

Slope Stability Assessment of a Proposed Development Adjacent to a Rail Track

91 Buckingham Road, Manchester

Mr D Campbell

M25-066

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SLOPE STABILITY ASSESSMENT OF A PROPOSED DEVELOPMENT
ADJACENT TO A RAIL TRACK

91 BUCKINGHAM ROAD, MANCHESTER

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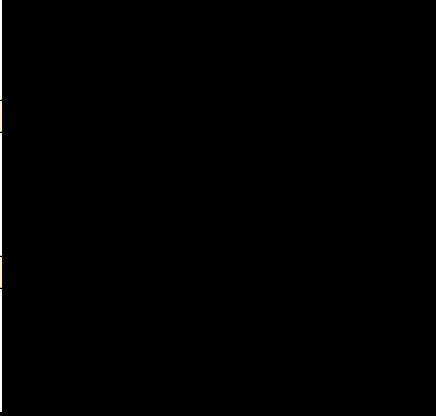
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Revision	Date	Prepared By	Signed
Final	December 2025	R Izatt-Lowry Consultant	
		Checked By	
		L Richards Associate Director	
		Approved By	
		R Woods Managing Director	

1 INTRODUCTION

1.1 Authorisation

The site investigation and slope stability assessment presented in this report was carried out by Solmek to the instructions of Mr D Campbell, on land at 91 Buckingham Road, Manchester M21 0QG, as shown in Figure 1.

1.2 Scope of Works

The site is to be developed with a garden office structure, as shown in Drawing Campbell-04-Rev A, Appendix A, which is to be constructed at the top of a slope ~15m to the east of a rail track on Metrolink land.

Solmek have been commissioned to undertake a window sample borehole, at the proposed location of the garden office structure and to undertake a slope stability assessment, to evaluate the impact of development loadings on the slope adjacent to the Metrolink rail track.

The geotechnical investigation was generally carried out according to;

- BS 5930:2015+A1:2020 Code of Practice for Ground Investigations
- Rock and soil descriptions shall be in accordance with BS EN ISO 14689-1:2003, BS EN ISO 14688-1:2002 and BS EN ISO 14688-2:2004

The information provided in this report is based on the investigation fieldwork and is subject to the comments and approval of the various regulatory authorities. There may be other conditions prevailing on the site which have not been disclosed by this investigation, and which have not been taken into account by this report. Solmek reserve the right to alter conclusions and recommendations should further information be available or provided. Any schematic representation or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

1.3 Sources of Information

The following sources of information were considered in preparing this report:

- Development Layout Drawing Campbell-04-Rev A, Appendix A.
- Development loadings (email from Mr D Campbell 29/08/25)
- Topographic Survey 15/11/24 by Survey Solutions (Drawing 72389MCLS-01 Appendix A).
- Topographic levels through the Metrolink cut slope, prepared by the Client, as illustrated in Figures 2 and 3 Appendix A.
- British Geological Survey (BGS) 1:10,000 Sheet SJ89SW.
- BGS GeoIndex Borehole SJ89SW 47 (Appendix B), located to the northwest of the site.
- Exploratory hole logs downloaded from the Planning Portal for development at Albany Road, Chorton (Appendix B).
- Solmek Borehole (BH01) log presented in Appendix B.
- Geotechnical Testing (Appendix C).

2 SITE DESCRIPTION

A site inspection, as recommended in BS 5930, was undertaken on Tuesday 6th September 2025. The site is centred at Ordnance Survey Co-ordinates 381811, 394318 and covers approximately 0.1Ha.

The site is currently a domestic garden at an elevation of 27.4m AOD. To the west of the boundary garden wall is a 0.8m high landscaped bund above the cut slope down to the Metrolink rail track.

An assessment of slope gradients and ground levels across the western boundary including the Metrolink cut slope has been provided by the Client (Figures 2 and 3 Appendix A), from which it is determined that:

- the garden area, to be developed with the office structure, is at an elevation of ~27.4m AOD.
- The slope above the Metrolink rail line has a maximum height of ~2.6m and a maximum gradient of 1 vertical in 1.9 horizontal.
- The cut slope is densely vegetated by shrubs and mature trees.

3 GEOLOGICAL SETTING

The BGS 1:10,000 sheet (SJ89SW) records the site to be underlain by glacial till overlying sandstone of the Sherwood Sandstone Formation.

Based on the GeoIndex borehole and ground investigation records from Albany Road, both to the west of the site, it is expected that the glacial till will extend to depths of over 10m below ground level (bgl) and comprise loose and medium dense orange, brown slightly gravelly sand interlayered with firm and stiff dark red brown sandy gravelly clay.

In general, the relative density of the granular glacial soils was reported to be loose within the upper 2m becoming medium dense below this depth.

Localised groundwaters were reported within the glacial soils at depths of below 2m bgl.

4 FIELDWORK

The fieldwork was carried out on 9th June 2025 and comprised one, window sample to a depth of 10m bgl, included disturbed soil sampling and Standard Penetration Tests (SPT) at 1m intervals. On completion of the borehole, it was backfilled with arisings.

The borehole log is presented in Appendix B and the location of the borehole onsite is illustrated in Figure 1 Appendix A.

5 GROUND CONDITIONS

A summary of the ground conditions encountered is given below. The exploratory hole logs are presented in Appendix B.

5.1 Topsoil

Topsoil was proven within the footprint of the proposed garden office extending to a depth of 0.7m bgl

5.2 Natural Deposits

Beneath the topsoil, glacial soils were proven comprising interlayered orange, brown fine to coarse sands and dark brown sandy gravelly clays, with layer thicknesses of between 1m to 2m thick.

Within the depth profile of the slope to the west of the development, the following ground profile was determined:

- Ground Level (27.4m AOD).
 - Topsoil to 0.7m bgl (26.7m AOD).
 - Very loose fine to coarse sand to 3m bgl (24.4m AOD).
 - Very soft silty sandy slightly gravelly organic clay to 4m bgl (23.4m AOD).
 - Soft becoming firm slightly sandy, slightly gravelly clay to 9m bgl (18.4m AOD).
 - Very stiff to hard sandy gravelly clay.
-

5.3 Solid Geology

The ground investigation did not record sandstone within a depth of 10m bgl. Based on the desk study information sandstone rockhead would be expected at a depth of over 10m bgl.

5.4 Groundwater

The ground investigation did not record any groundwater strikes in BH01.

Based on the groundwater conditions recorded on adjacent sites (Section 3), seasonal groundwater levels may develop within the granular till at depths of around 2m bgl.

6 GROUND CONDITIONS AND MATERIAL PROPERTIES

6.1 Ground Profile

Table 1 presents a summary of the ground conditions determined within the slope profile illustrated in Figure 3 (Appendix A).

Table 1 Summary of Ground Conditions within the Slope Profile

Ground level	Upper Slope	Mid Slope		Toe Slope
	27.4m AOD	28.2m AOD	25.5m AOD	25.5m AOD
Slope Gradient	Flat	1 vertical in 1.9 horizontal		Flat
Ground Conditions	Strata			Thickness
	General Fill (Class 1 or 2 General Granular or Cohesive Fill)			0.7m
	Very loose fine to coarse sand			2.3m
	Very soft silty sandy gravelly organic clay			1.0m
	Soft becoming firm sandy gravelly clay			>6m

6.2 Development

The single storey office unit is to be constructed on a raft foundation of dimensions 4.5m x 3.5m, which is designed to induce a maximum bearing pressure of 25 kN/m². It has been assumed that the 0.7m thick topsoil layer will be removed as part of the raft construction and reinstated with compacted granular fill.

6.3 General Fill

For the purpose of this stability assessment, it has been assumed that the landscaped bund at the crest of the cut slope to the Metrolink land asset, was formed of site won granular glacial soils, extending to an elevation of 26.7m AOD.

From the soil descriptions, published data, and empirical correlations, the following geotechnical design parameters have been assumed for the landscape general fill:

- Angle of internal friction of 28° and an effective cohesion of 0 kN/m².
- Dry unit weight 18 kN/m³ and wet unit weight 19 kN/m³.

6.4 Glacial Soils

The glacial soils recorded in the borehole onsite (BH01) comprised an upper layer of very loose sands, to a depth of 3m bgl, underlain by a layer of soft sandy gravelly organic clay to a depth of 4m bgl, beneath which was cohesive sandy gravelly clay to a depth of over 10m bgl.

From the soil descriptions, geotechnical testing, published data, and empirical correlations, the following geotechnical design parameters have been determined:

Very Loose Sands

- Standard Penetration Test N Values 0 – 2.
- Angle of internal friction of 28° and an effective cohesion of 0 kN/m².
- Dry unit weight 19 kN/m³ and wet unit weight 21 kN/m³.

Very Soft Clays

- Standard Penetration Test N Value 0.
- Undrained shear strength 15 kN/m².
- Angle of internal friction of 24° and an effective cohesion of 0 kN/m².
- Dry unit weight 18 kN/m³ and wet unit weight 20 kN/m³.

Soft / Firm Stiff Clays

- Standard Penetration Test N Value 8 to >50.
- Undrained shear strength 40 kN/m².
- Angle of internal friction of 30° and an effective cohesion of 1 kN/m².
- Dry unit weight 18 kN/m³ and wet unit weight 20 kN/m³.

7 STABILITY ANALYSIS

7.1 Design Standards

The ultimate limit state slope stability analysis undertaken has been carried out in accordance with the principles of BS EN 1997 – 1:2004 Eurocode 7: Geotechnical Design. This was undertaken using the OASYS slope programme, adopting the Bishop's method Design Approach 1 Combinations 1 and 2.

The serviceability limit state assessment has been carried out in accordance with the principles of Clause 11.6 of Eurocode 7 to consider the impact of ground deformation and subsidence on the cut slope.

The office unit is set back 1.2m from the boundary fence and 3.64m from the crest of the Metrolink slope which has a gradient of 1 vertical in 1.9 horizontal.

The slope above the Metrolink rail line is considered a conventional type of structure, assessed as a Geotechnical Category 2 structure.

As the critical slope condition determined for this pre-existing cut slope comprises the long-term drained condition, a Persistent Normal Design Situation has been analysed.

As the purpose of this stability analysis is to evaluate whether the proposed single storey office development will have an impact on the stability of the Metrolink cut slope, analysis of the following conditions have been undertaken:

- Condition 1 – Pre-Development Existing Slope Condition (i.e. with no additional loadings).
- Condition 2 – Post Development Slope Condition (i.e. including raft loading).

