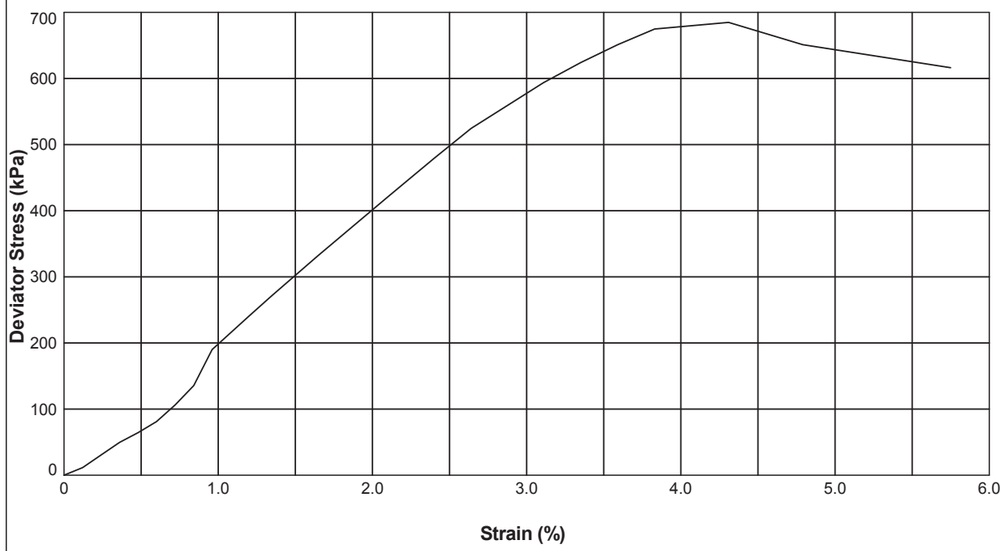
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BH1** Sample Ref: **6** Sample Type: **U** Depth (m): **16.50**

Description : **Dark grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	103.62		
	Height	(mm)	208.67		
	Moisture Content	(%)	24		
	Bulk Density	(Mg/m^3)	2.02		
	Dry Density	(Mg/m^3)	1.63		
TEST DETAILS	Membrane Thickness	(mm)	0.23		
	Rate of Axial Displacement	(%/min)	0.79		
	Cell Pressure	(kPa)	330		
	Membrane Correction	(kPa)	0.26		
	Corrected Deviator Stress	(kPa)	685		
	Undrained Shear Strength	(kPa)	342		
	Strain at Failure	(%)	4.3		
	Mode of Failure		Brittle		



STRUCTURAL SOILS
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
MDStrowger	MICHAEL STROWGER	27/07/16
Contract: The Hope Project	Contract Ref: 583462	

AGS

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Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442-262323, Fax: 01442-262683, Web: www.solls.co.uk, Email: ask@solls.co.uk. | 27/07/16 - 07:16 | AF3 |

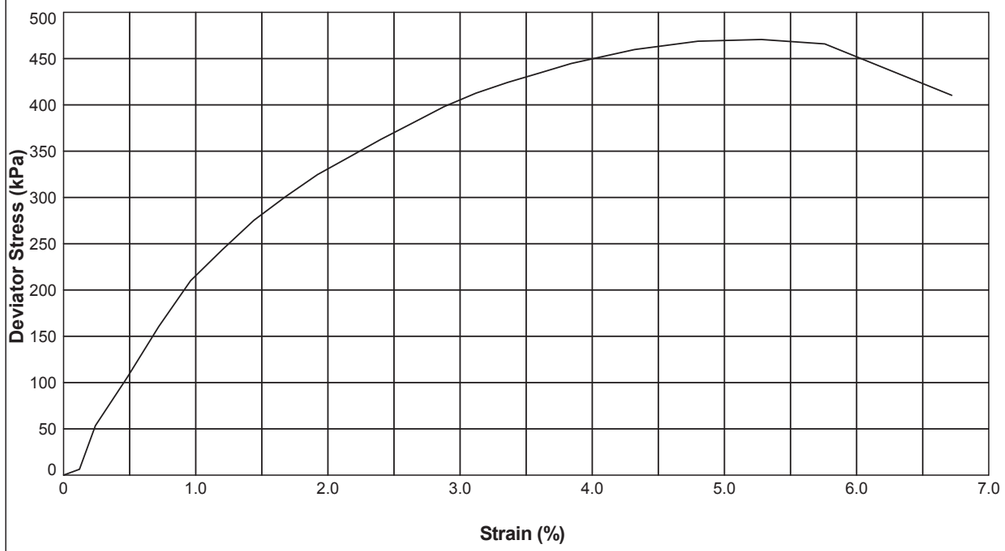
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BH1** Sample Ref: **7** Sample Type: **U** Depth (m): **19.50**

Description : **Dark grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	103.19		
	Height	(mm)	208.30		
	Moisture Content	(%)	21		
	Bulk Density	(Mg/m^3)	2.05		
	Dry Density	(Mg/m^3)	1.70		
TEST DETAILS	Membrane Thickness	(mm)	0.25		
	Rate of Axial Displacement	(%/min)	0.79		
	Cell Pressure	(kPa)	390		
	Membrane Correction	(kPa)	0.34		
	Corrected Deviator Stress	(kPa)	471		
	Undrained Shear Strength	(kPa)	235		
	Strain at Failure	(%)	5.3		
	Mode of Failure		Brittle		



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18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
MDStrowger	MICHAEL STROWGER	27/07/16
Contract: The Hope Project	Contract Ref: 583462	

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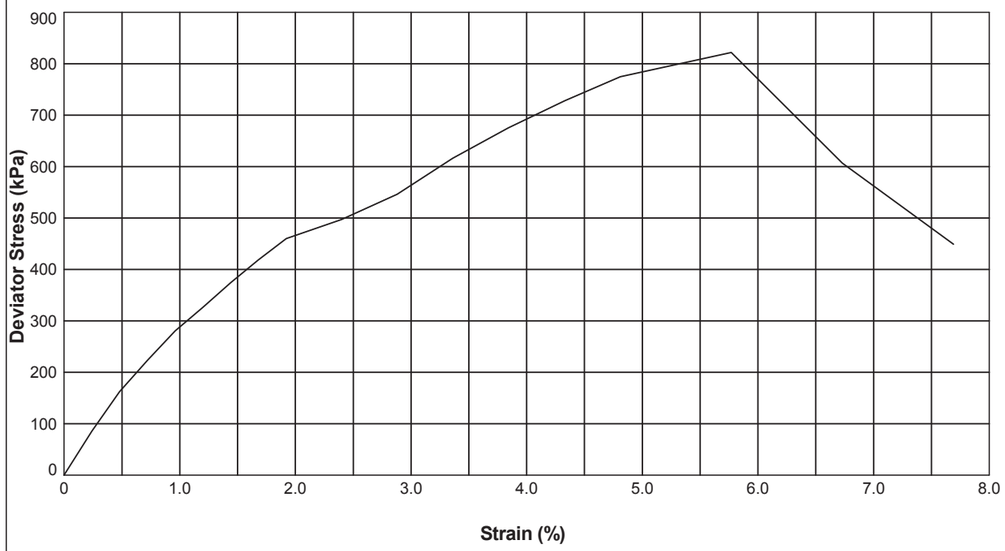
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BH1** Sample Ref: **8** Sample Type: **U** Depth (m): **22.50**

Description : **Dark greyish brown slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	103.57		
	Height	(mm)	208.09		
	Moisture Content	(%)	21		
	Bulk Density	(Mg/m^3)	2.04		
	Dry Density	(Mg/m^3)	1.69		
TEST DETAILS	Membrane Thickness	(mm)	0.35		
	Rate of Axial Displacement	(%/min)	1.11		
	Cell Pressure	(kPa)	450		
	Membrane Correction	(kPa)	0.51		
	Corrected Deviator Stress	(kPa)	822		
	Undrained Shear Strength	(kPa)	411		
	Strain at Failure	(%)	5.8		
	Mode of Failure		Brittle		



