COCHRANE CONSTRUCTION CONSULTANTS
Email: ccconsultw4@gmail.com
Tel: 07793200529

Project No:	Calc By:
S-2930	BC
Project:	
161 ARLINGTON ROAD,LONDON NW1 7ET	
Date:	**Rev:**
01 February 2024	0

Title: Structural Calculations for Proposed Refurbishment of 161 Arlington Road

Section 7 Superstructure elements

Cpe

Front wall	D/H < 1		0.85
Side wall			-1.3
Roof		A	-1.9
		B	-1.3
		C	-0.7
		D	±0.2

Cpi

Two walls pereamble		0.2
		-0.3

Cp

		Cp	Length	
parapet without returns	A	3.4	0.225	m
	B	2.1	1.5	
	C	1.7	3	
	D	1.2	3.7	

Side Wall qs = 0.33 kPa Ca = 0.97 k = 0.7

p = qs . Ca (Cpe-Cpi)	Cpe-Cpi =	1.15	P= 0.368 kPa	windward
		-1.5	P= -0.481 kPa	side

Parapet

L 3.7 m <15h = 11.25 with L/h = 4.933 gives reduction factor

h = Hr = 0.75 m max k = 0.7

					start	end	length
p = qs . Cp . Ca . K	A	Pa =	0.763	kPa	0.00	0.23	0.23
	B	Pb =	0.471	kPa	0.23	1.50	1.28
	C	Pc =	0.381	kPa	1.50	3.00	1.50
	D	Pd =	0.269	kPa	3.00	3.70	0.70

Roof - check for uplift

Roof loads Dead 0.898

Live 1.5

	Cpe	Cpi	Cpe-Cpi	p	
A	-1.90	0.20	-2.10	-0.67	OK
B	-1.30	0.20	-1.50	-0.48	OK
C	-0.70	0.20	-0.90	-0.29	OK
D	-0.20	0.20	-0.40	-0.13	OK
	0.20	-0.30	0.50	0.16	OK

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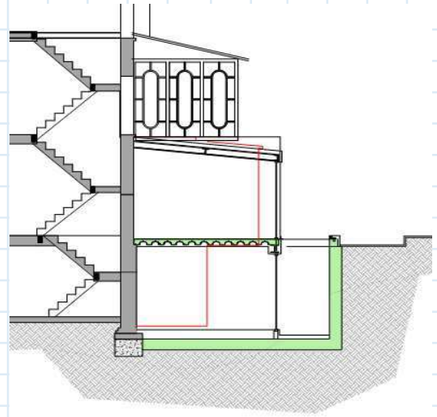
Section 7 Superstructure elements

Rear Extension Side Walls- masonry design **To BS5628-1**

Side walls	Width	3700	mm	
	Storey Height	2850	mm	max
	Parapet	750	mm	



Density brick	20	kN/m3	set in type (iii) 1:1:6 mortar
Density block	18	kN/m3	

Assume 100 block inner leaf / 100 cavity / 102.5 brick outer leaf

Vertical Capacity

Total height of wall above ground floor		2850	mm	
Panel width		3700	mm	
effective height = height between aupport =		2850	mm	
effective thickness = 2/3 (ti + to) =		135	mm	h/t = 21.11 < 40 - therefore panal ok
	λ =	21.11		less than 27 - okay

Tb7 gives ecc = 0.1 t β = 0.53 Ym = 3.1 t = 100

Vert load resistace Vr = (β . t / Ym) . fk = 17.1 x (fk) N/mm

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Section 7 Superstructure elements

							Dead	Live	
Self wt of wall = ρ . t . h =							5.13		
Beams - assume to act as udl along full length									
	R dead		R live		width =				
B5	4.15		3.08		3.7	m	1.122	0.832	
B4	2.17		1.54				0.586	0.416	
						SLS	**6.838**	**1.249**	
Yf	dead	1.4	live	1.6		ULS	**9.573**	**1.998**	
Vd =	11.57	kN/m		stress vd =			0.116	N/mm2	
vr = vd, gives fk reqd =				0.677	N/mm2				**Try 2.8N block**

Block

Tb 2c with type (iii) mortar gives reqd compressive strength of unit = 2.8 N/mm2

fk =	2.8	N/mm2							
fkx	parallel	0.25	N/mm2		perpendicular	0.4	N/mm2		

Block

	N/mm2
fk =	**2.8**
fkx par=	**0.25**
fkx prp	**0.4**

Brick

20N brick in type(iii0 mortar water absorption between 7% and 12%

fk =	5.8	N/mm2							
fkx	parallel	0.4	N/mm2		perpendicular	1.1	N/mm2		

Brick

	N/mm2
fk =	**5.8**
fkx par=	**0.4**
fkx prp	**1.1**

Padstones

To CP 111, using 2.8N block in 1:1:6 mortar, comp stress = 0.28 N/mm2

t = 100 mm Ym = 3.1

	R dead	R live	Total kN	Bearing factor	Local cap	Area reqd	L reqd (mm)
B5	4.15	3.08	7.23	1.5	1.355	5336	53
B4	2.17	1.54	3.71	1.25	1.129	3286	33

Lateral Loading

Assume wall is: simply supported at ground floor
simply supported at existing rear wall
continuous over first floor and roof
free on rear edge ***Tb 9 - case L***

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Section 7 Superstructure elements

Wind Loading

From wind loading (see above) Wk = 0.368 kPa
Yf = 1.4

Panal

L = 3700 h/L = 0.77
h = 2850
teff = 135

	μ	α	α from Tb9 / L
Brick	0.364	0.06	
Block	0.625	0.043	

Ck panal (cl 36.3)
hl < 1350 teff2
10545000 < 24603750 OK

Design Moment Md

Assume wall spans vertically
Md = $W_{kγf}h^2/8$ = 0.524 kNm

Moment of resistance Mr

Mr = $\frac{f_{kx}}{\gamma_m} Z$

Ym = special / normal = 3.1 Z = bd2/6

fkx parallel enhanced by self weight over
enhanced fkx = fkx' = fkx + Ym (gd . Yfg) Yfg = 0.9