7.2 Stability of Railway Cutting

7.2.1 Design Assumptions

The design assumptions adopted in analysis of the cut slope condition are as follows:

- The slope profile analysed is as illustrated in Figure 3 and using the ground profile described in Section 6.1, as illustrated in the design analysis slope sections Appendix D.
- Characteristic parameters for the soils are as detailed in Sections 6.3 and 6.4.
- Based on the ground investigation data, which identified no laterally extensive groundwater within the glacial soils onsite and as boreholes close to the site only recorded localised groundwaters at a depth of over 2m bgl, it has been assumed that the ground water table will exist below the toe of the existing cut slope below 25.5m AOD.
- Due to the dense vegetation on the cut slope, no vehicle access is expected on the Metrolink slope and, as such, no maintenance surcharge loadings have been included for on the slope.
- During the “post development” long-term conditions, surcharge loads of 25 kN/m² have been adopted across the office raft foundation footprint.
- For the purpose of this stability assessment, a minimum failure size of 50 kN/m has been adopted.

7.2.2 Slope Conditions Analysed

Drained and undrained slope stability analysis of the slope condition has been undertaken using the Bishop's method Design Approach 1 Combinations 1 and 2 using the OASYS slope stability analysis.

7.2.3 Results of Ultimate Limit State Stability Analysis

The results of the OASYS slope stability analyses for the short- and long-term slope condition, under undrained and drained conditions, are presented in Appendix D and the minimum over design factors determined for the critical slips are summarised below:

ANALYSES OF PRE-DEVELOPMENT CONDITIONS

Long Term Drained Condition

- 1.085 for Design Approach 1 Combination 1 (limit state defined by “Actions” i.e. partial factors applied to unit weight of soil) [Slope 1 Figure 1.1 Appendix D].
- 0.879 for Design Approach 1 Combination 2 (limit state defined by “Resistance” i.e. partial factors applied to soil strength) [Slope 2 Figure 1.2 Appendix D].

ANALYSES OF POST DEVELOPMENT CONDITIONS

Long Term Drained Condition

- 1.085 for Design Approach 1 Combination 1 (limit state defined by “Actions” i.e. partial factors applied to unit weight of soil) [Slope 3 Figure 1.3 Appendix D].
- 0.879 for Design Approach 1 Combination 2 (limit state defined by “Resistance” i.e. partial factors applied to soil strength) [Slope 4 Figure 1.4 Appendix D].

CONCLUSIONS FROM THE STABILITY ANALYSIS

Based on the results of the Design Approach 1 Combination 2 (limit state defined by “Resistance” i.e. partial factors applied to soil strength) analysis for both undrained and drained conditions for the “pre-development condition”, over design values of less than 1 have been determined, which demonstrate that the gradient of this cut slope, i.e. prior to development, is not currently of adequate stability to sustain its future integrity. It is likely, however, that the dense vegetation present stabilises the slope through root reinforcement, creating a stronger soil-root matrix that increases the soil shear strength and thereby limiting the potential for shallow slope failures to occur.

Based on the results of the Design Approach 1 Combination 2 (limit state defined by “Resistance” i.e. partial factors applied to soil strength) analysis for both undrained and drained conditions for the “post development condition”, no decrease in the calculated over design values is caused by the raft foundation development loadings. From the results of these analyses, it is therefore demonstrated that the proposed development has no significant adverse impact on slope stability to the adjacent Metrolink cut slope.

7.2.4 Assessment of Serviceability State

Ground Deformation

The results of the drained and undrained analysis, adopting partial factors of 1 on both the unit weight of soil and soil strength, both determined an over design value of 1.085, which indicate that the existing slope should be stable in a serviceability state condition. However, as the results of the limit state analyses Design Approach 1 Combination 2 (where partial factors are applied to the Geofailure Material Properties of the reprofiled slope condition), determined an over design value against circular slope failure of less than 1 for long term conditions, this demonstrates that the “existing” cut slope may not adequately limit the mobilised shear strength in the soils in excess of that required to maintain the design effects less than the design resistance. However, as noted above dense vegetation present stabilises the slope through root reinforcement, creating a stronger soil-root matrix that increases the soil shear strength and thereby limiting the potential for shallow slope failures to occur. As such, it is expected that the serviceability state of the current slope may be adequate, as improved by the action of root reinforcement.

As detailed above for the Ultimate Limit State Condition, the proposed development is determined to cause no adverse impact on the serviceability state of the Metrolink cut slope.

8 RECOMMENDATIONS

Based on the results of this preliminary stability assessment of the proposed development to be constructed above a 1 in 1.9 gradient cut slope, adjacent to the Metrolink rail track, it is determined that the proposed development presents no additional adverse impact on the stability of the slope and no further investigation or analyses is considered necessary.

SOLMEK

APPENDIX A



12-16 Yarm Road, Stockton on Tees, TS18 3NA
Tel: 01642 607083 Email: info@solmek.com

Figure Title

Location Plan

Project Number

M25-066

Project Name

91 Buckingham Road, Manchester

Client

Dwayne Campbell

Date

August 2025

DRG Number

Figure 1

Scale

1:500 @ A4 [DO NOT SCALE]

Legend Key

-  Locations By Type - Empty
-  Locations By Type - BH
-  Project Bounds - Project Bounds

FIGURE 2 PLAN OF SECTION LINE

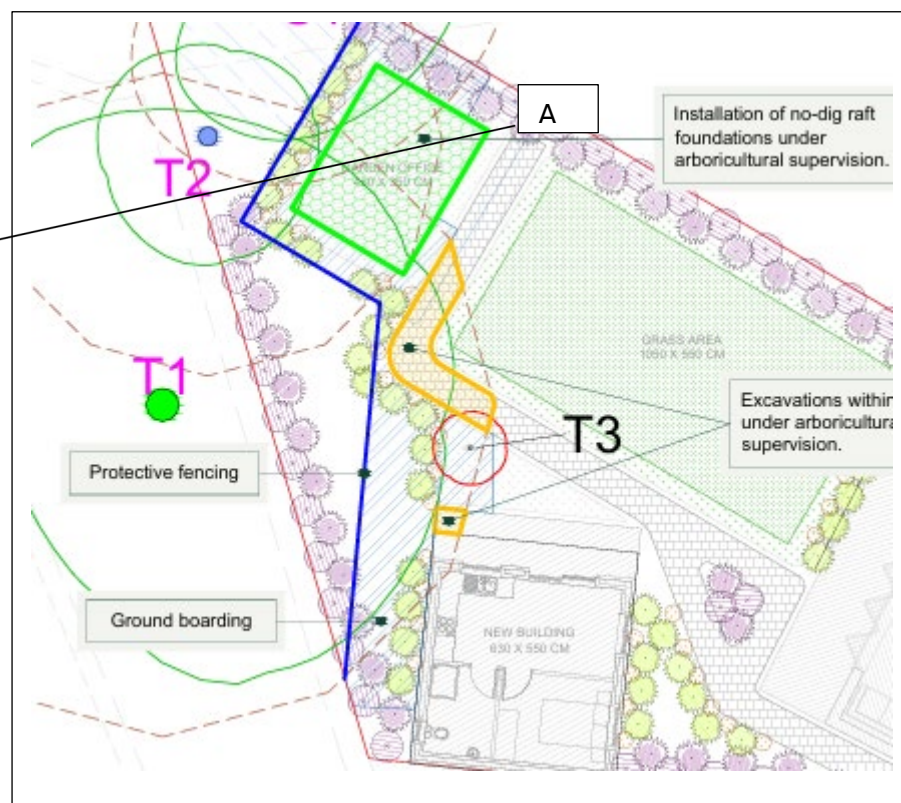
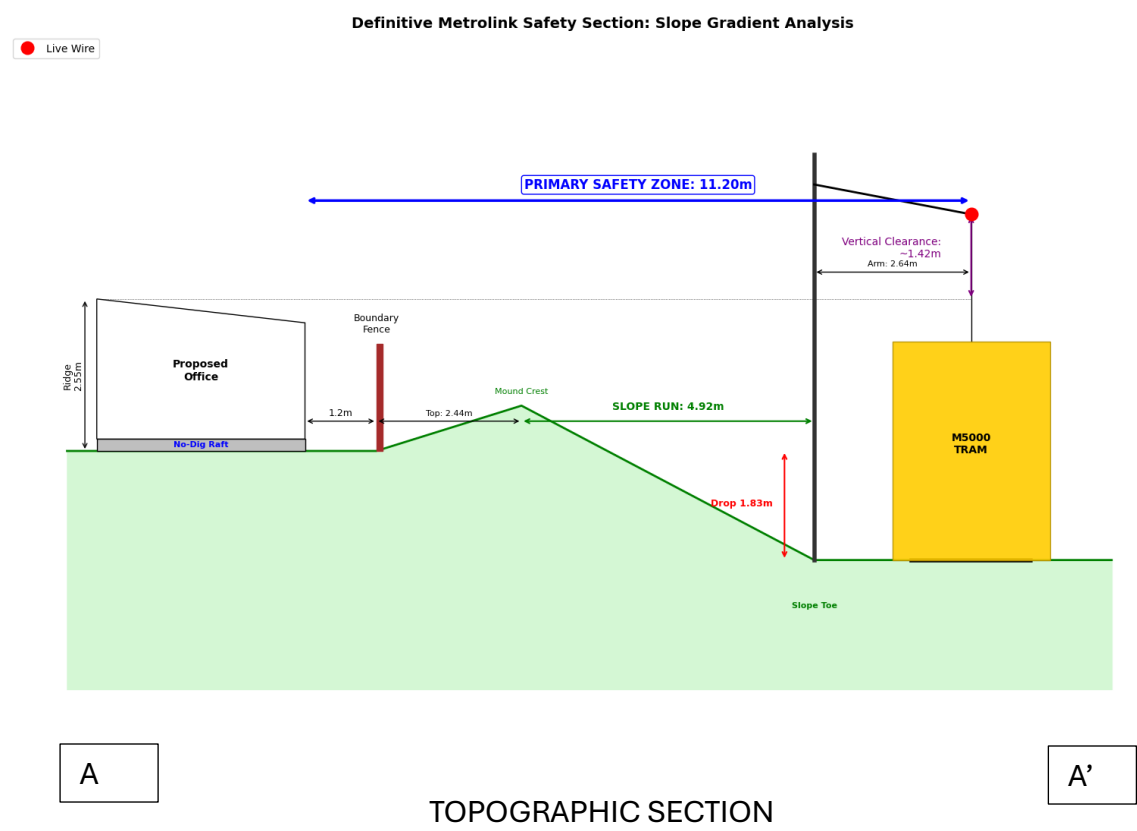


