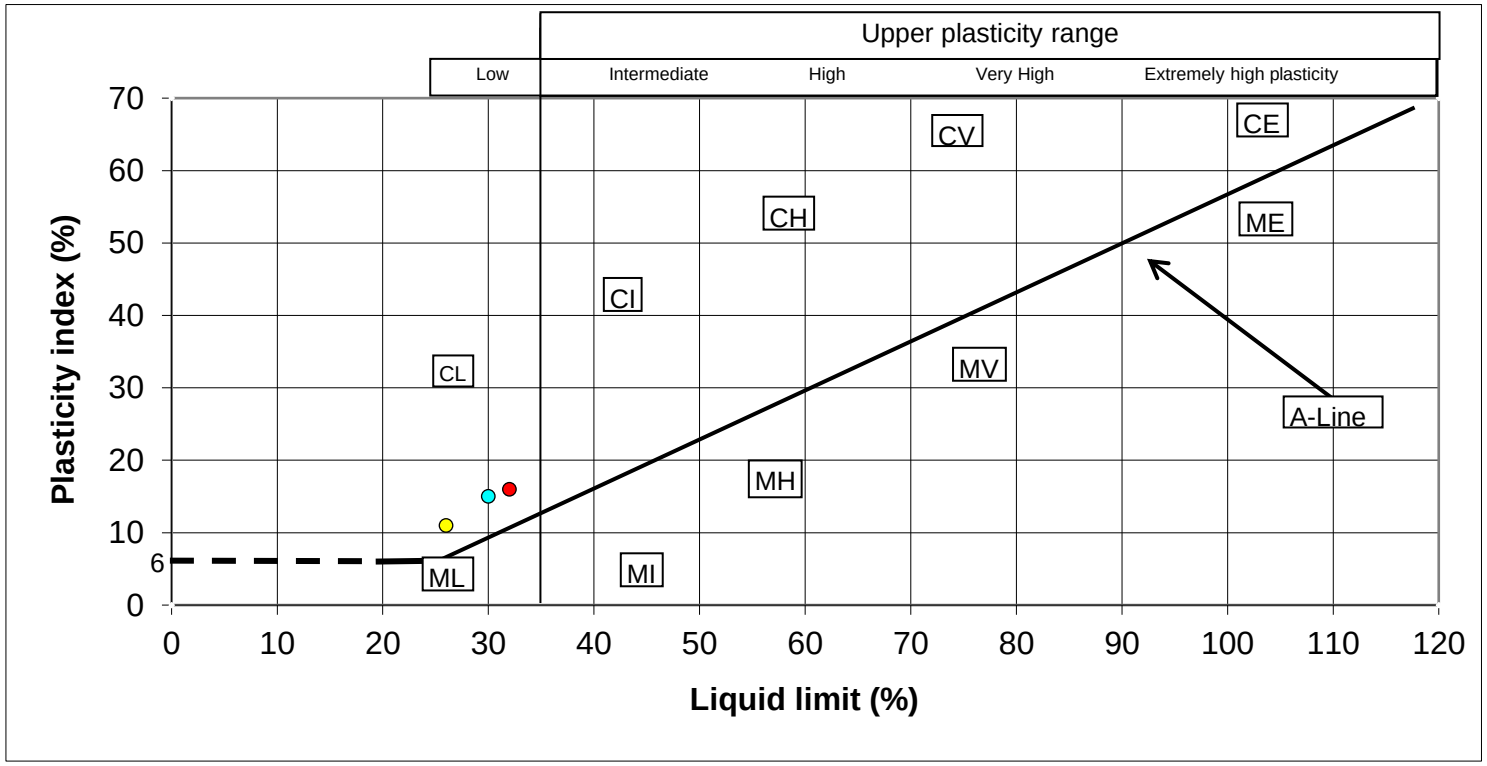
UKAS TESTING 4514

Key:- BD = Bulk Disturbed; SD = Small Disturbed; U100 = Undisturbed 100mm; WS = Window Sample
CL = Low Plasticity; CI = Intermediate; CH = High; CV = Very high; CE = Extremely high; NP = Non-plastic
(* Denotes Hand Shear Vane test result)
Sample description not accredited by UKAS

ATTERBERG TEST RESULT SHEET

BS 1377:Part 2:1990:cl 4.4,5

SILT (M-SOIL), M plots below A-Line , CLAY,C, plots above A-Line, M and C may be combined as FINE SOIL, F.



BH	Sample Depth	Liquid limit	Plasticity index
WS1	1.50	32.0	16.0
WS2	1.80	26.0	11.0
WS4	3.60	30.0	15.0

UKAS TESTING
4514

APPROVED BY	DK

CLIENT: ARCADIA	SITE: GLOVERS BROW, KIRKBY (CCG-C-25-15322)

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Analytical Report Number : 25-016399

Project / Site name:	Glovers Brow, Kirkby	**Samples received on:**	01/04/2025
Your job number:	25 15322	**Samples instructed on/ Analysis started on:**	01/04/2025
Your order number:	25 15322	**Analysis completed by:**	07/04/2025
Report Issue Number:	1	**Report issued on:**	07/04/2025
Samples Analysed:	4 soil samples		

Signed:

Rachel Chappell
Key Account Manager
For & on behalf of i2 Analytical Ltd.