Use masonry stress at mid height of panels

	Ht		Density	tk	Load	gd	Ym.gd.Yfg	fkx	fkx'	Z	Mr
	m		kN/m3	mm	kN/m	N/mm2	N/mm2	N/mm2	N/mm2	mm3	kNm
Grd	4.81	brick	20	102.5	9.8605	0.096	0.268	0.4	0.668	1751041.7	0.38
	4.81	block	18	100	8.658	0.087	0.242	0.25	0.492	1666666.7	0.26
											0.64

Mr ground 0.64 kNm > Design Moment Md 0.524 kNm

Main panels okay

Parapet Treat as freestanding wall (cantilever)

750 mm $M_d = Y_f w l^2/2$ Y_f = 1

Maximum height =

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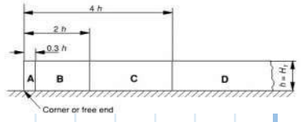
Title: Structural Calculations for Proposed Refurbishment of 161 Arlington Road

Section 7 Superstructure elements

Design Moment Md

Wind loading from above

		start	end	length	Md
	p	0.000	0.225	0.225	0.3
Zone A	0.763	0.225	1.500	1.275	0.185
Zone B	0.471	1.500	3.000	1.500	0.15
Zone C	0.381	3.000	3.700	0.700	0.106
Zone D	0.269	m	m	m	kNm
	kPa				



Ym = 3.1

Moment of Resistance Mr

	Tk	Z	fkx	Mr
brick	102.5	1751041.7	0.4	0.226
block	100	1666666.7	0.25	0.134
				0.360
				kNm

Panel okay for all zones

UF = 0.833 (zone A)

Support to leading edge

Double exposure of parapet and cyclic nature of loading on leading edge - add windpost on leading edge fixed to steels

Design loading

Wind Loading (0.225)*zone A + (1-0.225)*zone B

= 0.537 kPa Υ_f = 1.6 I = 1000 mm

Wk = 0.859

M = wl2/2 = 0.268 Zreqd = M/σ σ= 275 N/mm2

Zreqd = 975.62052 mm3 δ =wk l4/8EI δlimit = span /

500

2 mm

I reqd = w l^4/8Eδ

##

mm4

60x60x5 SHS Z 18100 mm3

I 544000 mm4 δ = 0.96 mm

Deflection of beam will give deflection on windpost

152x89UB (Initial B4 section)

w 1.55 kN/m

I 838 cm4 8380000 mm4

e 205000

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Section 7 Superstructure elements

L 4100

Slope wl^3 / 24 EI = 0.002591 radians = 148.5 degrees

3.139 = 31.54 deg from horz

Wind post 1000 mm long

beam deflection = 2.59

post deflection = 0.96

total deflction = 3.55 mm Deflection = span / ##

Try 152UC23

w 1.55 kN/m

I 1250 cm4 12500000 mm4

e 205000

L 4100

Slope wl^3 / 24 EI = 0.001737 radians = 0.1 degrees

3.140 = 179.9 deg from horz

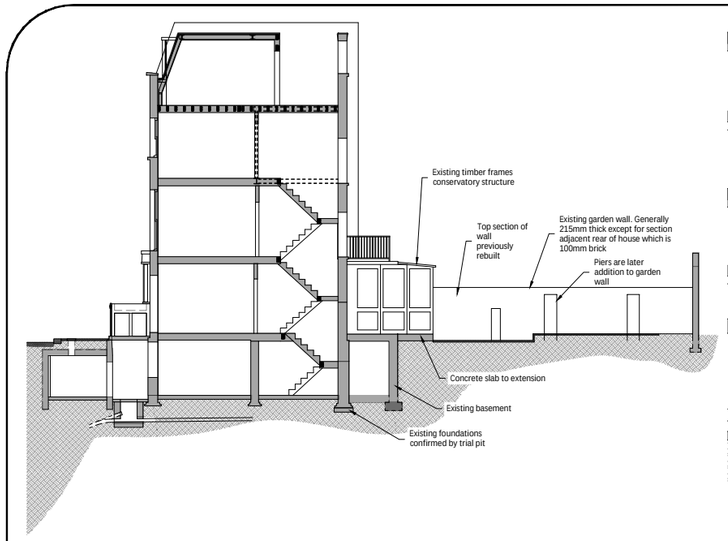
beam deflection = 1.74

post deflection = 0.96

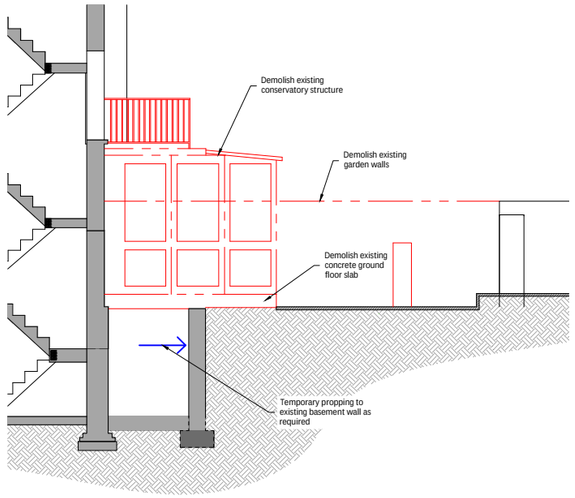
total deflection = 2.70 mm Deflection = span / 370.5