FIGURE 3 TOPOGRAPHIC SECTION



394320.000 mN

394300.000 mN

394280.000 mN

381800.000 mE

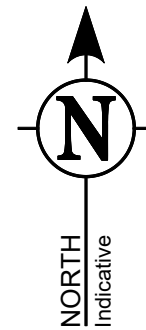
381800.000 mE

381820.000 mE

381820.000 mE

381840.000 mE

381840.000 mE



394320.000 mN

394300.000 mN

394280.000 mN

TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH Arch Head Level	ET EP+Transformer	RSD Roller Shutter Door
AB Air Brick	FB Flower Bed	RSJ Rolled Steel Joist
AR Assumed Route	FG Lev False Ceiling Level	SI Sign Post
AV Air Valve	FBD Floor Board Direction	SL Window Sill Level
BB Belsa Beacon	FH Fire Hydrant	SP Arch Spring Point Level
BH Bore Hole	FL Floor Level	SV Stop Valve
BL Bed Level	FP Flag Pole	SW Surface Water
BO Bollard	FW Foul Water	SY Cable Stay
BS Bus Stop	GG Gully Grate	Tac Tactile Paving
BU Built	GV Gas Valve	TC Telecom Cover
BW Barbed Wire Fence	HL Window Head Level	TH Trial Pit
BX Box (Utilities)	IC Inspection Cover	THL Threshold Level
C/B Close Board Fence	IL Invert Level	TL Traffic Light
CL Cover Level	IR Iron Railings	ToF Top of Fence
CL Chain Link Fence	KO Kerb Outlet	ToW Top of Wall
C Lev Ceiling Level	LP Lamp Post	TP Telegraph Pole
Col. Column	MH Manhole	TS Traffic Signal Cover
CIP Chestnut Paling Fence	MP Marker Post	TV Cable TV Cover
CR Cable Rise	NB Name Board	UC Unknown Cover
CW Chicken Wire	OHL Overhead Line (approx)	UK Unknown Tree
DC Drainage Channel	Pan Panel Fence	UMG Unmade Ground
DI Disaligned	PB Post Box	USB Under Side Beam
DL Door Level	PM Parking Meter	UTL Unable To Lift
DP Down Pipe	PO Post	UTS Unable To Survey
DR Drain	PRR Post & Rail Fence	VP Vent Pipe
EBV Electric Box	PWV Post & Wire Fence	WB Waste Bin
EC Electric Supply Cover	RE Rodding Eye	WH Weep Hole
EL Eaves Level	RL Ridge Level	WL Water Level
EP Electric Pole	RP Reflector Post	WM Water Meter
ER Earth Road	RS Road Sign	WO Wash Out
		Survey Control Station

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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This drawing should only be scaled using digital methods.

SURVEY STATIONS

Name	Easting	Northing	Height
RS01	381835.980	394298.172	28.115
RS02	381822.066	394302.051	27.956
RS03	381809.423	394314.251	27.453

REV	DESCRIPTION	DRAWN	APPR	DATE
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LAND SURVEYING
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UNDERGROUND SURVEYING
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0845 040 5969
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PROJECT TITLE
91 Buckingham Road, Manchester,
M21 0QT

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 1 of 1

CLIENT Dwayne Campbell	SCALE 1:100
SURVEYOR RS	SURVEY DATE 14/11/2024
CHECKED BY SR	APPROVED BY SR
DWG STATUS FINAL	REVISION
DRAWING NUMBER 72389MCLS-01	ISSUE DATE 15/11/2024



Protective Fencing

To be erected prior to the commencement of all works on site, and retained in place throughout construction.
Specification: To comprise of 2m tall welded mesh panels on rubber or concrete feet. Panels are to be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabilizer struts, which should be attached to a base plate and secured with ground pins.
All weather notices should be erected at regular intervals on the weld mesh panels with words such as "Construction exclusion zone - Keep out".

Tree Protection Area
KEEP OUT
Do not move this fence
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECT OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION
ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

ARBTECH
ARBTECH CONSULTING LIMITED
Unit 3, Well House Barns, Chester Road, Chester, CH4 0DH
01244 661170
https://arbtech.co.uk

Ground boarding

New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

Note The ground protection might comprise one of the following:

a) for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane;
b) for pedestrian-operated plant up to a gross weight of 2t, proprietary inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150mm depth of woodchip), laid onto a geotextile membrane;

For situations other than those described in a) or b), the ground boarding is to be designed by a suitably qualified person to an engineering specification in conjunction with arboricultural advice, to be able to support the expected loading to be placed upon it.

In all cases, the objective of the ground boarding is to avoid compaction of soil beneath, so that tree root function remains unimpaired.

Supervised Excavation

All excavations within and immediately adjacent to RPAs are to be undertaken under direct on-site arboricultural supervision.

Any roots that are to be cut will be cleanly severed by the project arboriculturist using a suitable hand saw or secateurs. The edge of all excavation closest to the retained trees will be covered over with damp hessian to prevent drying out, and where necessary be shuttered to prevent soil collapse or contamination by concrete.

Excavation within the RPAs will consist of a mixture of mechanical and manual excavation.
Where an excavator is used it will be fitted with a suitably sized toothless grading bucket, using a grading / scraping motion rather than digging. During each motion the excavator will not be permitted to removing no more than 10 - 20mm deep of soil in any one pass. If any roots are discovered, mechanical excavation will immediately be stopped and manual excavation will take over to expose the root. Upon the root being uncovered and either severed or protected the excavations can then continue.
Any excavator or other machinery that is to be used will be situated outside of the RPAs of all retained trees or on top of a suitable ground protection.
Where an excavator or any other machinery is to be used within RPAs or beneath canopies the project arboriculturist will clearly instruct the operator about what they want and expect to happen prior to any works may commence.

Supervised raft foundation installation

Arboricultural Supervision

The arboricultural consultant will be required to attend site to directly supervise all demolition and construction works that have to be undertaken within the root protection areas. This will include:
1. Pre-commencement site meeting & location of protective measures.
2. Supervised excavations within the RPA of tree no. T01
3. Installation of raft foundation above the RPAs of trees T01, T02 & group G03.
4. Any demolition and or excavations within or adjacent to RPAs, including foundations, hard surfacing or underground services (a non-exhaustive list).

Indicative only

No.93

No.89

0m 1m 3m 5m 10m

Tree Categories

Trees are categorised in accordance with the cascade chart in Table 1 of the British Standard BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'

Category 'U' - Trees in such condition that they cannot realistically be retained as living trees in context of the current land use for longer than 10 years.
Category 'A' - Trees of high quality with an estimated remaining life expectancy of at least 40 years.
Category 'B' - Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
Category 'C' - Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm.

Root Protection Area

In order to avoid damage to the roots or rooting environment of retained trees, the Root Protection Areas (RPAs) should be plotted around each of the category A, B and C trees. This is a minimum area in m² which should be left undisturbed around each retained tree.

The RPA is calculated using the British Standard BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'.

The calculated RPA is capped to 707m², which is the equivalent to a circle with a radius of 15m. Where there appears to be restrictions to root growth the root protection area is reshaped to more accurately reflect the likely distribution of the roots.

Arboricultural Impacts

Impacts	Nos. of trees
Trees to be removed	1
Groups / Hedges to be removed (Partial removal of groups)	0 (0)
Trees with proposed incursions into RPAs	2
Groups / Hedges with proposed incursions into RPAs	1
Trees that will require pruning	1
Groups / Hedges that will require pruning	1
Trees to be transplanted	0
Groups / Hedges to be transplanted	0

No.	Species	Proposed structure	Incursion
T1	Oak	Garden annexe & garden office	RPA
T2	Leyland cypress	Garden office	RPA
G1	Leyland cypress	Garden office	RPA

Tree Work Schedule

No.	Species	Works	Category
G1	Leyland cypress	Prune canopy to give 1m clearance from proposed garden office	B1
T2	Leyland cypress	Prune canopy to give 1m clearance from proposed garden office	B1
T3	Cordylone	Fell to ground level, remove stump	C1

All tree work is to be undertaken in accordance with British Standard BS 3998:2010 Tree work - Recommendations.
All arising's are to be removed and the site is to be left as found.
Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of tree surgery operations. No equipment or vehicles such as timber lorries, tractors, excavators or cranes shall be parked or driven beneath the crowns of any retained trees, to prevent subsequent compaction and root death.

No. of individual trees to be removed

U	A	B	C
0	0	0	1

No. of groups / hedges to be removed

U	A	B	C
0 (0)	0 (0)	0 (0)	0 (0)

() = Partial removal of a groups

arb'tech

Unit 3, Well House Barns, Chester, CH4 0DH
https://arbtech.co.uk, 01244 661170

Project:
91 Buckingham Road,
Manchester,
M21 0QG.