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18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
A.D.Frost	ALAN FROST	27/07/16
Contract: **The Hope Project**	Contract Ref: **583462**	

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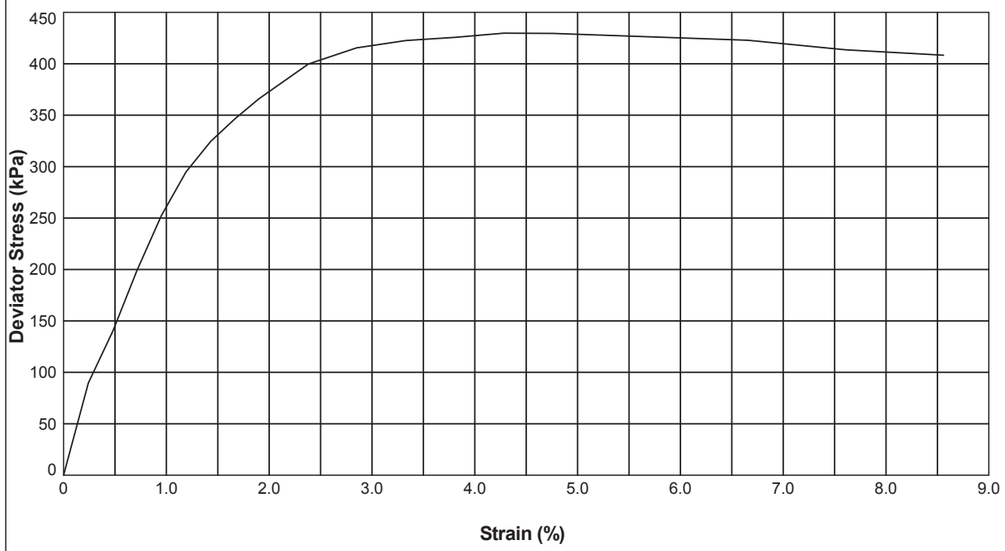
UNCONSOLIDATED QUICK UNDRAINED (SINGLE STAGE) TRIAXIAL COMPRESSION TEST

In accordance with BS1377:Part 7:1990, Clause 8

Borehole: **BH1** Sample Ref: **9** Sample Type: **U** Depth (m): **25.50**

Description : **Brown mottled grey slightly sandy CLAY**

STAGE NUMBER			1	2	3
SAMPLE DETAILS	Sample Condition		Undisturbed		
	Orientation of sample		Vertical		
	Diameter	(mm)	103.18		
	Height	(mm)	210.18		
	Moisture Content	(%)	26		
	Bulk Density	(Mg/m^3)	2.04		
	Dry Density	(Mg/m^3)	1.62		
TEST DETAILS	Membrane Thickness	(mm)	0.30		
	Rate of Axial Displacement	(%/min)	0.59		
	Cell Pressure	(kPa)	510		
	Membrane Correction	(kPa)	0.34		
	Corrected Deviator Stress	(kPa)	430		
	Undrained Shear Strength	(kPa)	215		
	Strain at Failure	(%)	4.3		
	Mode of Failure		Brittle		



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18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Compiled By		Date
MDStrowger	MICHAEL STROWGER	27/07/16
Contract: **The Hope Project**	Contract Ref: **583462**	

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GINT_LIBRARY_V8_06.GLB LibVersion: v8_06_012 PrjVersion: v8_06 - Core+Logs+Geotech Lab-Hemel - 003.I Graph L - TRIAXIAL - BS - A4P | 583462 THE HOPE PROJECT RSK 371475.GPJ - v8_06.
Structural Soils Ltd, Branch Office - Hemel Hempstead: 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT. Tel: 01442-262323, Fax: 01442-262683, Web: www.solls.co.uk, Email: ask@solls.co.uk. | 27/07/16 - 07:17 | AF3 |

APPENDIX K
LABORATORY CERTIFICATES FOR SOIL ANALYSIS

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/03976
Issue Number: 1 **Date:** 06 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 29/06/16
Date Instructions Received: 29/06/16
Date Analysis Completed: 05/07/16

Prepared by:

Danielle Brierley
Administrative Assistant

Approved by:

Lianne Bromiley
Senior Client Manager

Lab Sample ID	16/03976/1									Units	Method ref
Client Sample No	1										
Client Sample ID	BH1										
Depth to Top	1.10										
Depth To Bottom											
Date Sampled	27-Jun-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
% Stones >10mm$_A$ #	3.6									% w/w	A-T-044
Organic matter$_D$ M#	4.8									% w/w	A-T-032 OM
Arsenic$_D$ M#	13									mg/kg	A-T-024s
Cadmium$_D$ M#	1.2									mg/kg	A-T-024s
Copper$_D$ M#	115									mg/kg	A-T-024s
Chromium$_D$ M#	16									mg/kg	A-T-024s
Lead$_D$ M#	300									mg/kg	A-T-024s
Mercury$_D$	0.69									mg/kg	A-T-024s
Nickel$_D$ M#	22									mg/kg	A-T-024s
Selenium$_D$	<1									mg/kg	A-T-024s
Zinc$_D$ M#	84									mg/kg	A-T-024s

Lab Sample ID	16/03976/1									Units	Method ref
Client Sample No	1										
Client Sample ID	BH1										
Depth to Top	1.10										
Depth To Bottom											
Date Sampled	27-Jun-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
Asbestos in Soil (inc. matrix)											
Asbestos in soil$_A$ #	NAD										A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A										Gravimetry

Envirolab Job Number: 16/03976

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/03976/1								Units	Method ref
Client Sample No	1									
Client Sample ID	BH1									
Depth to Top	1.10									
Depth To Bottom										
Date Sampled	27-Jun-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.02								mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<0.06								mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08								mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	<0.08								mg/kg	A-T-019s
TPH Banded 1 with ID										
>C6-C8$_A^{\#}$	<10								mg/kg	A-T-007s
>C8-C10$_A^{\#}$	<10								mg/kg	A-T-007s
>C10-C12$_A^{\#}$	<10								mg/kg	A-T-007s
>C12-C16$_A^{\#}$	<10								mg/kg	A-T-007s
>C16-C21$_A^{\#}$	<10								mg/kg	A-T-007s
>C21-C40$_A$	<10								mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_A$	<10								mg/kg	A-T-007s
TPH ID (for FID characterisations)$_A$	N/A									A-T-007s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04010
Issue Number: 1 **Date:** 07 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 30/06/16
Date Instructions Received: 30/06/16
Date Analysis Completed: 07/07/16

Prepared by:

Kate Ellison
Administrative Assistant

Approved by:

Iain Haslock
Analytical Consultant

Lab Sample ID	16/04010/1	16/04010/2							Units	Method ref
Client Sample No	1	1								
Client Sample ID	TP2	TP4								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	28-Jun-16	28-Jun-16								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	4AB	5AB								
% Stones >10mm$_A^{\#}$	3.2	22.3							% w/w	A-T-044
Organic matter$_D^{M\#}$	-	2.8							% w/w	A-T-032 OM
Arsenic$_D^{M\#}$	19	12							mg/kg	A-T-024s
Cadmium$_D^{M\#}$	1.5	1.5							mg/kg	A-T-024s
Copper$_D^{M\#}$	75	45							mg/kg	A-T-024s
Chromium$_D^{M\#}$	16	19							mg/kg	A-T-024s
Lead$_D^{M\#}$	501	308							mg/kg	A-T-024s
Mercury$_D$	1.19	0.99							mg/kg	A-T-024s
Nickel$_D^{M\#}$	22	19							mg/kg	A-T-024s
Selenium$_D$	<1	<1							mg/kg	A-T-024s
Zinc$_D^{M\#}$	60	51							mg/kg	A-T-024s