Change B4 to 152UC23

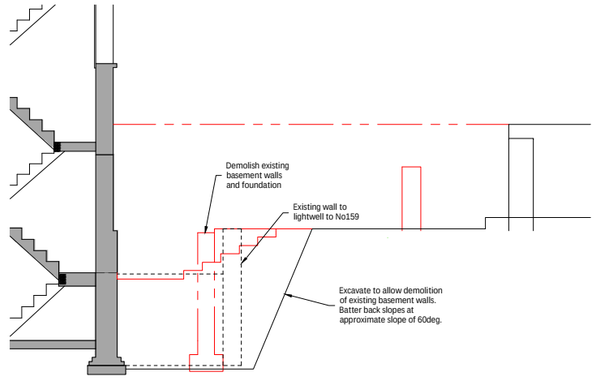
APPENDIX D – CONSTRUCTION SEQUENCE



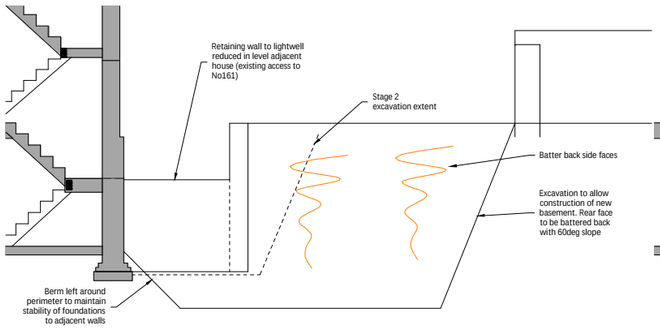
STAGE 0 - EXISTING BUILDING



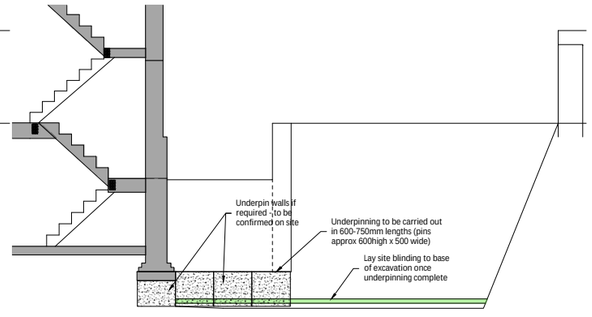
STAGE 1 - SITE PREPARATION & INITIAL DEMOLITION



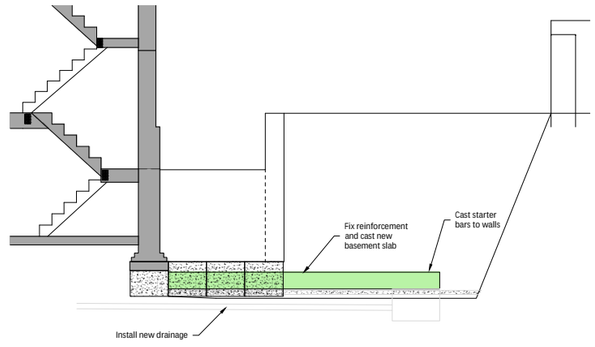
STAGE 2 - COMPLETION OF DEMOLITION



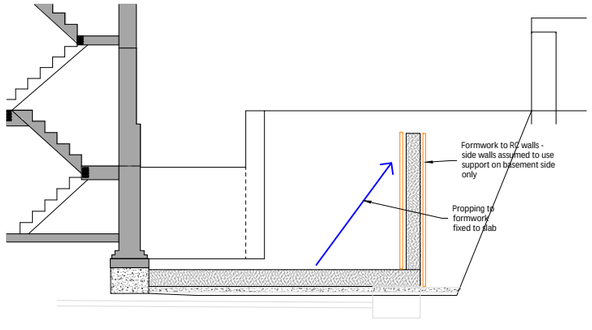
STAGE 3 - EXCAVATION



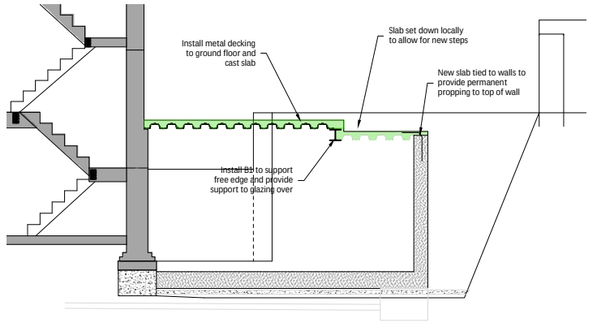
STAGE 4 - UNDERPINNING



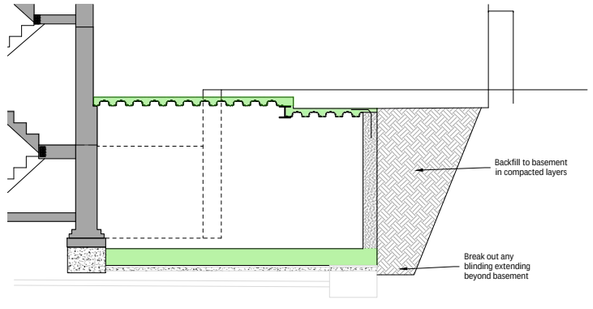
STAGE 5 - CAST BASEMENT SLAB



STAGE 6 - CAST BASEMENT WALLS



STAGE 7 - CONSTRUCT GROUND FLOOR SLAB



STAGE 8 - BACKFILL

General Notes

NOTES

Sequence shown is that assumed in the design for the rebuilding of the rear extension to 161 Arlington Road and referenced in the Basement Impact Assessment submitted as part of the planning application to Camden.

Existing foundations shown are based on site investigation carried out by Fastrak.