Client:
Dwayne Campbell

Drawing:
Arboricultural Impact Assessment

Based on:
Campbell-04-Rev A

Drawing No:
Arbtech TCP 01

Rev:

Date:
Mar 2024

Scale:
1:75 @ A1

Drawn:
AST

Key:

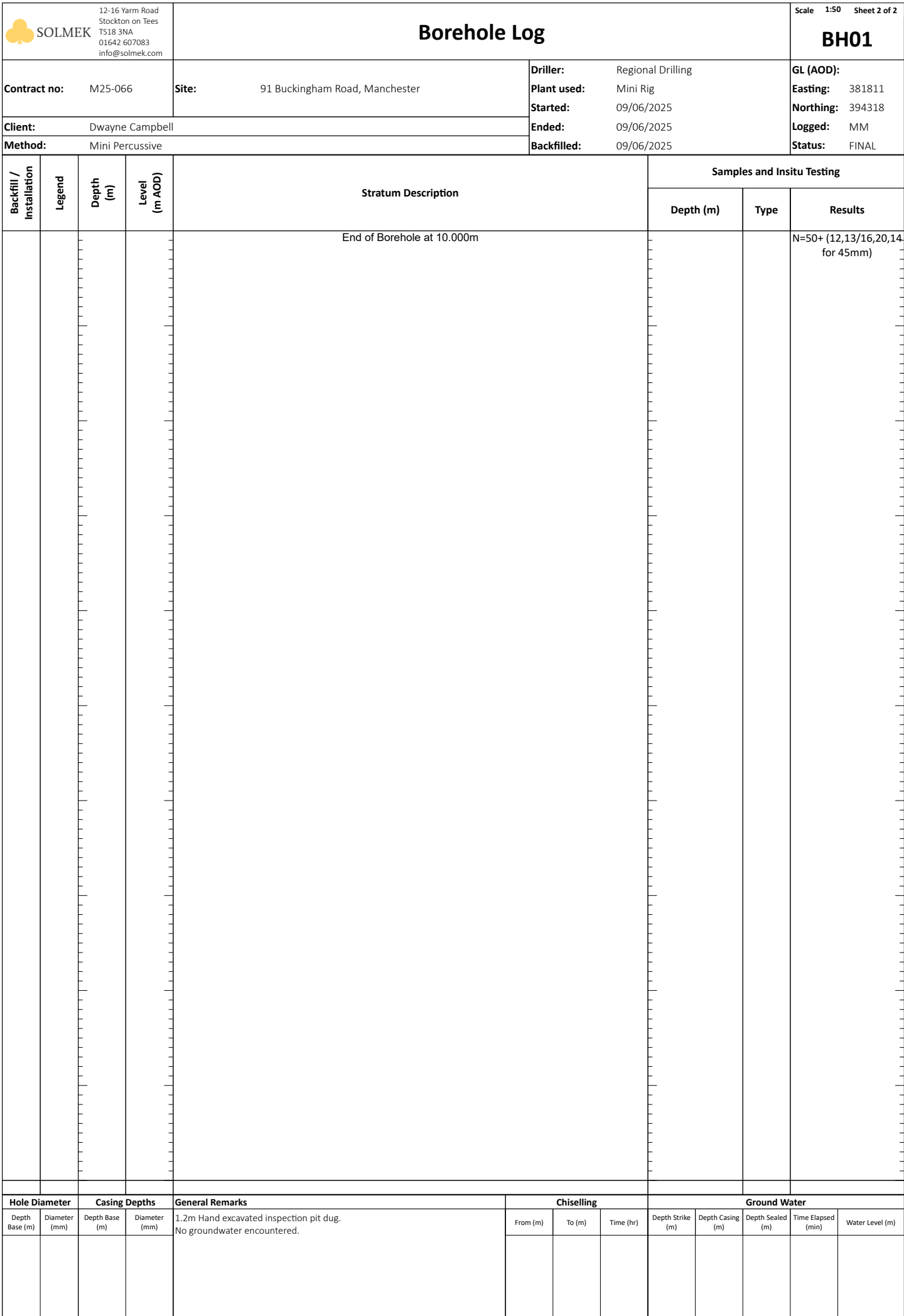
Tree Nos.	T1	Tree Canopies:	Trunks:
RPAs:	Category 'A' trees:	Category 'B' trees:	Category 'C' trees:
Category 'B' groups:	Category 'C' trees:	Arboricultural supervision - Excavations:	

All dimensions should be checked on site. No dimensions are to be scaled from this drawing.
Please notify us of any discrepancies found. Arbtech Consulting Ltd cannot be held responsible for inaccuracies in the base drawing in which this plan is based.
This drawing is designed to reflect the principles of the layout or design only, and relates only to the protection of retained trees.
This drawing is not to be read as a definitive part of the engineering or construction designs or method statement.
An architect or structural engineer should be contacted over any matters of construction, detailing or specification and for any standards or regulatory requirements relating to proposed structures, hard surfacing or underground services.
This drawing was produced in colour - a monochrome copy should not be relied upon.

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APPENDIX B

12-16 Yarm Road Stockton on Tees TS18 3NA 01642 607083 info@solmek.com SOLMEK				Borehole Log						Scale 1:50 Sheet 1 of 2 BH01	
Contract no: M25-066		Site: 91 Buckingham Road, Manchester				Driller: Regional Drilling Plant used: Mini Rig Started: 09/06/2025 Ended: 09/06/2025 Backfilled: 09/06/2025		GL (AOD): Easting: 381811 Northing: 394318 Logged: MM Status: FINAL			
Client: Dwayne Campbell											
Method: Mini Percussive											
Backfill / Installation	Legend	Depth (m)	Level (m AOD)	Stratum Description	Samples and Insitu Testing						
					Depth (m)		Type	Results			
</											



APPENDIX C

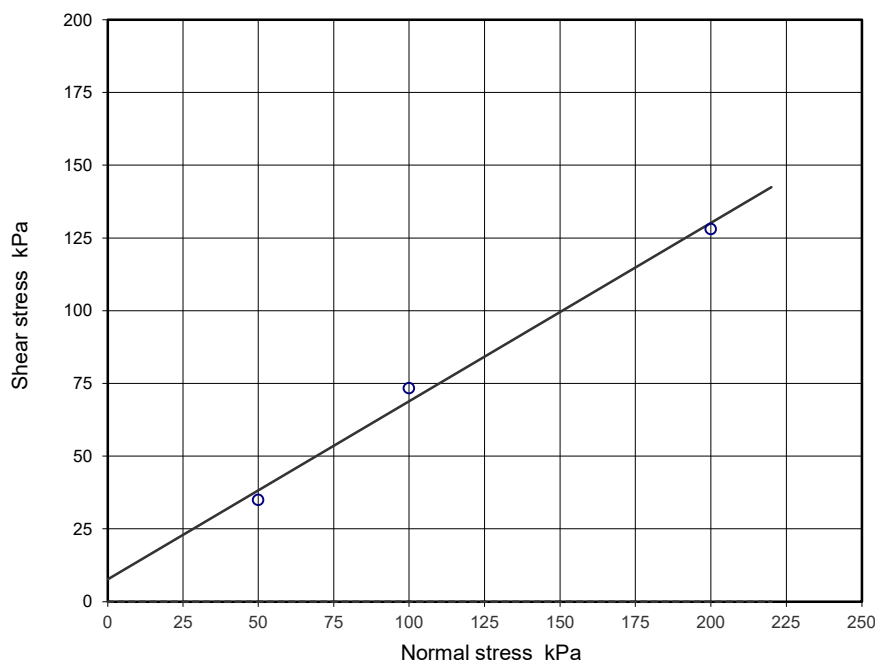
GQF-008-64 Issue 01 - Oct 22	Determination of shear strength using the Small Direct Shearbox Apparatus			Job Ref	J316449
				Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester			Sample No.	
Soil Description	Brown very sandy SILT			Depth m	3
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	TTLP2025071447
Test Method	BS EN ISO 17892-10:2018			Date of test	22/07/2025

Preparation Details -2mm material. Recompactd using 2.5KG equivalent effort at as received moisture content.

Specimen Details		Test No.	1	2	3			
Initial	Height		24.0	24.0	24.0			mm
	Bulk Density		2.12	2.12	2.12			Mg/m ³
	Moisture Content		24.8	24.8	24.8			%
	Dry density		1.70	1.70	1.70			Mg/m ³
	Voids ratio		0.559	0.559	0.559			
	Degree of Saturation		118	118	118			%
Consolidation	Consolidation / Normal Stress applied		50	100	200			kPa
	Change in height during consolidation*		-1.804	-2.330	-3.146			mm
	Voids ratio after consolidation		0.442	0.407	0.354			
After test	Final Moisture content		20.1	19.2	18.0			

Shearing stage(s)

Rate of displacement	Peak	0.02564	0.02564	0.02564				mm/min
	Residual							mm/min
Peak values, (o)	Relative horizontal displacement	6.14	7.40	5.00				mm
	Shear stress	35.0	73.3	128.0				kPa
	Vertical Movement at peak shear stress*	-1.98	-2.71	-3.25				mm
Residual values, (x)	No. of traverses (including peak run)	1	1	1				
	Relative horizontal displacement							mm
	Shear stress							kPa
	Vertical movement at residual shear stress*							mm



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c'	kPa	7.7	-
Ø'	degrees	31.5	-

Residual strength, (x)

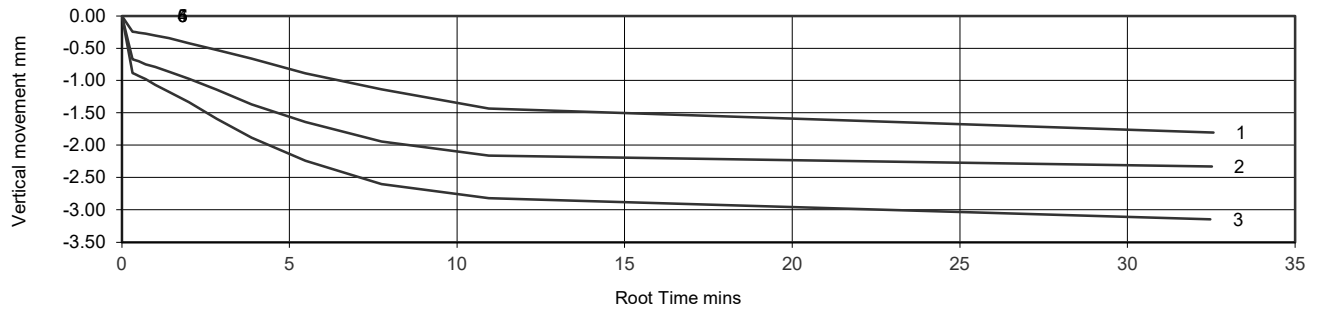
c' _R	kPa	not assessed	-
Ø' _R	degrees	not assessed	-