Lab Sample ID	16/04010/1	16/04010/2							Units	Method ref
Client Sample No	1	1								
Client Sample ID	TP2	TP4								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	28-Jun-16	28-Jun-16								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	4AB	5AB								
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{A}^{\#}$	NAD	NAD								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A								Gravimetry

Envirolab Job Number: 16/04010

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04010/1	16/04010/2							Units	Method ref
Client Sample No	1	1								
Client Sample ID	TP2	TP4								
Depth to Top	0.50	0.60								
Depth To Bottom										
Date Sampled	28-Jun-16	28-Jun-16								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	4AB	5AB								
PAH 16										
Acenaphthene$_{A}^{M\#}$	<0.01	<0.01							mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.01	<0.01							mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.02	<0.02							mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	<0.04	0.06							mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	<0.04	0.07							mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	<0.05	0.09							mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	<0.05	0.06							mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	<0.07	<0.07							mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	<0.06	0.06							mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04	<0.04							mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	<0.08	0.12							mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.01	<0.01							mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	<0.03	0.06							mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.03	<0.03							mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	<0.03	0.05							mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	<0.07	0.09							mg/kg	A-T-019s
PAH (total 16)$_{A}^{M\#}$	<0.08	0.68							mg/kg	A-T-019s
TPH Banded 1 with ID										
>C6-C8$_{A}^{\#}$	<10	<10							mg/kg	A-T-007s
>C8-C10$_{A}^{\#}$	<10	<10							mg/kg	A-T-007s
>C10-C12$_{A}^{\#}$	<10	<10							mg/kg	A-T-007s
>C12-C16$_{A}^{\#}$	<10	<10							mg/kg	A-T-007s
>C16-C21$_{A}^{\#}$	<10	<10							mg/kg	A-T-007s
>C21-C40$_{A}$	<10	<10							mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_{A}$	<10	<10							mg/kg	A-T-007s
TPH ID (for FID characterisations)$_{A}$	N/A	N/A								A-T-007s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
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Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
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Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04078
Issue Number: 1 **Date:** 14 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 04/07/16
Date Instructions Received: 04/07/16
Date Analysis Completed: 12/07/16

Prepared by:
Danielle Brierley
Administrative Assistant

Approved by:
Georgia King
Client Service Manager

UKAS TESTING 1247

Lab Sample ID	16/04078/1	16/04078/2	16/04078/3						Units	Method ref
Client Sample No	1	1	1							
Client Sample ID	TP5	TP6	TP9							
Depth to Top	0.50	0.80	0.40							
Depth To Bottom										
Date Sampled	30-Jun-16	30-Jun-16	29-Jun-16							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4A	6A	4A							
% Stones >10mm$_A$ #	3.4	<0.1	16.7						% w/w	A-T-044
Organic matter$_D$ M#	7.4	0.6	-						% w/w	A-T-032 OM
Arsenic$_D$ M#	20	11	6						mg/kg	A-T-024s
Cadmium$_D$ M#	1.8	2.2	1.2						mg/kg	A-T-024s
Copper$_D$ M#	84	24	22						mg/kg	A-T-024s
Chromium$_D$ M#	22	30	20						mg/kg	A-T-024s
Lead$_D$ M#	928	68	73						mg/kg	A-T-024s
Mercury$_D$	1.49	<0.17	<0.17						mg/kg	A-T-024s
Nickel$_D$ M#	20	32	17						mg/kg	A-T-024s
Selenium$_D$	<1	<1	<1						mg/kg	A-T-024s
Zinc$_D$ M#	74	58	38						mg/kg	A-T-024s

Envirolab Job Number: 16/04078

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04078/1	16/04078/2	16/04078/3						Units	Method ref
Client Sample No	1	1	1							
Client Sample ID	TP5	TP6	TP9							
Depth to Top	0.50	0.80	0.40							
Depth To Bottom										
Date Sampled	30-Jun-16	30-Jun-16	29-Jun-16							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4A	6A	4A							
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A$ #	NAD	NAD	NAD							A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	N/A	N/A							Gravimetry

Lab Sample ID	16/04078/1	16/04078/2	16/04078/3						Units	Method ref
Client Sample No	1	1	1							
Client Sample ID	TP5	TP6	TP9							
Depth to Top	0.50	0.80	0.40							
Depth To Bottom										
Date Sampled	30-Jun-16	30-Jun-16	29-Jun-16							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4A	6A	4A							
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01	<0.01	<0.01						mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01	<0.01						mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.02	<0.02	<0.02						mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.08	<0.04	<0.04						mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.10	<0.04	<0.04						mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.12	<0.05	<0.05						mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	<0.05	<0.05						mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	<0.07	<0.07						mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.08	<0.06	<0.06						mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04	<0.04						mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	<0.08	<0.08						mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01	<0.01	<0.01						mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.06	<0.03	<0.03						mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03	<0.03	<0.03						mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03	<0.03	<0.03						mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.07	<0.07	<0.07						mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	0.44	<0.08	<0.08						mg/kg	A-T-019s
TPH Banded 1 with ID										
>C6-C8$_A^{\#}$	<10	-	<10						mg/kg	A-T-007s
>C8-C10$_A^{\#}$	<10	-	<10						mg/kg	A-T-007s
>C10-C12$_A^{\#}$	<10	-	<10						mg/kg	A-T-007s
>C12-C16$_A^{\#}$	<10	-	<10						mg/kg	A-T-007s
>C16-C21$_A^{\#}$	<10	-	<10						mg/kg	A-T-007s
>C21-C40$_A$	<10	-	<10						mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_A$	<10	-	<10						mg/kg	A-T-007s
TPH ID (for FID characterisations)$_A$	N/A	-	N/A							A-T-007s

Envirolab Job Number: 16/04078

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04078/1	16/04078/2	16/04078/3						Units	Method ref
Client Sample No	1	1	1							
Client Sample ID	TP5	TP6	TP9							
Depth to Top	0.50	0.80	0.40							
Depth To Bottom										
Date Sampled	30-Jun-16	30-Jun-16	29-Jun-16							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4A	6A	4A							
VOC										
Dichlorodifluoromethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Chloromethane$_A^{\#}$	-	-	*<10*						µg/kg	A-T-006s
Vinyl Chloride$_A^{\#}$	-	-	<0.2						µg/kg	A-T-006s
Bromomethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Chloroethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Trichlorofluoromethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,1-Dichloroethene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Carbon Disulphide$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Dichloromethane $_A$	-	-	<5						µg/kg	A-T-006s
trans 1,2-Dichloroethene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,1-Dichloroethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
cis 1,2-Dichloroethene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
2,2-Dichloropropane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Bromochloromethane$_A^{\#}$	-	-	<5						µg/kg	A-T-006s
Chloroform$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,1,1-Trichloroethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,1-Dichloropropene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Carbon Tetrachloride$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,2-Dichloroethane$_A^{\#}$	-	-	<2						µg/kg	A-T-006s
Benzene $_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Trichloroethene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,2-Dichloropropane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Dibromomethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Bromodichloromethane$_A^{\#}$	-	-	<10						µg/kg	A-T-006s
cis 1,3-Dichloropropene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Toluene $_A^{\#}$	-	-	<1						µg/kg	A-T-006s
trans 1,3-Dichloropropene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,1,2-Trichloroethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
1,3-Dichloropropane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Tetrachloroethene$_A^{\#}$	-	-	<1						µg/kg	A-T-006s
Dibromochloromethane$_A^{\#}$	-	-	<3						µg/kg	A-T-006s
1,2-Dibromoethane$_A^{\#}$	-	-	<1						µg/kg	A-T-006s