Extent of works to garden walls to be agreed with neighbouring properties under Party Wall process

No.	Revision/Issue	Date

COCHRANE CONSTRUCTION CONSULTANTS

Mob: 07793200529
Email: ccconsultw4@gmail.com

Client

Project Name and Address

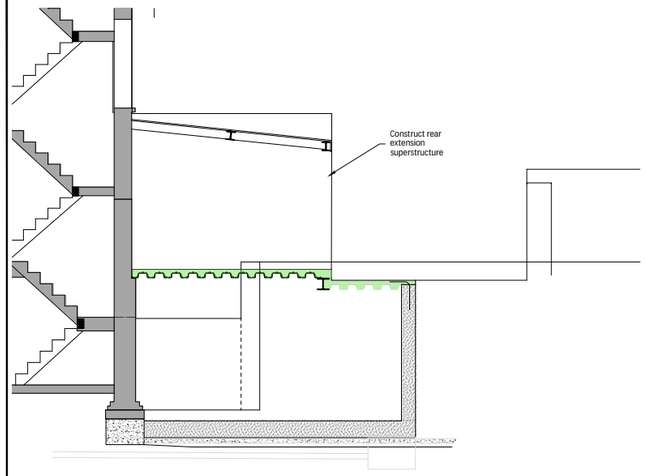
161 ARLINGTON ROAD
LONDON NW1 7ET

Proposed Structure
Sequence of Construction
1 of 2

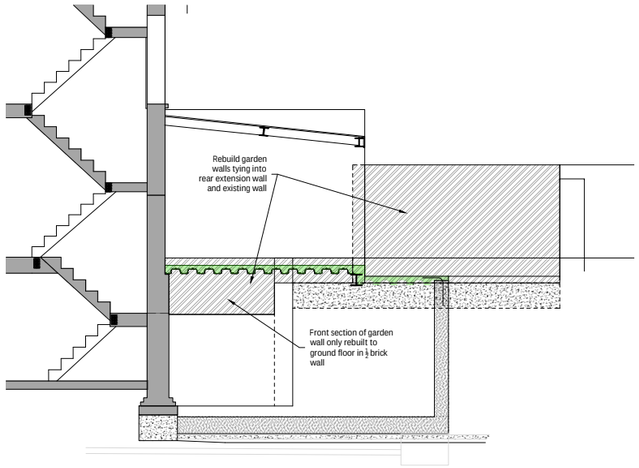
Drawn: BC	Project: S 2930
Date: 20.01.2024	Sheet: TW 001
Scale: 1:50 @ A1, 1:100 @ A3	Rev: --

S 2930 - 161 AR Sequence.dwg

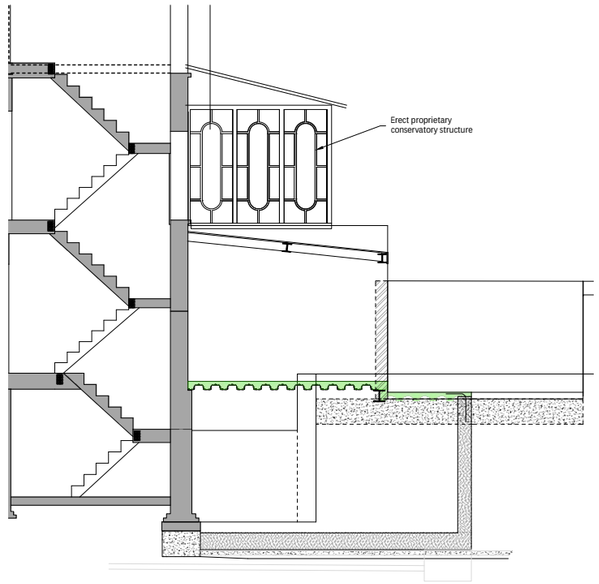
8 April 2024



STAGE 9 - CONSTRUCT SUPERSTRUCTURE



STAGE 10 - REBUILD GARDEN WALLS



STAGE 11 - COMPLETION

General Notes

No.	Revision/Issue	Date

COCHRANE CONSTRUCTION CONSULTANTS

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Email: ccconsultw4@gmail.com

Client

Project Name and Address
161 ARLINGTON ROAD
LONDON NW1 7ET

Proposed Structure
Sequence of Construction
2 of 2

Drawn: BC	Project: S 2930
Date: 20.01.2024	Sheet: TW 002
Scale: 1:50 @ A1, 1:100 @ A3	Rev: --

S 2930 - 161 AR Sequence.dwg

8 April 2024

APPENDIX E – SITE INVESTIGATION REPORT

Geotechnical Survey Report

FSI Ref: 27798
Issue Date: January 2024

Risk Address: 161 Arlington Road,
Camden,
London,
NW1 7ET

Managing Director: Martin Rush MSc FGS
Finance Director: Louise Banks BSc (Hons)

Laboratory Manager: Jade McLellan

Senior Geologist: Thomas Lee BSc (Hons)
Assistant Geologist: Sarah Brand
Geotechnical Assistant: Bradley Webb

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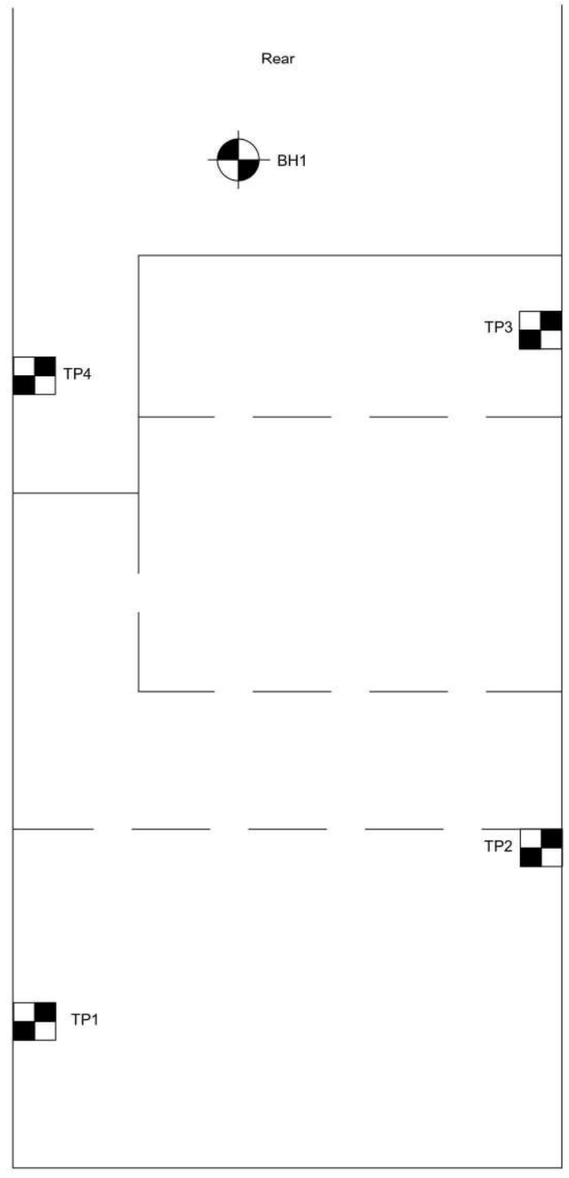
197-199 High Street, Maldon, Essex CM9 5BU
Telephone: 0844 3358908
Fax: 0844 3358907
Email:enquiries@fastrackgroup.co.uk
Web: www.fastrackgroup.co.uk