Remarks

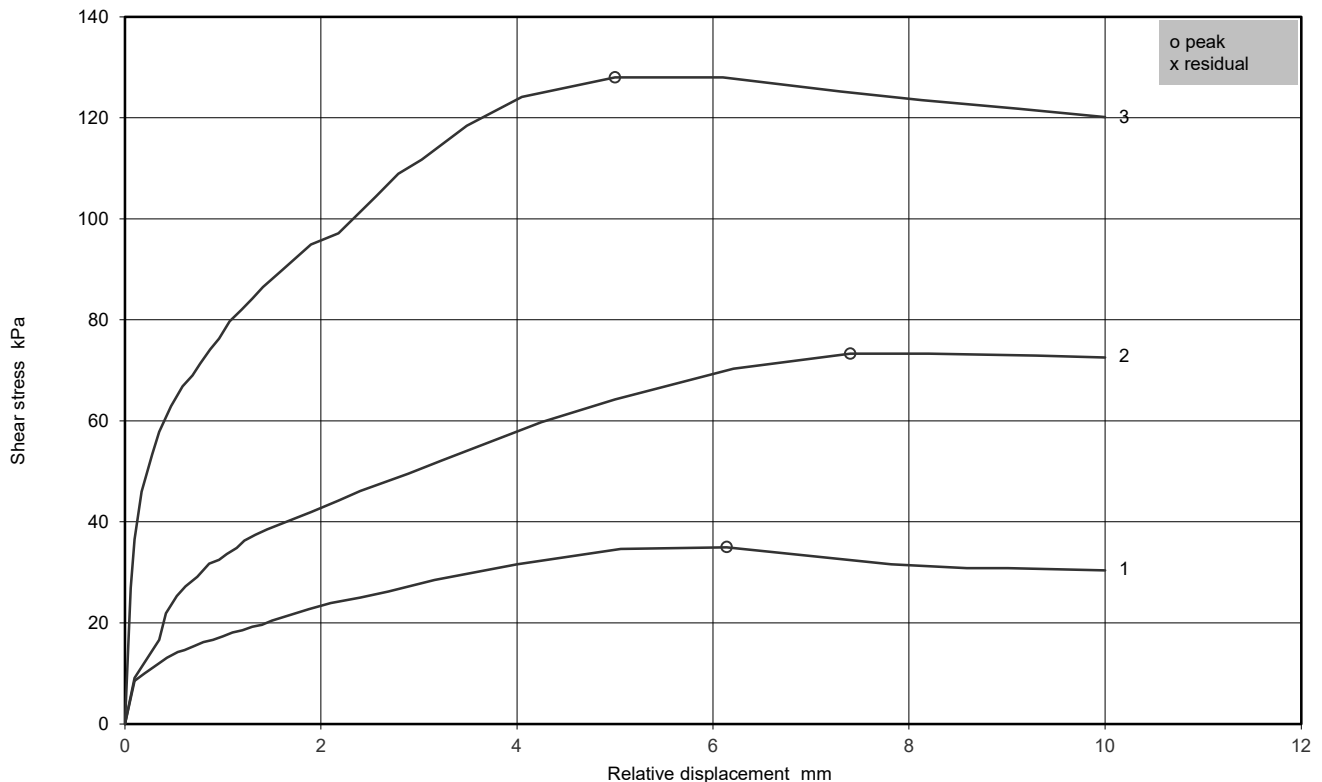
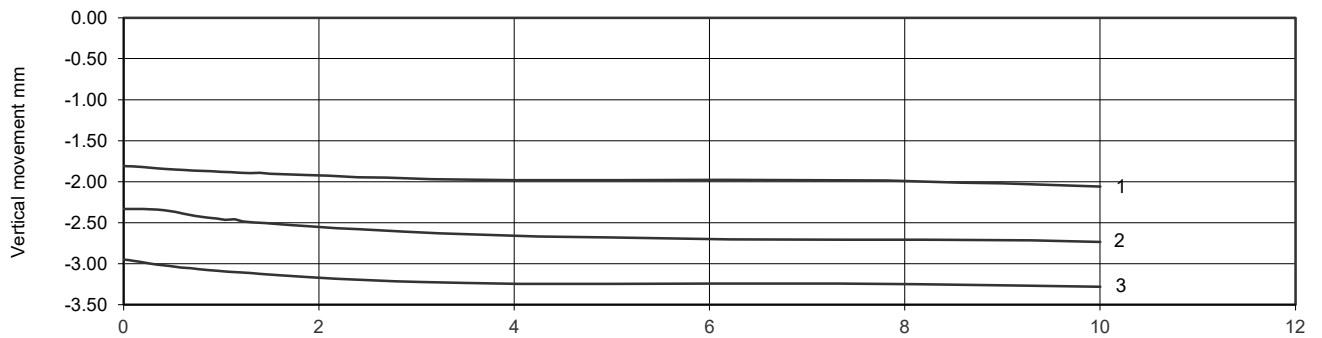
	Date Printed			SSB
	24/07/2025			

	Determination of shear strength using the Small Direct Shearbox Apparatus				Job Ref	J316449
					Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester				Sample No.	
Soil Description	Brown very sandy SILT				Depth m	3
Specimen Reference		Specimen Depth		m	Sample Type	B
Specimen Description					KeyLAB ID	TTLP2025071447

Consolidation stage(s)



Shearing stage(s)



*Note : Vertical movement/change in height is recorded as negative for reduced height (settlement) and positive for increased height (swell).

Date Printed

24/07/2025



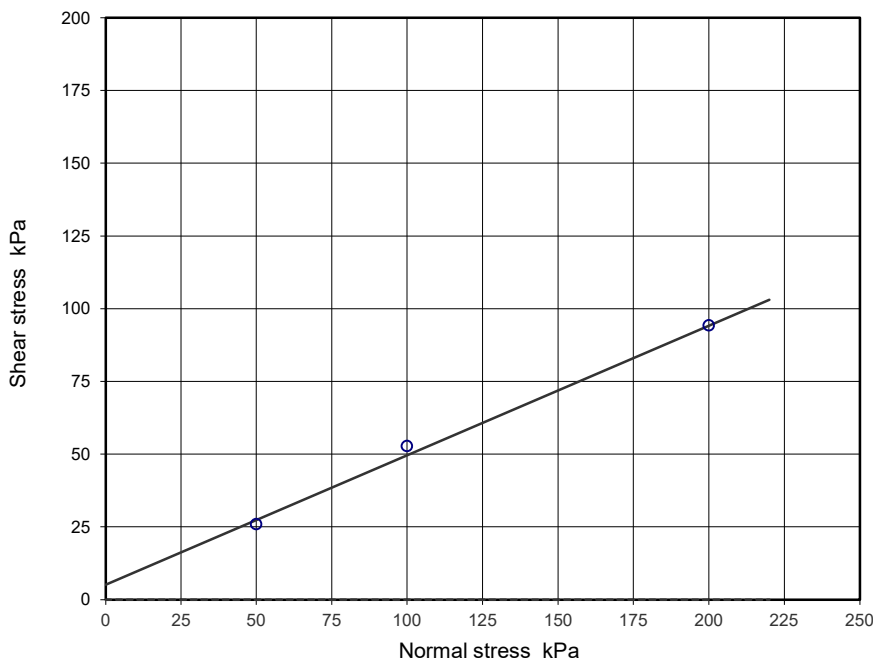
SSB

GQF-008-64 Issue 01 - Oct 22	Determination of shear strength using the Small Direct Shearbox Apparatus			Job Ref	J316449
				Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester			Sample No.	
Soil Description	Brown sandy CLAY			Depth m	6
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	TTLP2025071448
Test Method	BS EN ISO 17892-10:2018			Date of test	22/07/2025

Preparation Details -2mm material. Recompactd using 2.5KG equivalent effort at as received moisture content.

Specimen Details		Test No.	1	2	3			
Initial	Height		24.0	24.0	24.0			mm
	Bulk Density		1.96	1.96	1.96			Mg/m ³
	Moisture Content		12.4	12.4	12.4			%
	Dry density		1.74	1.74	1.74			Mg/m ³
	Voids ratio		0.523	0.523	0.523			
	Degree of Saturation		63	63	63			%
Consolidation	Consolidation / Normal Stress applied		50	100	200			kPa
	Change in height during consolidation*		-0.642	-1.300	-1.960			mm
	Voids ratio after consolidation		0.482	0.440	0.398			
After test	Final Moisture content		18.6	17.5	16.0			

Shearing stage(s)								
Rate of displacement	Peak		0.03165	0.03165	0.03165			mm/min
	Residual							mm/min
Peak values, (o)	Relative horizontal displacement		10.00	7.47	8.12			mm
	Shear stress		25.9	52.8	94.3			kPa
	Vertical Movement at peak shear stress*		-1.33	-1.98	-2.72			mm
Residual values, (x)	No. of traverses (including peak run)		1	1	1			
	Relative horizontal displacement							mm
	Shear stress							kPa
	Vertical movement at residual shear stress*							mm



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c'	kPa	5.2	-
Ø'	degrees	24	-

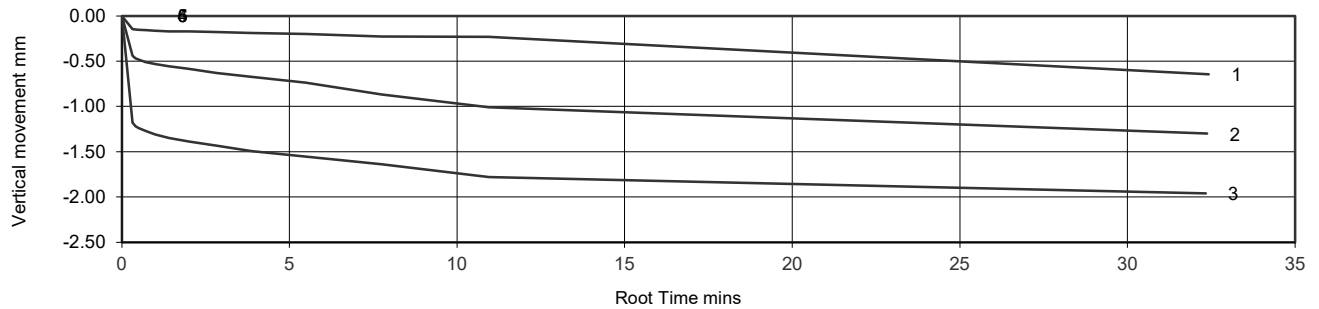
Residual strength, (x)			
c' _R	kPa	not assessed	-
Ø' _R	degrees	not assessed	-