Envirolab Job Number: 16/04078 **Client Project Name: The Hope Project, Camden**

Client Project Ref: 371475

Lab Sample ID	16/04078/1	16/04078/2	16/04078/3						Units	Method ref
Client Sample No	1	1	1							
Client Sample ID	TP5	TP6	TP9							
Depth to Top	0.50	0.80	0.40							
Depth To Bottom										
Date Sampled	30-Jun-16	30-Jun-16	29-Jun-16							
Sample Type	Soil - ES	Soil - ES	Soil - ES							
Sample Matrix Code	4A	6A	4A							
Chlorobenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,1,1,2-Tetrachloroethane$_A$	-	-	<1						µg/kg	A-T-006s
Ethylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
m & p Xylene$_A^\#$	-	-	<1						µg/kg	A-T-006s
o-Xylene$_A^\#$	-	-	<1						µg/kg	A-T-006s
Styrene$_A^\#$	-	-	<1						µg/kg	A-T-006s
Bromoform$_A^\#$	-	-	<1						µg/kg	A-T-006s
Isopropylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,1,2,2-Tetrachloroethane$_A$	-	-	*<1*						µg/kg	A-T-006s
1,2,3-Trichloropropane$_A^\#$	-	-	<1						µg/kg	A-T-006s
Bromobenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
n-Propylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
2-Chlorotoluene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,3,5-Trimethylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
4-Chlorotoluene$_A^\#$	-	-	<1						µg/kg	A-T-006s
tert-Butylbenzene$_A^\#$	-	-	<2						µg/kg	A-T-006s
1,2,4-Trimethylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
sec-Butylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
4-Isopropyltoluene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,3-Dichlorobenzene$_A$	-	-	<1						µg/kg	A-T-006s
1,4-Dichlorobenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
n-Butylbenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,2-Dichlorobenzene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,2-Dibromo-3-chloropropane$_A$	-	-	<2						µg/kg	A-T-006s
1,2,4-Trichlorobenzene$_A$	-	-	<3						µg/kg	A-T-006s
Hexachlorobutadiene$_A^\#$	-	-	<1						µg/kg	A-T-006s
1,2,3-Trichlorobenzene$_A$	-	-	<3						µg/kg	A-T-006s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04167
Issue Number: 1 **Date:** 20 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 07/07/16
Date Instructions Received: 07/07/16
Date Analysis Completed: 15/07/16

Prepared by:

Kate Ellison
Administrative Assistant

Approved by:

Lianne Bromiley
Senior Client Manager

Lab Sample ID	16/04167/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP7									
Depth to Top	0.35									
Depth To Bottom										
Date Sampled	05-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
% Stones >10mm$_A^{\#}$	6.6								% w/w	A-T-044
Organic matter$_D^{M\#}$	9.8								% w/w	A-T-032 OM
Arsenic$_D^{M\#}$	9								mg/kg	A-T-024s
Cadmium$_D^{M\#}$	2.1								mg/kg	A-T-024s
Copper$_D^{M\#}$	39								mg/kg	A-T-024s
Chromium$_D^{M\#}$	30								mg/kg	A-T-024s
Lead$_D^{M\#}$	218								mg/kg	A-T-024s
Mercury$_D$	0.37								mg/kg	A-T-024s
Nickel$_D^{M\#}$	24								mg/kg	A-T-024s
Selenium$_D$	<1								mg/kg	A-T-024s
Zinc$_D^{M\#}$	70								mg/kg	A-T-024s

Lab Sample ID	16/04167/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP7										
Depth to Top	0.35										
Depth To Bottom											
Date Sampled	05-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
Asbestos in Soil (inc. matrix)											
Asbestos in soil$_{A}^{\#}$	NAD										A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A										Gravimetry

Envirolab Job Number: 16/04167

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04167/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP7										
Depth to Top	0.35										
Depth To Bottom											
Date Sampled	05-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
PAH 16											
Acenaphthene$_{A}^{M\#}$	<0.01									mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	0.01									mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.02									mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	<0.04									mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.09									mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	0.12									mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	<0.05									mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	<0.07									mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	<0.06									mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04									mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	<0.08									mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.01									mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.06									mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.03									mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	<0.03									mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	0.10									mg/kg	A-T-019s
PAH (total 16)$_{A}^{M\#}$	0.38									mg/kg	A-T-019s
TPH Banded 1 with ID											
>C6-C8$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C8-C10$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C10-C12$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C12-C16$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C16-C21$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C21-C40$_{A}$	<10									mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_{A}$	<10									mg/kg	A-T-007s
TPH ID (for FID characterisations)$_{A}$	N/A										A-T-007s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04207
Issue Number: 1 **Date:** 20 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 08/07/16
Date Instructions Received: 08/07/16
Date Analysis Completed: 20/07/16

Prepared by:
Kate Ellison
Administrative Assistant

Approved by:
Gill Walker
Laboratory Manager

UKAS TESTING 1247

Lab Sample ID	16/04207/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP13a										
Depth to Top	0.30										
Depth To Bottom											
Date Sampled	06-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	5AB										
% Stones >10mm$_A$ #	0.8									% w/w	A-T-044
Organic matter$_D$ M#	0.8									% w/w	A-T-032 OM
Arsenic$_D$ M#	9									mg/kg	A-T-024s
Cadmium$_D$ M#	2.3									mg/kg	A-T-024s
Copper$_D$ M#	25									mg/kg	A-T-024s
Chromium$_D$ M#	33									mg/kg	A-T-024s
Lead$_D$ M#	110									mg/kg	A-T-024s
Mercury$_D$	<0.17									mg/kg	A-T-024s
Nickel$_D$ M#	31									mg/kg	A-T-024s
Selenium$_D$	<1									mg/kg	A-T-024s
Zinc$_D$ M#	62									mg/kg	A-T-024s

Envirolab Job Number: 16/04207

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04207/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP13a										
Depth to Top	0.30										
Depth To Bottom											
Date Sampled	06-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	5AB										
Asbestos in Soil (inc. matrix)											
Asbestos in soil$_A$ #	NAD										A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A										Gravimetry

Lab Sample ID	16/04207/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP13a									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	06-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	5AB									
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.02								mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<0.06								mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08								mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	<0.08								mg/kg	A-T-019s
TPH Banded 1 with ID										
>C6-C8$_A^{\#}$	<10								mg/kg	A-T-007s
>C8-C10$_A^{\#}$	<10								mg/kg	A-T-007s
>C10-C12$_A^{\#}$	<10								mg/kg	A-T-007s
>C12-C16$_A^{\#}$	<10								mg/kg	A-T-007s
>C16-C21$_A^{\#}$	<10								mg/kg	A-T-007s
>C21-C40$_A$	<10								mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_A$	<10								mg/kg	A-T-007s
TPH ID (for FID characterisations)$_A$	N/A									A-T-007s

Envirolab Job Number: 16/04207

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04207/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP13a									
Depth to Top	0.30									
Depth To Bottom										
Date Sampled	06-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	5AB									
VOC										
Dichlorodifluoromethane$_A^{\#}$	<1								µg/kg	A-T-006s
Chloromethane$_A^{\#}$	<10								µg/kg	A-T-006s
Vinyl Chloride$_A^{\#}$	<0.2								µg/kg	A-T-006s
Bromomethane$_A^{\#}$	<1								µg/kg	A-T-006s
Chloroethane$_A^{\#}$	<1								µg/kg	A-T-006s
Trichlorofluoromethane$_A^{\#}$	<1								µg/kg	A-T-006s
1,1-Dichloroethene$_A^{\#}$	<1								µg/kg	A-T-006s
Carbon Disulphide$_A^{\#}$	<1								µg/kg	A-T-006s
Dichloromethane $_A$	<5								µg/kg	A-T-006s
trans 1,2-Dichloroethene$_A^{\#}$	<1								µg/kg	A-T-006s
1,1-Dichloroethane$_A^{\#}$	<1								µg/kg	A-T-006s
cis 1,2-Dichloroethene$_A^{\#}$	<1								µg/kg	A-T-006s
2,2-Dichloropropane$_A^{\#}$	<1								µg/kg	A-T-006s
Bromochloromethane$_A^{\#}$	<5								µg/kg	A-T-006s
Chloroform$_A^{\#}$	<1								µg/kg	A-T-006s
1,1,1-Trichloroethane$_A^{\#}$	<1								µg/kg	A-T-006s
1,1-Dichloropropene$_A^{\#}$	<1								µg/kg	A-T-006s
Carbon Tetrachloride$_A^{\#}$	<1								µg/kg	A-T-006s
1,2-Dichloroethane$_A^{\#}$	<2								µg/kg	A-T-006s
Benzene $_A^{\#}$	<1								µg/kg	A-T-006s
Trichloroethene$_A^{\#}$	<1								µg/kg	A-T-006s
1,2-Dichloropropane$_A^{\#}$	<1								µg/kg	A-T-006s
Dibromomethane$_A^{\#}$	<1								µg/kg	A-T-006s
Bromodichloromethane$_A^{\#}$	<10								µg/kg	A-T-006s
cis 1,3-Dichloropropene$_A^{\#}$	<1								µg/kg	A-T-006s
Toluene $_A^{\#}$	<1								µg/kg	A-T-006s
trans 1,3-Dichloropropene$_A^{\#}$	<1								µg/kg	A-T-006s
1,1,2-Trichloroethane$_A^{\#}$	<1								µg/kg	A-T-006s
1,3-Dichloropropane$_A^{\#}$	<1								µg/kg	A-T-006s
Tetrachloroethene$_A^{\#}$	<1								µg/kg	A-T-006s
Dibromochloromethane$_A^{\#}$	<3								µg/kg	A-T-006s
1,2-Dibromoethane$_A^{\#}$	<1								µg/kg	A-T-006s