Appendix No: 1
FSI Ref: 27798

SITE PLAN

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: N/A **Survey date:** 12/02/2024 **Operative:** SE1



Scale:	Drawn by:	Key:
NTS	TL	Trial Pit, Borehole, Manholes, Rain Water Pipe, Soil & Vent Pipe, Surface Water Gully, Foul Water Gully, Shrub, Tree (Conifer), Tree (Deciduous)

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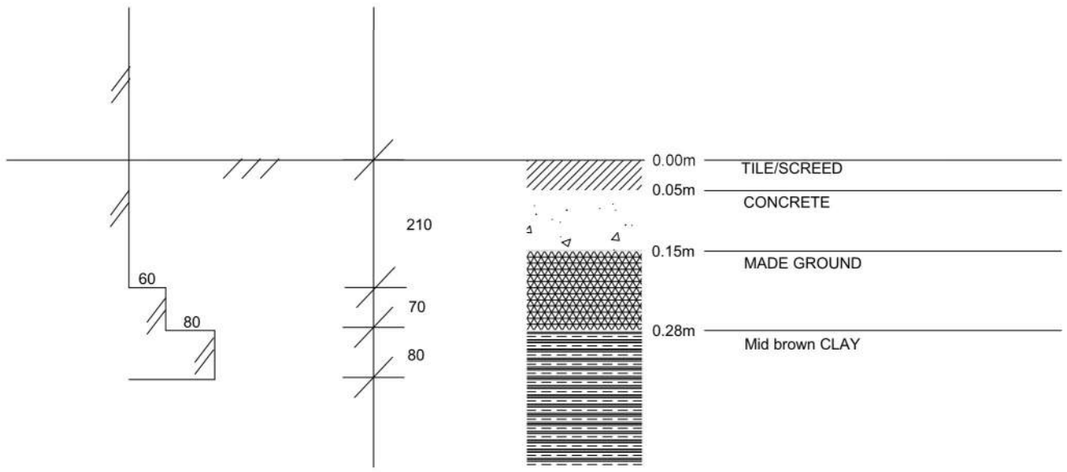
Email:enquiries@fastrackgroup.co.uk
Web: www.fastrackgroup.co.uk

Appendix No: 2
FSI Ref: 27798

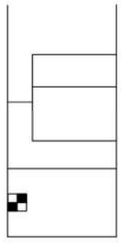
TRIAL PIT 1

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: N/A **Survey date:**12/02/2024 **Operative:** SE1



D1 @ F.L. (0.42m)
Founding strata: Mid brown CLAY

Trial Pit Location:



Drawn by: TL

Scale: 1:10

D= small disturbed sample, B= large bulk sample, U= undisturbed sample,
MP= mackintosh proble blow counts, V= shear vane reading (kPa)

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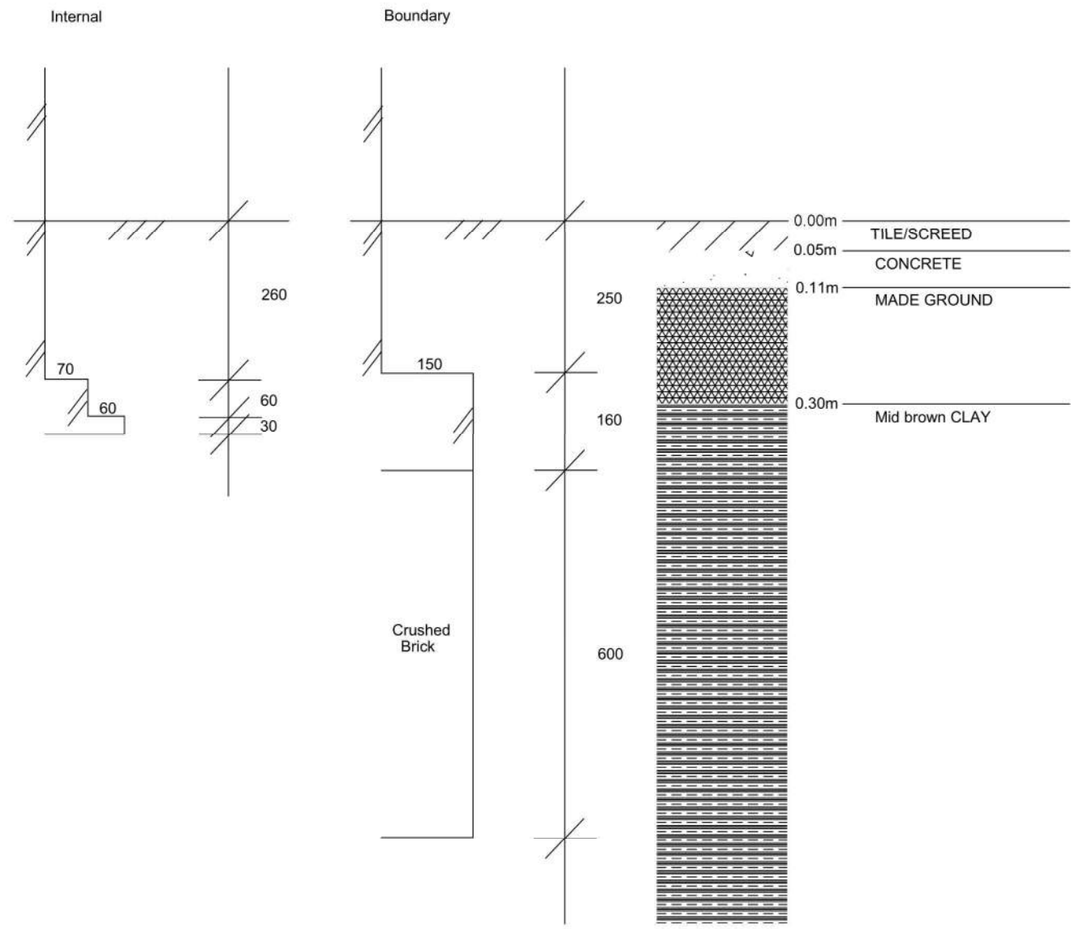
Web: www.fastrackgroup.co.uk