Remarks

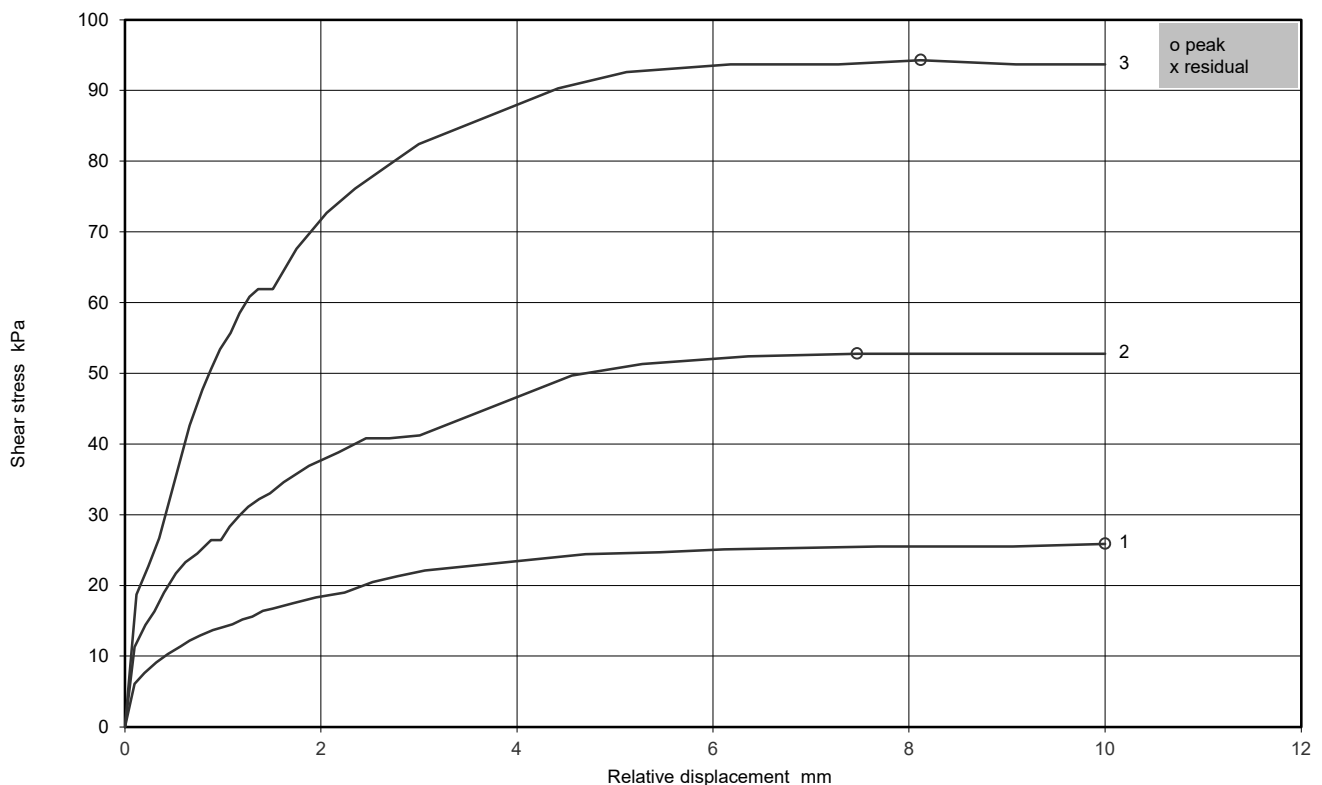
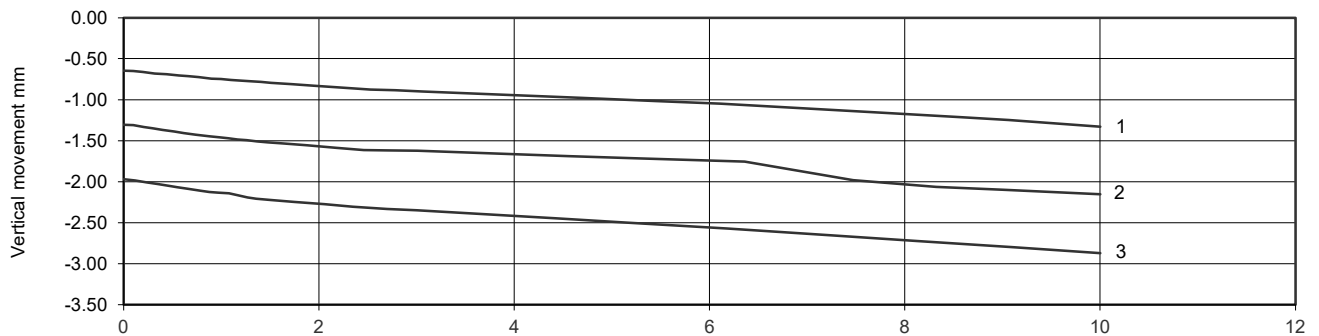
	Date Printed			SSB
	24/07/2025			

Determination of shear strength using the Small Direct Shearbox Apparatus					Job Ref	J316449
					Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester				Sample No.	
Soil Description	Brown sandy CLAY				Depth m	6
Specimen Reference		Specimen Depth		m	Sample Type	B
Specimen Description					KeyLAB ID	TTLP2025071448

Consolidation stage(s)



Shearing stage(s)



*Note : Vertical movement/change in height is recorded as negative for reduced height (settlement) and positive for increased height (swell).

Date Printed

24/07/2025



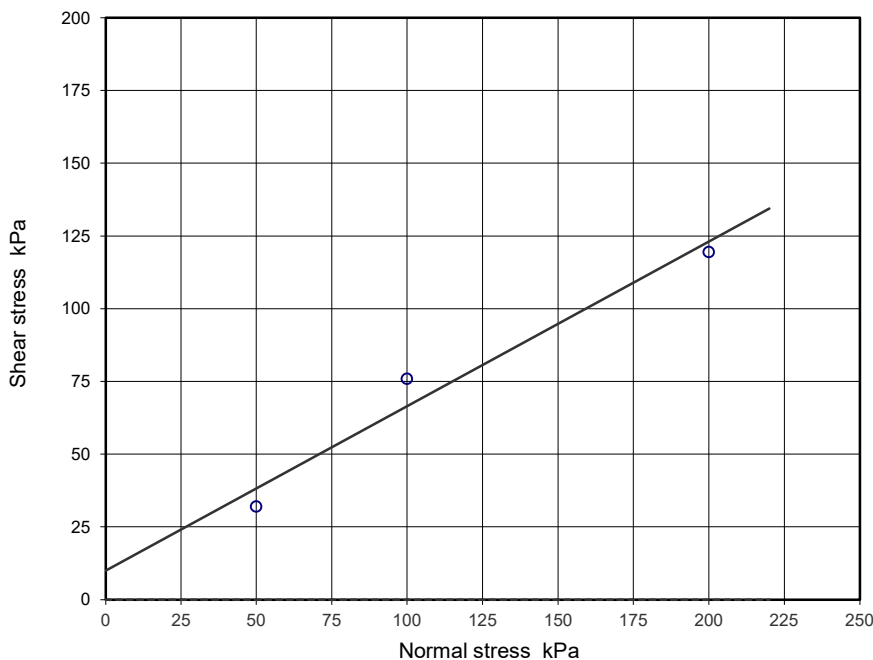
SSB

GQF-008-64 Issue 01 - Oct 22	Determination of shear strength using the Small Direct Shearbox Apparatus			Job Ref	J316449
				Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester			Sample No.	
Soil Description	Brown slightly silty SAND			Depth m	1
Specimen Reference		Specimen Depth	m	Sample Type	B
Specimen Description				KeyLAB ID	TTLP2025071446
Test Method	BS EN ISO 17892-10:2018			Date of test	21/07/2025

Preparation Details -2mm material. Recompactd using 2.5KG equivalent effort at as received moisture content.

Specimen Details		Test No.	1	2	3			
Initial	Height		26.4	26.3	26.5			mm
	Bulk Density		1.84	1.84	1.84			Mg/m ³
	Moisture Content		10.9	10.9	10.9			%
	Dry density		1.66	1.66	1.66			Mg/m ³
	Voids ratio		0.596	0.596	0.596			
	Degree of Saturation		48	48	48			%
Consolidation	Consolidation / Normal Stress applied		50	100	200			kPa
	Change in height during consolidation*		-0.176	-0.346	-0.642			mm
	Voids ratio after consolidation		0.585	0.575	0.557			
After test	Final Moisture content		16.1	15.3	16.1			

Shearing stage(s)								
Rate of displacement	Peak		0.60000	0.60000	0.60000			mm/min
	Residual							mm/min
Peak values, (o)	Relative horizontal displacement		2.50	4.00	2.75			mm
	Shear stress		32.0	75.9	119.5			kPa
	Vertical Movement at peak shear stress*		-0.26	-0.63	-0.78			mm
Residual values, (x)	No. of traverses (including peak run)		1	1	1			
	Relative horizontal displacement							mm
	Shear stress							kPa
	Vertical movement at residual shear stress*							mm



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c'	kPa	10	-
Ø'	degrees	29.5	-

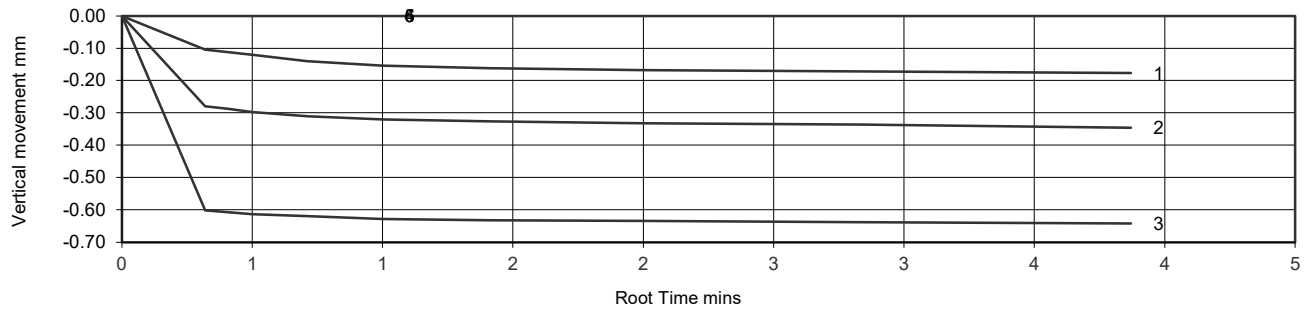
Residual strength, (x)			
c' _R	kPa	not assessed	-
Ø' _R	degrees	not assessed	-