Envirolab Job Number: 16/04207 **Client Project Name: The Hope Project, Camden**

Client Project Ref: 371475

Lab Sample ID	16/04207/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP13a										
Depth to Top	0.30										
Depth To Bottom											
Date Sampled	06-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	5AB										
Chlorobenzene$_A^\#$	<1									µg/kg	A-T-006s
1,1,1,2-Tetrachloroethane$_A$	<1									µg/kg	A-T-006s
Ethylbenzene$_A^\#$	<1									µg/kg	A-T-006s
m & p Xylene$_A^\#$	<1									µg/kg	A-T-006s
o-Xylene$_A^\#$	<1									µg/kg	A-T-006s
Styrene$_A^\#$	<1									µg/kg	A-T-006s
Bromoform$_A^\#$	<1									µg/kg	A-T-006s
Isopropylbenzene$_A^\#$	<1									µg/kg	A-T-006s
1,1,2,2-Tetrachloroethane$_A$	<1									µg/kg	A-T-006s
1,2,3-Trichloropropane$_A^\#$	<1									µg/kg	A-T-006s
Bromobenzene$_A^\#$	<1									µg/kg	A-T-006s
n-Propylbenzene$_A^\#$	<1									µg/kg	A-T-006s
2-Chlorotoluene$_A^\#$	<1									µg/kg	A-T-006s
1,3,5-Trimethylbenzene$_A^\#$	<1									µg/kg	A-T-006s
4-Chlorotoluene$_A^\#$	<1									µg/kg	A-T-006s
tert-Butylbenzene$_A^\#$	<2									µg/kg	A-T-006s
1,2,4-Trimethylbenzene$_A^\#$	<1									µg/kg	A-T-006s
sec-Butylbenzene$_A^\#$	<1									µg/kg	A-T-006s
4-Isopropyltoluene$_A^\#$	<1									µg/kg	A-T-006s
1,3-Dichlorobenzene$_A$	<1									µg/kg	A-T-006s
1,4-Dichlorobenzene$_A^\#$	<1									µg/kg	A-T-006s
n-Butylbenzene$_A^\#$	<1									µg/kg	A-T-006s
1,2-Dichlorobenzene$_A^\#$	<1									µg/kg	A-T-006s
1,2-Dibromo-3-chloropropane$_A$	<2									µg/kg	A-T-006s
1,2,4-Trichlorobenzene$_A$	<3									µg/kg	A-T-006s
Hexachlorobutadiene$_A^\#$	<1									µg/kg	A-T-006s
1,2,3-Trichlorobenzene$_A$	<3									µg/kg	A-T-006s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
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Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04246
Issue Number: 1 **Date:** 20 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Mike McCann/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 11/07/16
Date Instructions Received: 11/07/16
Date Analysis Completed: 19/07/16

Prepared by:

Kate Ellison
Administrative Assistant

Approved by:

John Gustafson
Director

Lab Sample ID	16/04246/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP1									
Depth to Top	0.70									
Depth To Bottom										
Date Sampled	08-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
% Stones >10mm$_A^{\#}$	22.4								% w/w	A-T-044
Arsenic$_D^{M\#}$	16								mg/kg	A-T-024s
Cadmium$_D^{M\#}$	1.9								mg/kg	A-T-024s
Copper$_D^{M\#}$	94								mg/kg	A-T-024s
Chromium$_D^{M\#}$	21								mg/kg	A-T-024s
Lead$_D^{M\#}$	353								mg/kg	A-T-024s
Mercury$_D$	1.14								mg/kg	A-T-024s
Nickel$_D^{M\#}$	24								mg/kg	A-T-024s
Selenium$_D$	<1								mg/kg	A-T-024s
Zinc$_D^{M\#}$	63								mg/kg	A-T-024s

Envirolab Job Number: 16/04246

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04246/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP1										
Depth to Top	0.70										
Depth To Bottom											
Date Sampled	08-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
Asbestos in Soil (inc. matrix)											
Asbestos in soil$_{A}^{\#}$	NAD										A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A										Gravimetry

Envirolab Job Number: 16/04246

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04246/1									Units	Method ref
Client Sample No	1										
Client Sample ID	TP1										
Depth to Top	0.70										
Depth To Bottom											
Date Sampled	08-Jul-16										
Sample Type	Soil - ES										
Sample Matrix Code	6A										
PAH 16											
Acenaphthene$_{A}^{M\#}$	<0.01									mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.01									mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.02									mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	<0.04									mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	<0.04									mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	<0.05									mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	<0.05									mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	<0.07									mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	<0.06									mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.04									mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	<0.08									mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.01									mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	<0.03									mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.03									mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	<0.03									mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	<0.07									mg/kg	A-T-019s
PAH (total 16)$_{A}^{M\#}$	<0.08									mg/kg	A-T-019s
TPH Banded 1 with ID											
>C6-C8$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C8-C10$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C10-C12$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C12-C16$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C16-C21$_{A}^{\#}$	<10									mg/kg	A-T-007s
>C21-C40$_{A}$	<10									mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_{A}$	<10									mg/kg	A-T-007s
TPH ID (for FID characterisations)$_{A}$	N/A										A-T-007s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
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All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
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N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04376
Issue Number: 1 **Date:** 27 July, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 18/07/16
Date Instructions Received: 18/07/16
Date Analysis Completed: 27/07/16

Prepared by:
Danielle Brierley
Administrative Assistant

Approved by:
Iain Haslock
Analytical Consultant

Lab Sample ID	16/04376/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP14									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	11-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
% Stones >10mm$_A$ #	<0.1								% w/w	A-T-044
Arsenic$_D$ M#	9								mg/kg	A-T-024s
Cadmium$_D$ M#	2.1								mg/kg	A-T-024s
Copper$_D$ M#	35								mg/kg	A-T-024s
Chromium$_D$ M#	39								mg/kg	A-T-024s
Lead$_D$ M#	61								mg/kg	A-T-024s
Mercury$_D$	0.31								mg/kg	A-T-024s
Nickel$_D$ M#	35								mg/kg	A-T-024s
Selenium$_D$	<1								mg/kg	A-T-024s
Zinc$_D$ M#	66								mg/kg	A-T-024s

Envirolab Job Number: 16/04376

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04376/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP14									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	11-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A$ #	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A									Gravimetry