Appendix No: 2
FSI Ref: 27998

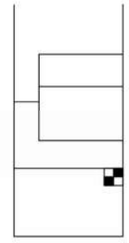
TRIAL PIT 2

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: N/A **Survey date:**12/02/2024 **Operative:** SE1



D1 @ F.L. (1.01m)
Founding strata: Mid brown CLAY

Trial Pit Location:



Drawn by: TL

Scale: 1:10

D= small disturbed sample, B= large bulk sample, U= undisturbed sample,
MP= mackintosh proble blow counts, V= shear vane reading (kPa)

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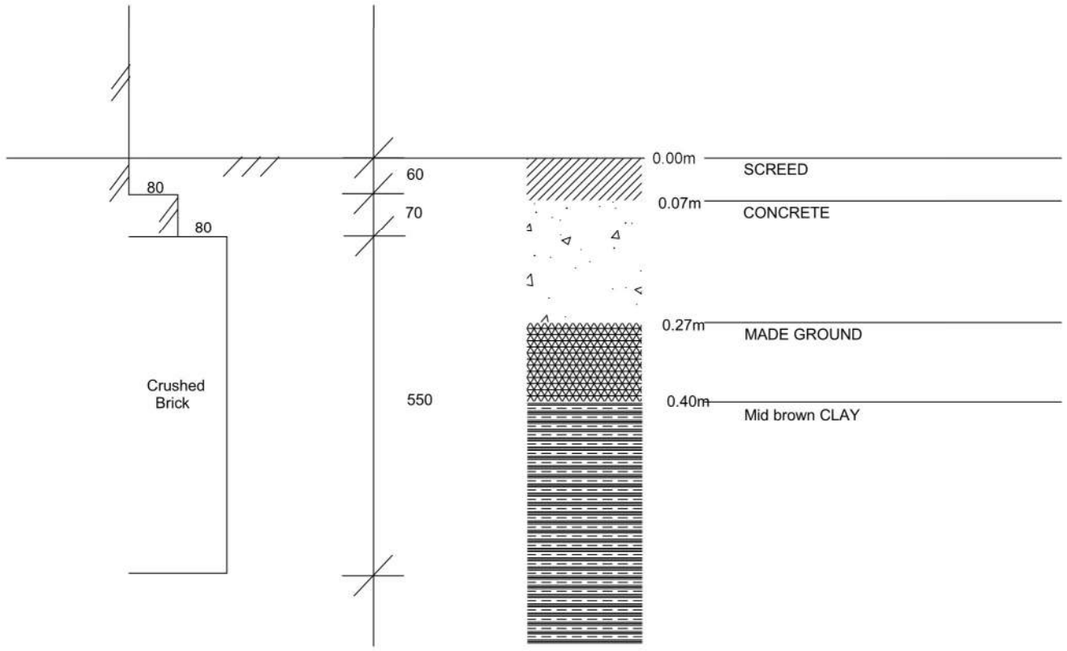
Web: www.fastrackgroup.co.uk

Appendix No: 2
FSI Ref: 27798

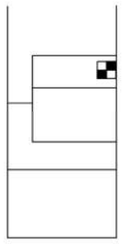
TRIAL PIT 3

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: N/A **Survey date:**12/02/2024 **Operative:** SE1



D1 @ F.L. (0.68m)
Founding strata: Mid brown CLAY

Trial Pit Location:



Drawn by: TL

Scale: 1:10

D= small disturbed sample, B= large bulk sample, U= undisturbed sample,
MP= mackintosh proble blow counts, V= shear vane reading (kPa)

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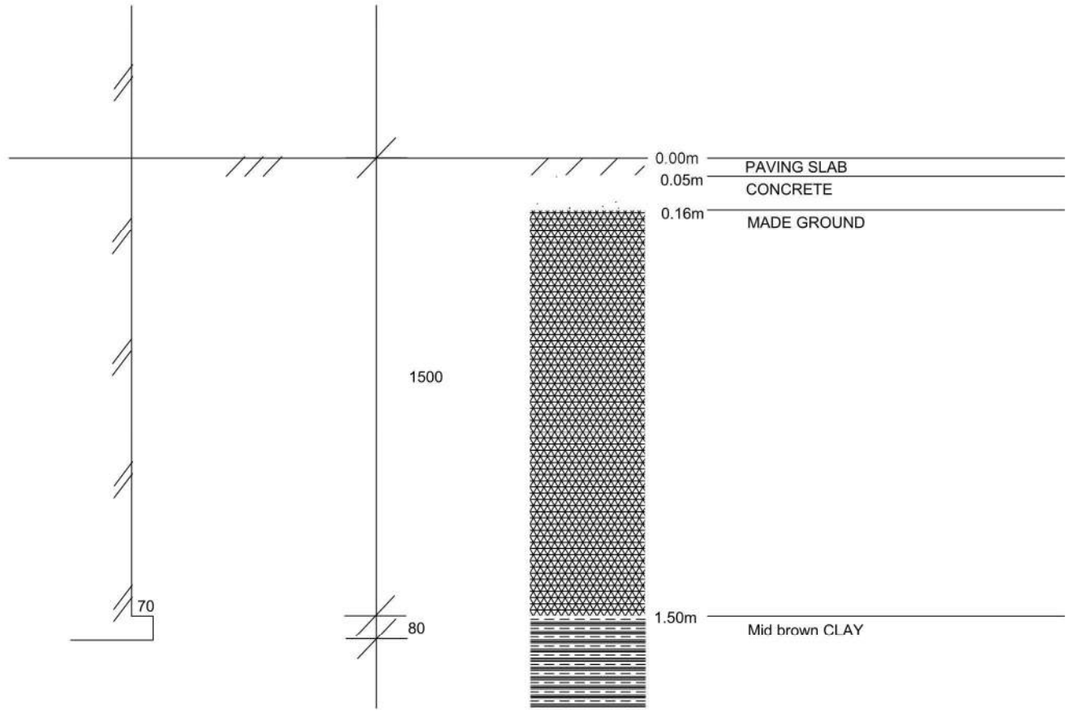
Web: www.fastrackgroup.co.uk