Remarks

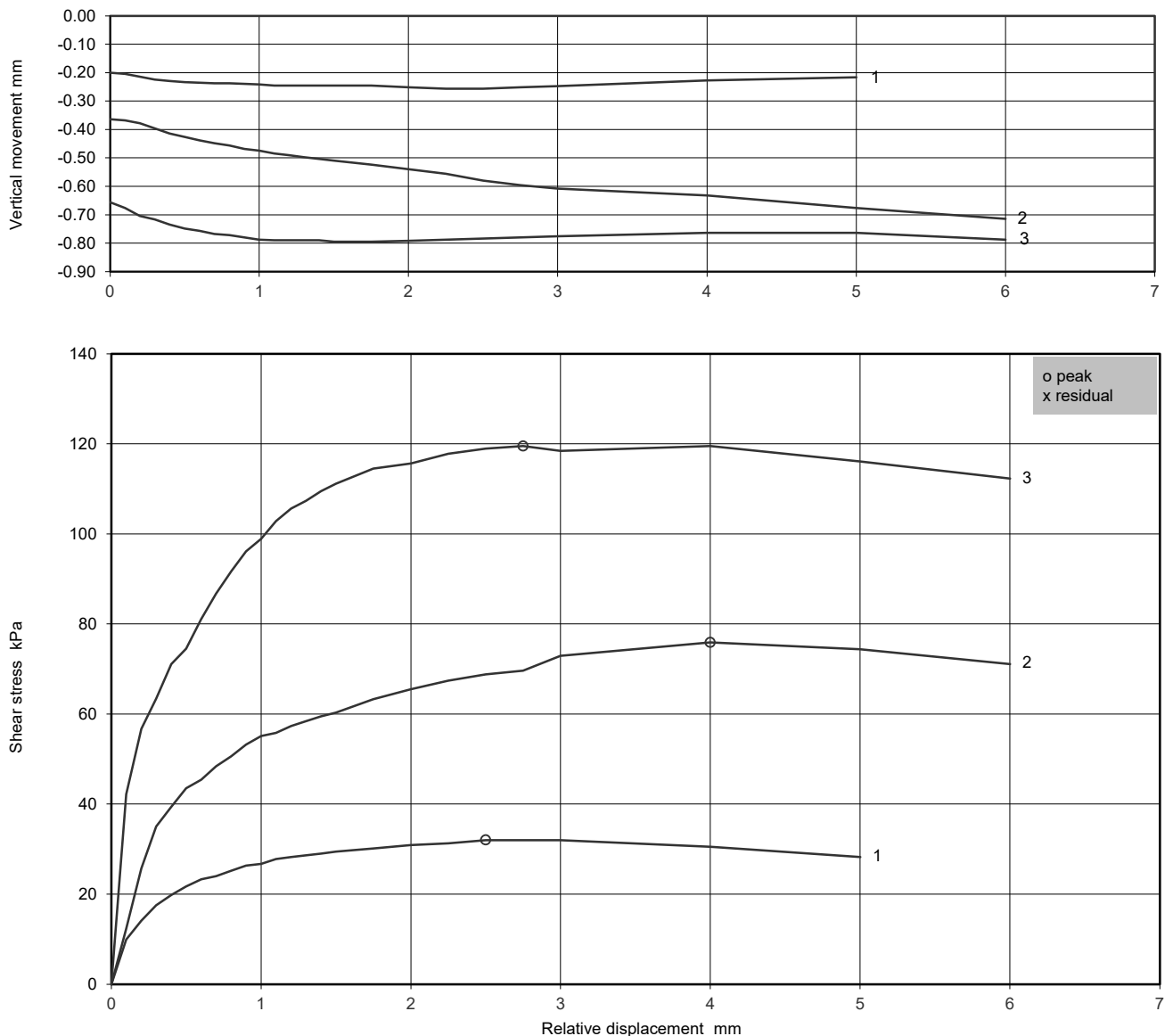
	Date Printed	 	SSB
	24/07/2025		

Determination of shear strength using the Small Direct Shearbox Apparatus		Job Ref	J316449
		Borehole/Pit No.	BH01
Project Name	91 Buckingham Road, Manchester		Sample No.
Soil Description	Brown slightly silty SAND		Depth m
Specimen Reference		Specimen Depth	m
Specimen Description			Sample Type
		KeyLAB ID	TTLP2025071446

Consolidation stage(s)



Shearing stage(s)



*Note : Vertical movement/change in height is recorded as negative for reduced height (settlement) and positive for increased height (swell).

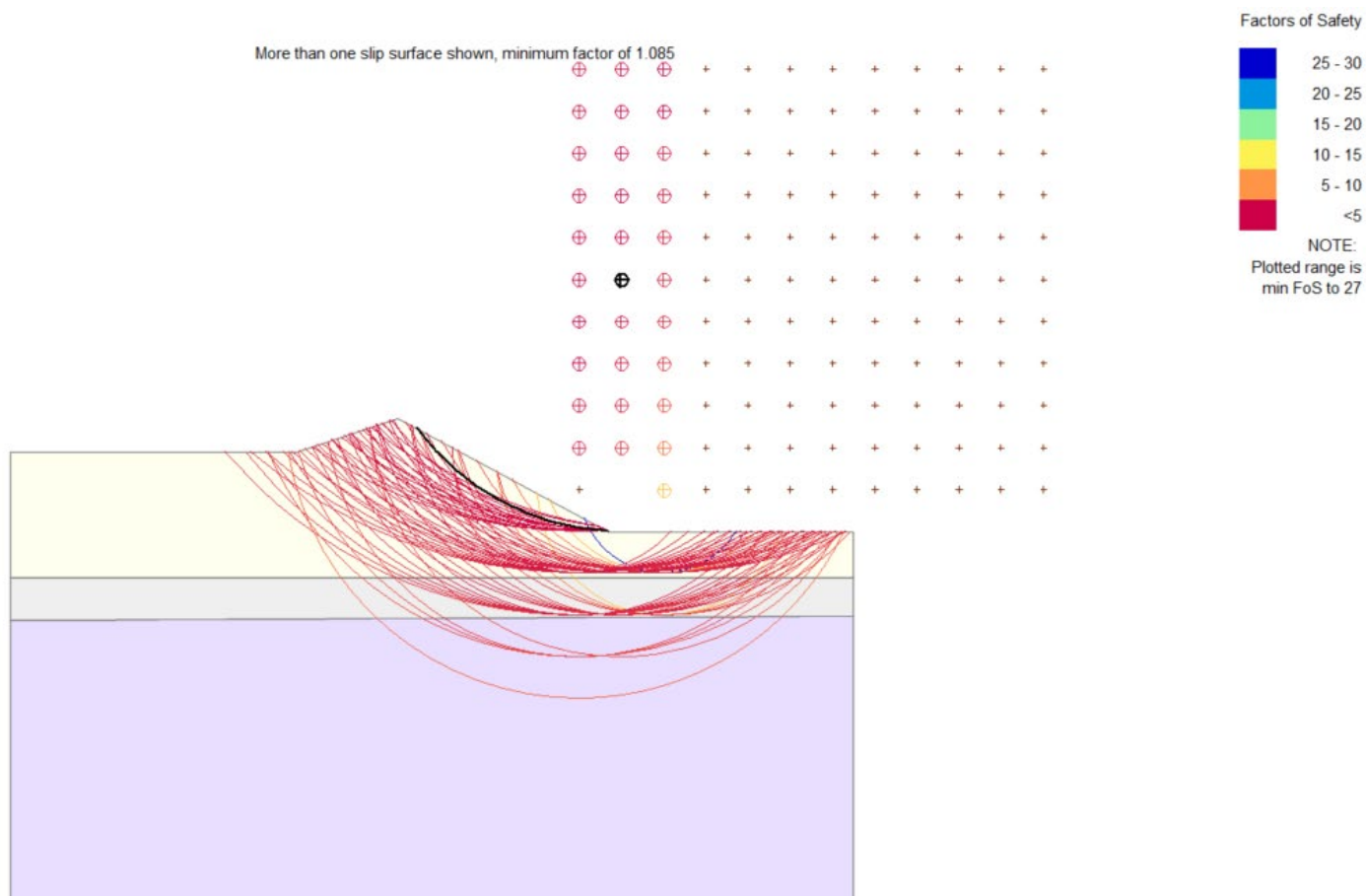
Date Printed

24/07/2025



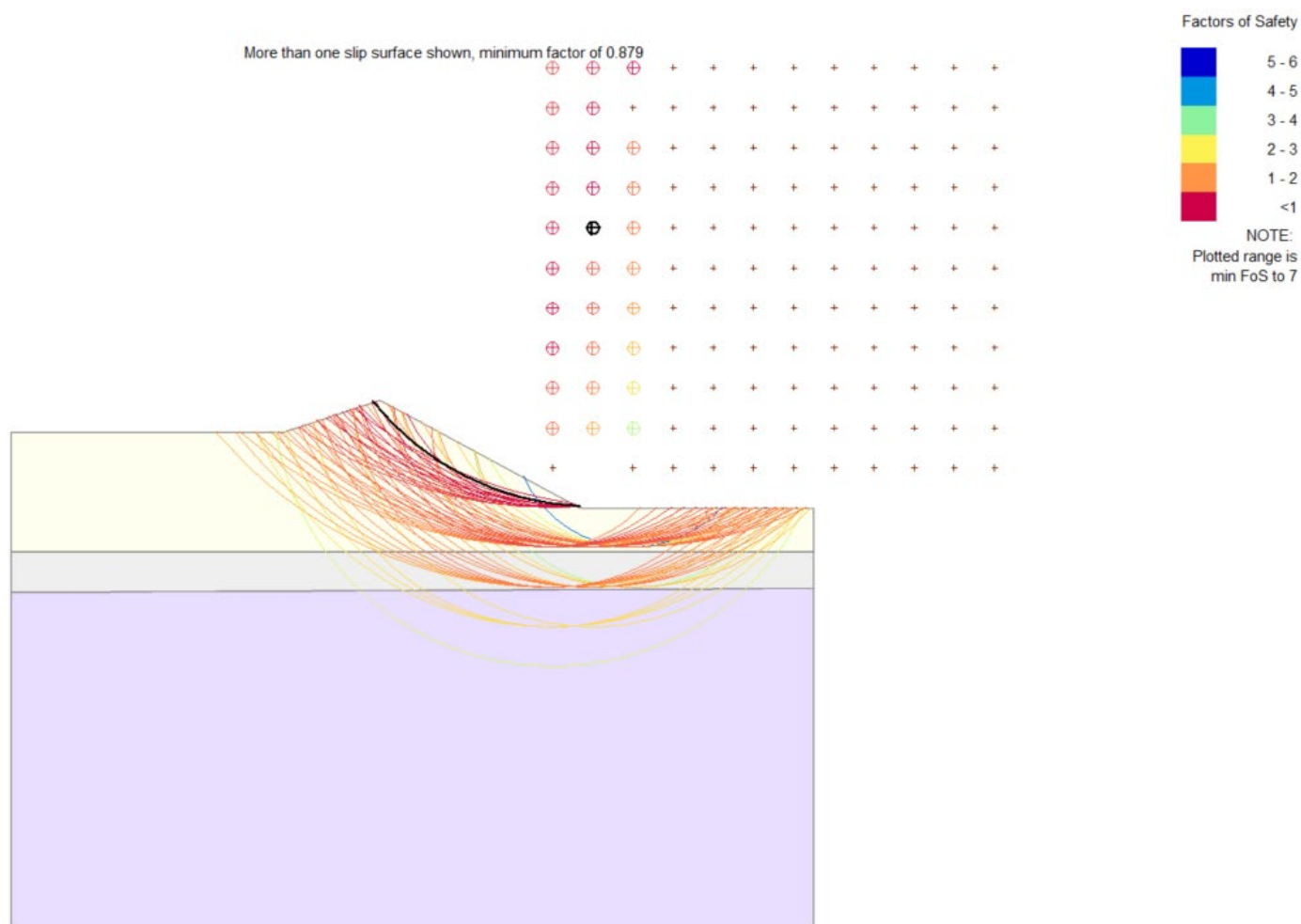
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APPENDIX D