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

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

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

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting
air	- once the analysis is complete

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Retention period for records and reports is minimum 6 years from the date of issue of the final report.
Some records may be kept for longer according to other legal/best practice requirements.

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: 25-016399
Project / Site name: Glovers Brow, Kirkby
Your Order No: 25 15322

Lab Sample Number				500519	500520	500521	500522
Sample Reference				WS1	WS2	WS4	WS6
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Water Matrix				N/A	N/A	N/A	N/A
Depth (m)				1.40	2.60	0.90	1.60
Date Sampled				31/03/2025	31/03/2025	31/03/2025	31/03/2025
Time Taken				1600	1600	1600	1600
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	39.1
Moisture Content	%	0.01	NONE	15	18	18	12
Total mass of sample received	kg	0.1	NONE	0.5	0.5	0.5	0.5
General Inorganics							
pH (L099)	pH Units	N/A	MCERTS	8.3	8	7.7	9.4
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	64	800	2200	310
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	32.1	401	1100	153

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

Analytical Report Number : 25-016399
Project / Site name: Glovers Brow, Kirkby

* 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 *
500519	WS1	None Supplied	1.4	Brown clay with gravel
500520	WS2	None Supplied	2.6	Brown clay and sand with gravel
500521	WS4	None Supplied	0.9	Brown loam and sand with gravel and vegetation
500522	WS6	None Supplied	1.6	Brown loam and sand with gravel and stones

Analytical Report Number : 25-016399
Project / Site name: Glovers Brow, Kirkby

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters Heating/Cooling (PrW) DI Process Water (DI PrW)
Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
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.	L019B	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
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
Soil Descriptions	Textural classification	In-house method	L019B	W	NONE

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.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

APPENDIX D

NOTES ON LIMITATIONS

`Notes on Limitations
For
Geoenvironmental and Geotechnical Consultancy Services

General

This document has been prepared by CC GEOTECHNICAL LTD within the terms of the contract, scope of work, and resources agreed in writing with the client. The limitations of liability of CC GEOTECHNICAL LTD for the contents of this document have been agreed with the Client, as set out in the terms and conditions of offer and related contract documentation.

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The findings and opinions provided in this document are made in good faith and are subject to the limitations imposed by employing site assessment methods and techniques, appropriate to the time of investigation and within the limitations and constraints defined in this document.

The findings and opinions are relevant to the dates when the assessment was undertaken, but should not necessarily be relied upon to represent conditions at a substantially later date. In particular, seasonal groundwater levels, with the effects of precipitation, may affect the conditions found during the investigation. The report should be read in conjunction with the further Notes on Limitations included in Appendix A.

Where opinions expressed in this report are based on current available guidance and legislation, no liability can be accepted by CC GEOTECHNICAL LTD for the effects of any future changes to such guidelines and legislation. Additional information, improved practices, new guidance, changes in legislation, or amendments to design proposals, may necessitate this report having to be reviewed in whole or in part after that date. Opinions and interpretations are not accredited by UKAS.

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Phase I Environmental Audits / Desk Studies

The work undertaken to provide the basis of a Phase 1 Desk Study report comprises 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 a Desk Study report have been dictated by 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 the report, CC GEOTECHNICAL LTD reserves the right to review such information and to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Factual Ground Investigations

The investigation of the site has been carried out in accordance with the scope and specification instructed by the Client. No interpretations of the data generated by the investigation have been provided or implied. The exploratory holes undertaken in this commission, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of site conditions. Conditions may exist on the site which have not been detected by the works undertaken. Furthermore, the number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” or more widespread contamination where concentrations may be significantly higher than those actually encountered.

Interpretative Phase II Environmental Audits

The investigation of the site has been carried out with the intention of providing sufficient information concerning the type and degree of contamination, and 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 to potential human targets, building materials, the environment (including adjacent land), and surface and groundwater.

The amount of exploratory work and chemical testing undertaken may have been restricted by factors including inter alia the Clients budget, the available timescale, access to all parts of the site, the existence of buried services etc., and where this is the case, a more comprehensive investigation may be required if the site is to be redeveloped, since a number of important engineering and environmental issues may need further assessment.

For those reasons, if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

It must be borne in mind, that the exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and 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 of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” or more widespread contamination where concentrations may be significantly higher than those actually encountered. The findings of the investigation are valid for the time of investigation and the passage of time may result in changes to the contamination status of the site, and a reassessment of the site may be required where significant time has elapsed.

Geoenvironmental Ground Investigations

The investigation of the site has been carried out within the constraints of Client budget, available timeframe, access to all parts of the site, the existence of buried services and a more comprehensive investigation may be required to provide sufficient information regarding the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions, to formulate a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to the site remediation, these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, investigate only a small volume of the ground in relation to the size of the site, and can only provide a general indication of the site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions present on the site which have not been disclosed by this investigation, and which have therefore not been taken into account in this report. The findings of the investigation are valid for the time of investigation and the passage of time may result in changes to the contamination status of the site, and a reassessment of the site may be required where significant time has elapsed.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal, weather, or other effects.

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