Appendix No: 2
FSI Ref: 27798

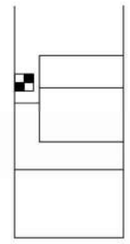
TRIAL PIT 4

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: N/A **Survey date:**12/02/2024 **Operative:** SE1



D1 @ F.L. (1.58m)
Founding strata: Mid brown CLAY

Trial Pit Location:



Drawn by: TL

Scale: 1:20

D= small disturbed sample, B= large bulk sample, U= undisturbed sample,
MP= mackintosh proble blow counts, V= shear vane reading (kPa)

FASTRACK

Fastrack Site Investigations Ltd
Unit 9, Tyndales Farm
Southend Road
Maldon CM9 6TQ

Borehole Log

Borehole No. **BH1** Sheet 1 of 1

Project Name:	161 Arlington Road	Project No. 27798	Site Date:
Location:	161 Arlington Road, Camden, London, NW1 7ET		
Client:	Fourwalls London Construction Ltd		

Hole Type: BH | Scale: 1:27 | Logged By: SE1

Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Legend	Stratum Description
				0.12		TOPSOIL
						MADE GROUND
	0.50	D	V (kPa) = 38 V (kPa) = 38	0.45		Mid brown CLAY
	1.00	D	V (kPa) = 60 V (kPa) = 62			
	1.50	D	V (kPa) = 76 V (kPa) = 80			
	2.00	D	V (kPa) = 100 V (kPa) = 104			
	2.50	D	V (kPa) = 124 V (kPa) = 130	2.20		Mid brown sandy CLAY
						2.40m - Mid brown CLAY begins to show grey mottling.
	3.00	D	V (kPa) = 138 V (kPa) = 140			
	3.50	D	V (kPa) = 140			
	4.00	D	V (kPa) = 140			
	4.50	D	V (kPa) = 140			
▼						4.90m - Standing water
	5.00	D	V (kPa) = 140	5.00		End of Borehole at 5.000m

Key: D - Disturbed Sample V - Insitu Vane Test MP - Mackintosh Probe Test

Remarks: Borehole closed at 5.00m upon completion.
No roots observed.

AGS

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Appendix No: 3
FSI Ref: 27798

LABORATORY RESULTS

Property Address: 161 Arlington Road, Camden, London, NW1 7ET

SAMPLE DETAILS

Investigation date:	**12/02/2024**
Sample details:	**Bags as received**
Samples received:	**13/02/2024**
Schedule recieved:	**13/02/2024**
Samples tested:	**14/02/2024-19/02/2024**
Results reported:	**19/02/2024**

ANALYSIS REQUESTED

Moisture Content	☑	PSD	☑
Liquid Limit	☑	Soil Suction	☐
Plastic Limit	☑	Shear Strength	☐
Plasticity Index	☑	Contamination	☐
Root ID	☐	Root/Tree DNA	☐
		No roots found	

TEST DETAILS

General

Sample descriptions were written in accordance with BS 5930:1999.

Samples were prepared in accordance with BS 1377: Part 1: 1990, section 7

Samples from this contract will be retained for 1 calender month following the issue of this report unless otherwise notified

Written approval is required from Fastrack Site Investigations Limited to reproduce report in full. The results shown within this report only relate to the samples tested

Moisture Content

Samples were tested in accordance with BS 1377: Part 2: 1990, section 3.2 (Oven drying method)

In accordance with Note 1 to paragraph 3.2.4 of BS 1377 Part 2 1990; these moisture contents have been corrected to give the equivalent moisture content of the fraction passing the 425µm sieve, to enable comparison with the liquid & plastic limits. (If condition of test is 'natural' the retained percentage is an estimated value, if condition is 'washed' the percentage is a measured value).

Samples are dried at 105-110°C unless otherwise stated.

Atterberg Limits

Samples were tested in accordance with BS 1377: Part 2: 1990, section 4.3 (4 drop LL), 4.4 (1 drop LL), 5.3 (PL) and 5.4 (PI)
Test results on samples with a sand content, may show less accurate results. If condition of test is 'washed' results relate to the fraction passing the 425µm sieve only.

* *Driscoll's rules deem the soil to be desicated where the moisture content is less than the value calculated using driscoll's rule 1 and/or 2*

Particle Size Distribution

Samples were tested in accordance with BS 1377: Part 2: 1990 section 9.2 (Wet sieving method)

Undrained Shear Stength

Samples were prepared in accordance with BS 1377: Part 7: 1990 section 8.3 and testing in accordance with BS 1377: Part 7: 1990: section 8.4 (undrained shear strength in triaxial compression without measurement of pore pressure (UU))

Soil Suction

Samples were prepared and tested based on the BRE digest No:IP4/93 (Corrected). 'A method of determining the state of desiccation in clay soils.' (Filter paper method).

Test results on samples with a sand or silt content, may show less accurate results. Deviation to standard procedure - Polythene bags are not used from weighing filter papers.