Envirolab Job Number: 16/04376 **Client Project Name: The Hope Project, Camden**

Client Project Ref: 371475

Lab Sample ID	16/04376/1								Units	Method ref
Client Sample No	1									
Client Sample ID	TP14									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	11-Jul-16									
Sample Type	Soil - ES									
Sample Matrix Code	6A									
PAH 16										
Acenaphthene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.02								mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05								mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<0.06								mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04								mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08								mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.01								mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03								mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.07								mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	<0.08								mg/kg	A-T-019s
TPH Banded 1 with ID										
>C6-C8$_A^{\#}$	<10								mg/kg	A-T-007s
>C8-C10$_A^{\#}$	<10								mg/kg	A-T-007s
>C10-C12$_A^{\#}$	<10								mg/kg	A-T-007s
>C12-C16$_A^{\#}$	<10								mg/kg	A-T-007s
>C16-C21$_A^{\#}$	<10								mg/kg	A-T-007s
>C21-C40$_A$	<10								mg/kg	A-T-007s
TPH Total (sum of bands) (>C6-C40)$_A$	<10								mg/kg	A-T-007s
TPH ID (for FID characterisations)$_A$	N/A									A-T-007s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

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Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

envirolab

Units 7 & 8, Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

Final Test Report

Envirolab Job Number: 16/04078
Issue Number: 1 Date: 16-Aug-16

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A

Date Samples Received: 4-Jul-16
Date Instructions Received: 4-Jul-16
Date Analysis Completed: 16-Aug-16

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

Superscript "M" indicates method accredited to MCERTS.

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER.

Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

John Gustafson
Director

envirolab

Sample Details						Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	16/04078/1				
Client Sample Number				1				
Client Sample ID				TP5				
Depth to Top				0.5				
Depth to Bottom						Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Date Sampled				30/06/2016				
Sample Type				Soil - ES				
Sample Matrix Code				4A				
Solid Waste Analysis								
pH (pH Units)$_D$	A-T-031	Y	Y	**9.98**		-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**1.53**		-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.2**		-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**7.1**		-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**3.4**		3	5	6
PAH Sum of 17 (mg/kg)$_A$	A-T-019	N	N	**0.46**		100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**<10**		500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**		1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**		6	-	-
Eluate Analysis				**10:1 mg/l**	**10:1 mg/kg**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
Arsenic	A-T-025	Y	N	0.017	**0.160**	0.5	2	25
Barium	A-T-025	Y	N	0.013	**0.130**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	<0.001	**<0.01**	0.5	10	70
Copper	A-T-025	Y	N	0.002	**0.030**	2	50	100
Mercury	A-T-025	Y	N	<0.0001	**<0.001**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.003	**0.030**	0.5	10	30
Nickel	A-T-025	Y	N	0.003	**0.030**	0.4	10	40
Lead	A-T-025	Y	N	0.006	**0.060**	0.5	10	50
Antimony	A-T-025	Y	N	0.002	**0.030**	0.06	0.7	5
Selenium	A-T-025	Y	N	<0.001	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.013	**0.130**	4	50	200
Chloride	A-T-026	Y	N	2	**15**	800	15000	25000
Fluoride	A-T-026	Y	N	0.3	**3.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	8	**80**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	61	**589**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<0.2	**<200**	500	800	1000
Leach Test Information								
pH (pH Units)	A-T-031	N	Y	6.9				
Conductivity (µS/cm)	A-T-037	N	N	121				
Mass Sample (kg)				0.213				
Dry Matter (%)	A-T-044	N	N	76.9				

Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation

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Units 7 & 8, Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

Final Test Report

Envirolab Job Number: 16/04246
Issue Number: 1 Date: 16-Aug-16

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Mike McCann/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A

Date Samples Received: 11-Jul-16
Date Instructions Received: 11-Jul-16
Date Analysis Completed: 16-Aug-16

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

Superscript "M" indicates method accredited to MCERTS.

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER.

Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Prepared by:

MMarshall

Melanie Marshall
Laboratory Coordinator

Approved by:

G Walker

Gill Walker
Laboratory Manager

envirolab

Sample Details						Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	16/04246/1		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample Number				1				
Client Sample ID				TP1				
Depth to Top				0.7				
Depth to Bottom								
Date Sampled				08/07/2016				
Sample Type				Soil - ES				
Sample Matrix Code				6A				
Solid Waste Analysis								
pH (pH Units)$_D$	A-T-031	Y	Y	**8.51**		-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.78**		-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.1**		-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**4.7**		-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**2.86**		3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**<0.08**		100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**<10**		500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**		1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**		6	-	-
Eluate Analysis				**10:1 mg/l**	**10:1 mg/kg**	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	Y	N	0.020	**0.160**	0.5	2	25
Barium	A-T-025	Y	N	0.009	**0.060**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	0.001	**<0.01**	0.5	10	70
Copper	A-T-025	Y	N	0.004	**0.030**	2	50	100
Mercury	A-T-025	Y	N	<0.0001	**<0.001**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.002	**0.020**	0.5	10	30
Nickel	A-T-025	Y	N	<0.001	**<0.01**	0.4	10	40
Lead	A-T-025	Y	N	0.008	**0.060**	0.5	10	50
Antimony	A-T-025	Y	N	0.001	**<0.01**	0.06	0.7	5
Selenium	A-T-025	Y	N	<0.001	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.006	**0.050**	4	50	200
Chloride	A-T-026	Y	N	<1.00	**<10**	800	15000	25000
Fluoride	A-T-026	Y	N	0.2	**2.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	4	**33**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	48	**372**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<0.2	**<200**	500	800	1000
Leach Test Information								
pH (pH Units)	A-T-031	N	Y	7.4				
Conductivity (µS/cm)	A-T-037	N	N	96				
Mass Sample (kg)				0.171				
Dry Matter (%)	A-T-044	N	N	61.5				

Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation

APPENDIX L
LABORATORY CERTIFICATES FOR GROUNDWATER ANALYSIS

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Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 16/04872
Issue Number: 1 **Date:** 18 August, 2016

Client: RSK Environment Ltd Hemel
18 Frogmore Road
Hemel Hempstead
Hertfordshire
UK
HP3 9RT

Project Manager: Claire Siberry/Nigel Austin
Project Name: The Hope Project, Camden
Project Ref: 371475
Order No: N/A
Date Samples Received: 08/08/16
Date Instructions Received: 08/08/16
Date Analysis Completed: 18/08/16

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Georgia King
Client Service Manager

UKAS TESTING 1247

Lab Sample ID	16/04872/1									Units	Method ref
Client Sample No	1										
Client Sample ID	WS1										
Depth to Top	0.88										
Depth To Bottom											
Date Sampled	03-Aug-16										
Sample Type	Water - EW										
Sample Matrix Code	N/A										
pH (w)$_A^{\#}$	6.54									pH	A-T-031w
Sulphate (w)$_A^{\#}$	2472									mg/l	A-T-026w
Arsenic (dissolved)$_A^{\#}$	4									µg/l	A-T-025w
Cadmium (dissolved)$_A^{\#}$	<0.2									µg/l	A-T-025w
Copper (dissolved)$_A^{\#}$	<1									µg/l	A-T-025w
Chromium (dissolved)$_A^{\#}$	1									µg/l	A-T-025w
Lead (dissolved)$_A^{\#}$	<1									µg/l	A-T-025w
Mercury (dissolved)$_A^{\#}$	<0.1									µg/l	A-T-025w
Nickel (dissolved)$_A^{\#}$	7									µg/l	A-T-025w
Selenium (dissolved)$_A^{\#}$	3									µg/l	A-T-025w
Zinc (dissolved)$_A^{\#}$	<1									µg/l	A-T-025w