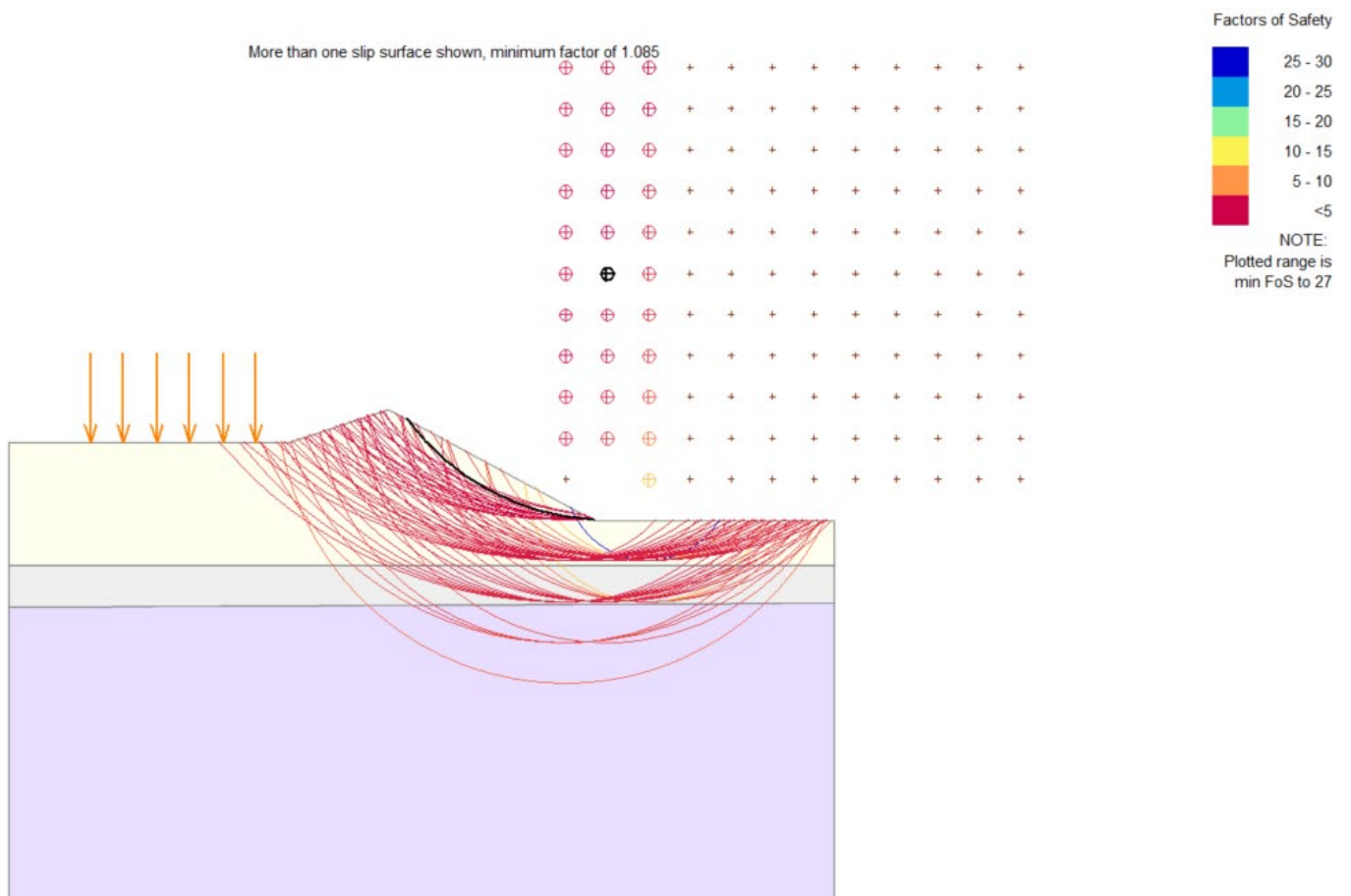
1.1. Existing Slope - Design Approach 1 Combination 1

Title	Date	Solmek Ltd. 12 Yarm Road Stockton-on-Tees TS18 3NA Tel: +44 (0) 1642 607083 Fax: +44 (0) 1642 612355 e-mail: south@solmek.com www.solmek.com  SOLMEK
Slope Outputs	December 2025	
Project	Figure No	
91 Buckingham Road, Manchester	Slope 1	
Client		
Dwayne Campbell		



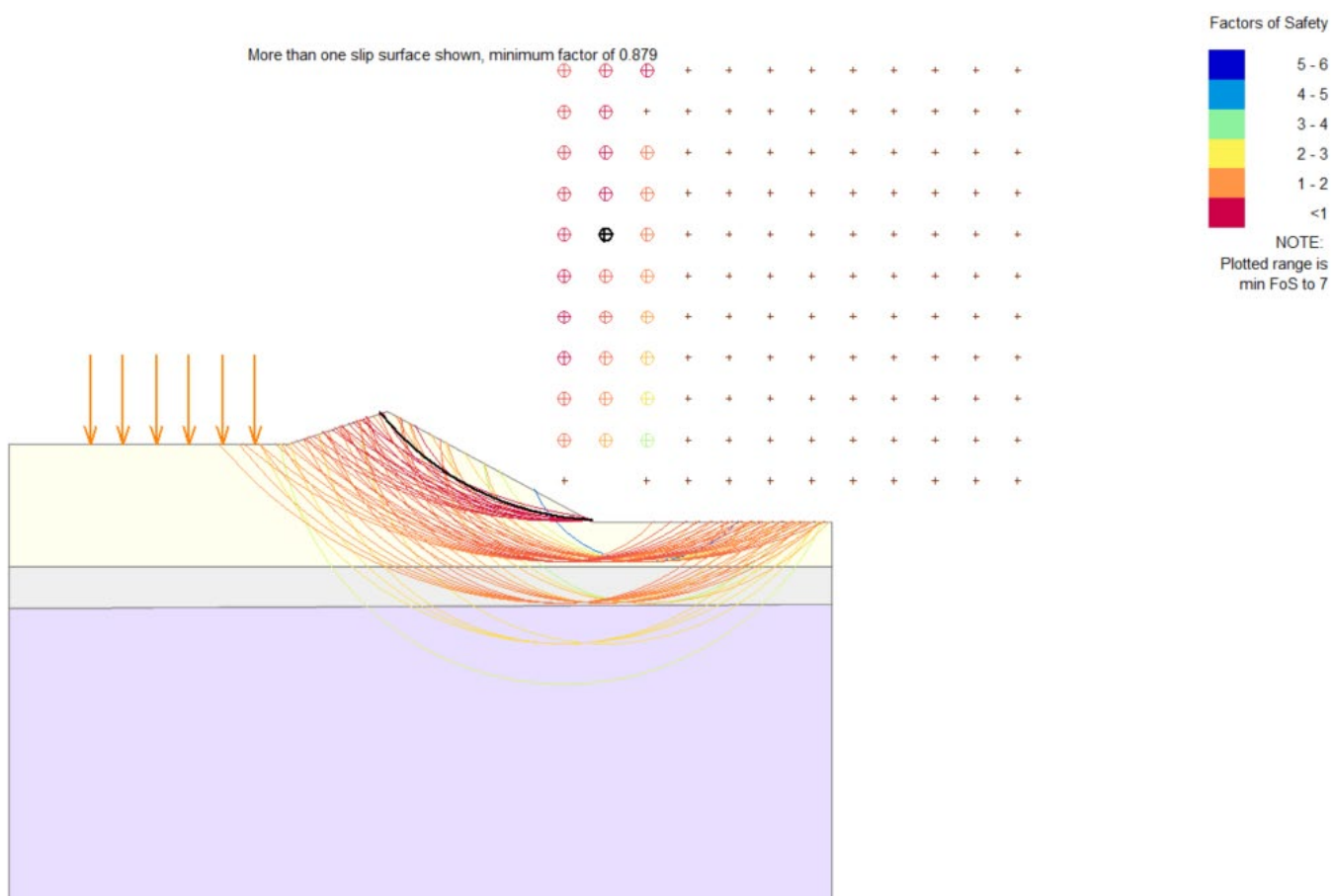
1.2. Existing Slope - Design Approach 1 Combination 2

Title	Date	Solmek Ltd. 12 Yarm Road Stockton-on-Tees TS18 3NA Tel: +44 (0) 1642 607083 Fax: +44 (0) 1642 612355 e-mail: south@solmek.com www.solmek.com  SOLMEK
Slope Outputs	December 2025	
Project	Figure No	
91 Buckingham Road, Manchester	Slope 2	
Client		
Dwayne Campbell		



1.3. Slope with proposed development load modelled - Design Approach 1 Combination 1

Title	Date	Solmek Ltd. 12 Yarm Road Stockton-on-Tees TS18 3NA Tel: +44 (0) 1642 607083 Fax: +44 (0) 1642 612355 e-mail: south@solmek.com www.solmek.com  SOLMEK
Slope Outputs	December 2025	
Project	Figure No	
91 Buckingham Road, Manchester	Slope 3	
Client		
Dwayne Campbell		



1.4. Slope with proposed development load modelled - Design Approach 1 Combination 2

Title	Date	Solmek Ltd. 12 Yarm Road Stockton-on-Tees TS18 3NA Tel: +44 (0) 1642 607083 Fax: +44 (0) 1642 612355 e-mail: south@solmek.com www.solmek.com  SOLMEK
Slope Outputs	December 2025	
Project	Figure No	
91 Buckingham Road, Manchester	Slope 4	
Client		
Dwayne Campbell		

APPENDIX E

♣Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2025)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall 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 as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. 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 mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2011 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.