FASTRACK

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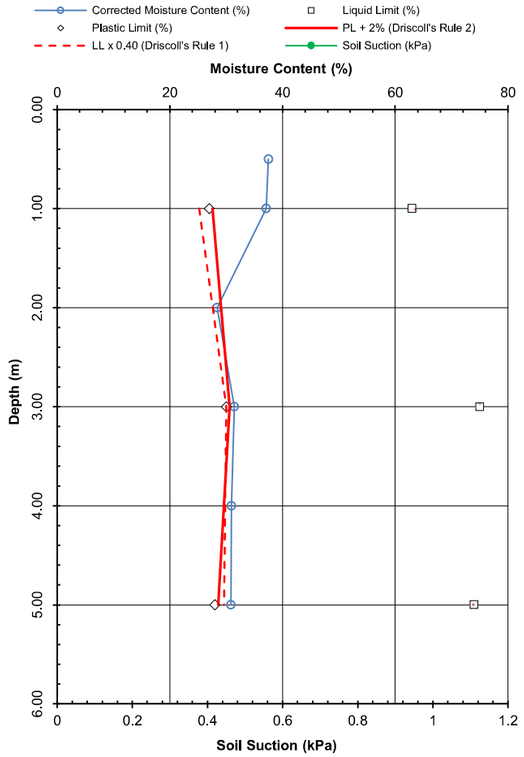
Appendix No: 3
FSI Ref: 27798

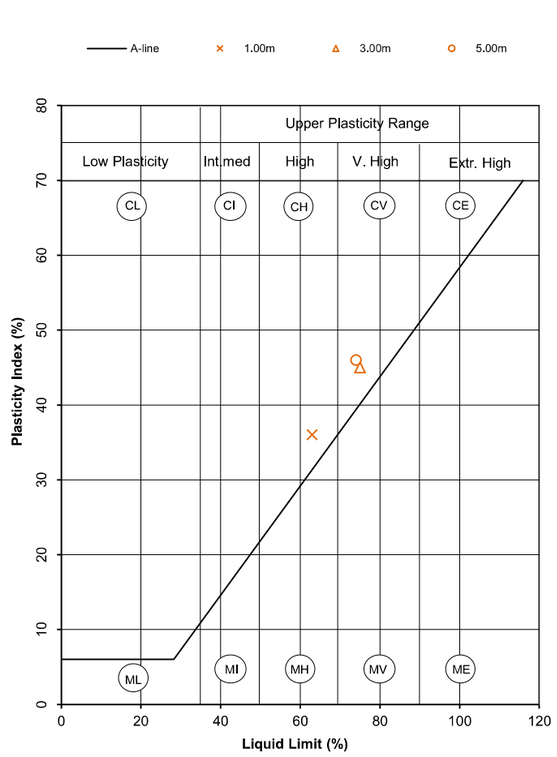
LABORATORY RESULTS

Property Address: 161 Arlington Road, Camden, London, NW1 7ET
Client Claim Ref: 0

BOREHOLE 1

Depth (m)	MC (%)	Corr. MC (%)	LL (%)	PL	PI (%)	Class	% Retained (425µm)	Soil Suction (kPa)	Condition of test	Soil Description
0.50	37.5	37.5					0		Natural	Brown silty CLAY
1.00	35	37.12	63	27	36	CH	5.72		Natural	Brown silty CLAY containing grey and orange mottle and gravel
2.00	28.4	28.4					0		Natural	Brown silty CLAY containing grey and orange mottle
3.00	31.4	31.4	75	30	45	CV	0		Natural	Brown silty CLAY containing grey mottle
4.00	30.9	30.9					0		Natural	Brown silty CLAY containing grey mottle
5.00	30.8	30.8	74	28	46	CV	0		Natural	Brown silty CLAY containing grey mottle and gypsum





Comments: Samples dried in 75° due to the presence of gypsum

Reported by: Issy Acerbis
Checked by: Jade McLellan

ELAB
UKAS TESTING 2683
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Certificate of Analysis

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 24-52393

Issue: 1

Date of Issue: 21/02/2024

Contact: Martin Rush

Customer Details: Fastrack Site Investigations Ltd
197-199 High Street
Maldon
EssexCM9 5BU

Quotation No: Q24-04367

Order No: 5000/27798

Customer Reference: 27798

Date Received: 16/02/2024

Date Approved: 21/02/2024

Details: 161 Arlington Road, Camden, London, WW1 7ET

Approved by:

Tim Reeve, Technical Coordinator

Sample Summary

Report No.: 24-52393, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
353075	BH1 D2 1.00	12/02/2024	16/02/2024	Silty clayey loam	
353076	BH1 D4 2.50	12/02/2024	16/02/2024	Silty clayey loam	

Results Summary

Report No.: 24-52393, issue number 1

			ELAB Reference	353075	353076
			Customer Reference	D2	D4
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH1	BH1
			Sample Depth (m)	1.00	2.50
			Sampling Date	12/02/2024	12/02/2024
Determinand	**Codes**	**Units**	**LOD**		
Soil sample preparation parameters					
Moisture Content	N	%	0.1	25.1	20.5
Material removed	N	%	0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	None
Anions					
Water Soluble Sulphate	M	g/l	0.02	0.04	2.01
Miscellaneous					
pH	M	pH units	0.1	9.8	8.9

Method Summary

Report No.: 24-52393, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
pH	M	Air dried sample	19/02/2024	113	Electromeric
Water soluble anions	M	Air dried sample	19/02/2024	172	Ion Chromatography

Report Information

Report No.: 24-52393, issue number 1

Key	
U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
NS	Subcontracted to approved laboratory. UKAS accreditation is not applicable.
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"
LOD	LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.
ELAB are unable to provide an interpretation or opinion on the content of this report.
The results relate only to the sample received.
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request
Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Deviation Codes

a	No date of sampling supplied
b	No time of sampling supplied (Waters Only)
c	Sample not received in appropriate containers
d	Sample not received in cooled condition
e	The container has been incorrectly filled
f	Sample age exceeds stability time (sampling to receipt)
g	Sample age exceeds stability time (sampling to analysis)

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month
All water samples will be retained for 7 days following the date of the test report
Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

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

End of Report