Envirolab Job Number: 16/04872

Client Project Name: The Hope Project, Camden

Client Project Ref: 371475

Lab Sample ID	16/04872/1									Units	Method ref
Client Sample No	1										
Client Sample ID	WS1										
Depth to Top	0.88										
Depth To Bottom											
Date Sampled	03-Aug-16										
Sample Type	Water - EW										
Sample Matrix Code	N/A										
PAH 16MS (w)											
Acenaphthene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Acenaphthylene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Anthracene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Benzo(a)anthracene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Benzo(a)pyrene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Benzo(b)fluoranthene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Benzo(ghi)perylene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Benzo(k)fluoranthene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Chrysene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Dibenzo(ah)anthracene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Fluoranthene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Fluorene (w)$_A^{\#}$	0.01									µg/l	A-T-019w
Indeno(123-cd)pyrene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Naphthalene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
Phenanthrene (w)$_A^{\#}$	0.02									µg/l	A-T-019w
Pyrene (w)$_A^{\#}$	<0.01									µg/l	A-T-019w
PAH (total 16) (w)$_A^{\#}$	0.03									µg/l	A-T-019w

Envirolab Job Number: 16/04872 **Client Project Name: The Hope Project, Camden**

Client Project Ref: 371475

Lab Sample ID	16/04872/1								Units	Method ref
Client Sample No	1									
Client Sample ID	WS1									
Depth to Top	0.88									
Depth To Bottom										
Date Sampled	03-Aug-16									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG										
Ali >C5-C6 $(w)_A^{\#}$	<2								µg/l	A-T-022w
Ali >C6-C8 $(w)_A^{\#}$	50								µg/l	A-T-022w
Ali >C8-C10 $(w)_A^{\#}$	<1								µg/l	A-T-022w
Ali >C10-C12 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Ali >C12-C16 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Ali >C16-C21 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Ali >C21-C35 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Total Aliphatics $(w)_A$	51								µg/l	A-T-022+23w
Aro >C5-C7 $(w)_A^{\#}$	<1								µg/l	A-T-022w
Aro >C7-C8 $(w)_A^{\#}$	<1								µg/l	A-T-022w
Aro >C8-C9 $(w)_A^{\#}$	<1								µg/l	A-T-022w
Aro >C9-C10 $(w)_A^{\#}$	<1								µg/l	A-T-022w
Aro >C10-C12 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Aro >C12-C16 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Aro >C16-C21 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Aro >C21-C35 $(w)_A^{\#}$	<5								µg/l	A-T-023w
Total Aromatics $(w)_A$	<5								µg/l	A-T-022+23w
TPH (Ali & Aro) $(w)_A$	51								µg/l	A-T-022+23w
BTEX - Benzene $(w)_A^{\#}$	<1								µg/l	A-T-022w
BTEX - Toluene $(w)_A^{\#}$	<1								µg/l	A-T-022w
BTEX - Ethyl Benzene $(w)_A^{\#}$	<1								µg/l	A-T-022w
BTEX - m & p Xylene $(w)_A^{\#}$	<1								µg/l	A-T-022w
BTEX - o Xylene $(w)_A^{\#}$	<1								µg/l	A-T-022w
MTBE $(w)_A^{\#}$	<1								µg/l	A-T-022w

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
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All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

APPENDIX □
□U□AN □EALT□ GENERIC ASSESS□ENT CRITERIA

Generic assessment criteria for human health: commercial scenario

Background

□□□'s □eneric assessment criteria (G□C) □ere initiall□ prepared □ollo□in□ the p□□lication □□ the □nvironment □□enc□ (□□) o□soil □□ideline val□e (□G□) and to□icolo□ical (T□□) reports, and associated p□□lications in □00□[1]□□□□ G□C □ere □pdated □ollo□in□ the p□□lication o□G□C □□ L□□□C□□H in □00□[□]□ □□□ G□C are periodicall□ revised □hen □pdated in□ormation on to□icolo□ical, land □se or receptor parameters is p□□lished□

Updates to the RSK GAC

□n □014, the p□□lication o□Cate□or□ 4 □creenin□ Levels (C4□L)[3,4], as part o□the □e□ra-□□nded research project □P1010, incl□ded modi□ications to certain e□pos□re ass□mptions doc□mented □ithin □□ □cience □eport □C050□□1□□□3 (herein a□ter re□erred to as □□3)[5] □sed in the □eneration o□□G□s□

C4□L □ere p□□lished □or si□ s□□stances (cadmi□m, arsenic, □en□ene, □en□o(a)p□rene, chromi□m □□and lead) □or a sand□ loam soil t□pe □ith □□ soil or□anic matter, □ased on a lo□ level o□to□icolo□ical concern (LLTC□see □ection □3 o□research project report □P1010[3])□ □ here a C4□L has □een p□□lished, the □□□ G□C d□plicates the C4□L p□□lished val□es □sin□ all inp□t parameters □ithin the □P1010 □inal project report[3] and associated appendices[□], and adopts them as G□C □or these si□s□□stances□

□or all other s□□stances the onl□ C4□L e□pos□re modi□ication relevant to a commercial end □se are dail□ inhalation rates□

The □□□ G□C have also □een revised □ith □pdated to□icolo□□ p□□lished □□ L□□□C□□H in □015[7] or □□the □□□P□[14], □here a C4□L has not □een p□□lished□

RSK GAC derivation for metals and organic compounds

Model selection

□oil assessment criteria (□□C) □ere calc□lated □sin□ the Contaminated Land □□pos□re □ssessment (CL□□) tool v1□071, s□pportin□ □□ □□idance[5,□,□] and revised e□pos□re scenarios p□□lished □or the C4□L[3]□Gro□nd□ater assessment criteria (Gr□C) protective o□h□man health via the inhalation path□a□ □ere derived □sin□ the □□C□ □□51 model □ith the □ohnson and □ttin□er model □or soil and □ro□nd□ater volatilisation□□□□ has □pdated the inp□ts □ithin □□C□ to re□lect □□ □□idance[1,5,□,□]□The □□C and Gr□C collectivel□ are termed G□C□

Pathway selection

□n accordance □ith □□3[5] the commercial scenario considers ris□s to a □emale □or□er □ho □or□s □rom the a□e o□1□ to □5 □ears□t sho□ld □e noted that this end □se is not s□ita□le □or a □or□place n□rser□ □□t ma□ □e appropriate □or a sports centre or shoppin□ centre □here children are present□□n accordance □ith □o□3□5, □□3[5] the path□a□s considered □or prod□ction o□the □□C in the commercial scenario are

- direct soil and d□st in□estion
- dermal contact □ith soil □oth indoors and o□tdoors

- indoor air inhalation □rom soil and vapo□r and o□tdoor inhalation o□soil and vapo□r□

The path□a□ considered in prod□ction o□the Gr□C is the volatilisation o□compo□nds □rom □ro□nd□ater and s□□se□□ent vapo□r inhalation □□ residents □hile indoors□□i□□re □ ill□strates this lin□a□e□□ltho□□h the o□tdoor air inhalation path□a□ is also valid, this contri□□tes little to the overall ris□s o□in□ to the dil□tion in o□tdoor air□□ ithin □□C□, the sol□□ilit□ limit o□the chemical restricts the e□tent o□volatilisation, □hich in t□rn drives the indoor air inhalation path□a□□□ hile the same restriction is not □□ilt into the CL□□ model, the CL□□ model o□tp□t cells are □la□□ed red □here the soil sat□ration limit has □een e□ceeded□

□ ith respect to volatilisation, the CL□□ model ass□mes a simple linear partitionin□ o□a chemical in the soil □et□een the sor□ed, dissolved and vapo□r phase[□]□The □pper □o□ndaries o□this partitionin□ are represented □□ the ma□im□m a□□eo□s sol□□ilit□ and p□re sat□rated vapo□r concentration o□the chemical□The CL□□ model estimates sat□rated soil concentrations □here these limits are reached[□]□The CL□□ so□□are □ses a tra□ic li□ht s□stem to identi□□ □hen individ□al and□or com□ined assessment criteria e□ceed the lo□er o□either the a□□eo□s- or vapo□r-□ased soil sat□ration limits□□odel o□tp□t cells are □la□□ed red □here the sat□rated soil concentration has □een e□ceeded and the contri□□tion o□the indoor and o□tdoor vapo□r path□a□ to total e□pos□re is □reater than 10□ □□ n this case, □rther consideration o□the □ollo□in□ is re□□ired[□]:

- □ree phase contamination ma□□e present□
- □□pos□re □rom the vapo□r path□a□s □ill □e over-predicted □□ the model, as in realit□ the vapo□r phase concentration □ill not increase at concentrations a□ove sat□ration limits
- □ here the vapo□r path□a□ contri□□tion is □reater than □0□, it is □nli□el□ the relevant health criteria val□e (HC□) □ill □e e□ceeded at soil concentrations at least a □actor o□ten hi□her than the relevant HC□□

□ here the vapo□r path□a□ is the predominant path□a□ (contri□□tes □reater than □0□ o□ e□pos□re) or the onl□ e□pos□re ro□te considered and the cell is hi□hli□hted red (□□C e□ceeds sat□ration limit), the ris□ □ased on the ass□med concept□al model is li□el□ to □e ne□li□i□le as the vapo□r ris□ is ass□med to □e tolera□le at ma□im□m possi□le soil concentrations□ □n s□ch circ□mstances, the vapo□r path□a□ e□pos□re sho□ld □e considered □ased on the presence o□ □ree phase or non-a□□eo□s phase li□□id so□rces and the meas□red concentrations o□volatile or□anic compo□nds (□□C) in the vapo□r phase□□creenin□ co□ld □e considered □ased on settin□ the □□C as the modelled soil sat□ration limits□Ho□ever, as stated □ithin the CL□□ hand□oo□[□], this is li□el□ to not □e practical in man□ cases □eca□se o□the ver□ lo□ sat□ration limits and, in an□case, is hi□hl□conservative□

□t sho□ld also □e noted that □or mi□t□res o□compo□nds, □ree phase ma□□e present □here soil (or □ro□nd□ater) concentrations are □ell □elo□ sat□ration limits □or individ□al compo□nds□

□ here the vapo□r path□a□ is onl□ one o□the e□pos□re path□a□s considered, an additional approach can then □e □tilised as detailed □ithin □ection 4□1□ o□the CL□□ model hand□oo□[□], □hich e□plains ho□ to calc□late an e□□ective assessment criterion man□all□□

□□3[5] states that, as a □eneral r□le o□th□m□, it is reco□nised that estimatin□ vapo□r phase concentrations □rom dissolved and sor□ed phase contamination □□ petrole□m h□drocar□ons are at least a □actor o□ten hi□her than those li□el□ to □e meas□red on-site□□□□ has there□ore applied an empirical s□□s□race to indoor air correction □actor o□10 into the CL□□ model chemical data□ase and to o□tp□ts □rom the □□C□ model □or all petrole□m h□drocar□on □ractions (incl□din□

□T□□, trimeth□l□en□enes and the pol□c□clic aromatic h□drocar□ons (P□H) naphthalene, acenaphthene and acenaphth□lene) to red□ce this conservatism□

n□□t selection

The most □p-to-date p□□lished chemical and to□icolo□ical data □as o□tained □rom □□ □eport □C0500□1□□□7[10], the □□ T□□[1] reports, the C4□L □P1010 project report and associated appendices[3,□], the □015 L□□□C□H report[7] or the □□□P□ □□□ data□ase[14]□□ here a C4□L has □een p□□lished, the □□□ G□C have d□plicated the C4□L p□□lished val□es □sin□ all inp□t parameters □ithin the □P1010 □inal project report[3] and associated appendices[□], and has adopted them as G□C □or these si□s□□stances□To□icolo□ical and speci□ic chemical parameters □or aromatic h□drocar□on C□–C□ (st□rene), 1,□,4-trimeth□l□en□ene and meth□l tertiar□-□□t□l ether □□T□□) □ere o□tained □rom the CL:□□□□ □oil Generic □ssessment Criteria report[11]□

□or TPH, aromatic h□drocar□ons C_5–C□ □ere not modelled, as this ran□e comprises □en□ene and tol□ene, □hich are modelled separatel□□The aromatic C□–C□ h□drocar□on □raction comprises eth□l□en□ene, □□lene and st□rene□□s eth□l□en□ene and □□lene are □ein□ modelled separatel□, the ph□sical, chemical and to□icolo□ical data □or aromatic C□–C□ have □een ta□en □rom st□rene□

□or the Gr□C, the HC□ □sed in the modellin□ □ere derived □sin□ the to□icolo□ical data □or the □□C amended as □ollo□s:

- □n ad□lt □ei□hin□ 70□□ and □reathin□ 15□7m^3 air per da□ in accordance □ith the revised e□pos□re parameters □sed in the □P1010 □inal project report □or the Cate□or□ 4 □creenin□ Levels (C4□L) (Ta□le 3□[3]) and □□□P□ data[1□]
- □ac□□ro□nd inhalation (mean dail□inta□e(□□)) □or an ad□lt (□□e Class 17)□

Physical □a□a□ete□s

For the commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3[5] notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3[5] have been used.

The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3[5]. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

For the GrAC, the depth to groundwater was taken as 2.5m based on RSK's experience of assessing the volatilisation pathway from groundwater. The GrAC were produced using the input parameters in Table 3. Inhalation rates have not been updated.

Summary of modifications to the default CLEA SR3[5] input parameters for a commercial land use

In summary, the RSK commercial GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3[5]. Modifications to the default SR3[5] exposure scenarios based on the C4SL exposure scenarios[3]

are presented in Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 4 with the combined GAC in Table 5.

Figure 1: Conceptual model for CLEA commercial scenario

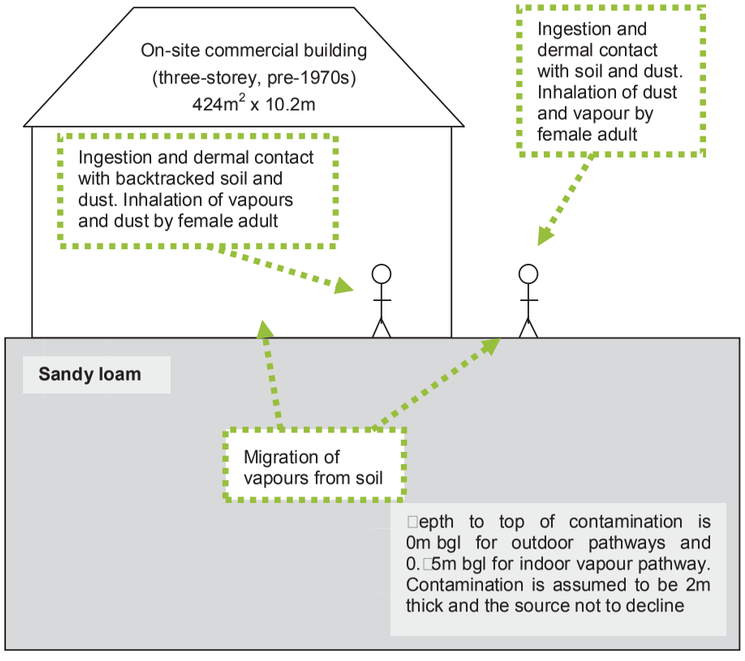

Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 1 to 5 years, ox 3.5, SR3[5]
uilding	Office (pre-1970)	Key generic assumption given in ox 3.5, SR3[5]. re-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4., SR3[5])
Soil type	Sandy loam	Most common K soil type (Section 4.3.1, Table 4.4, SR3[5])
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 1 to 5 years. Assumption given in ox 3.5, SR3[5]
End AC	17	
SOM (%)		Representative of sandy loam according to EA guidance note dated anuary 2009 entitled 'Changes We Have Made to the CLEA Framework Documents'[13]
	1	To provide SAC for sites where SOM % as often observed by RSK
	2.5	
p	7	Model default

Table 2: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m^3 day^{-1}	15.7	Mean value □SE□A, 2011[12]□Table 3.2, S□1010[3]

Figure 2: GrAC conceptual model for RBCA commercial scenario

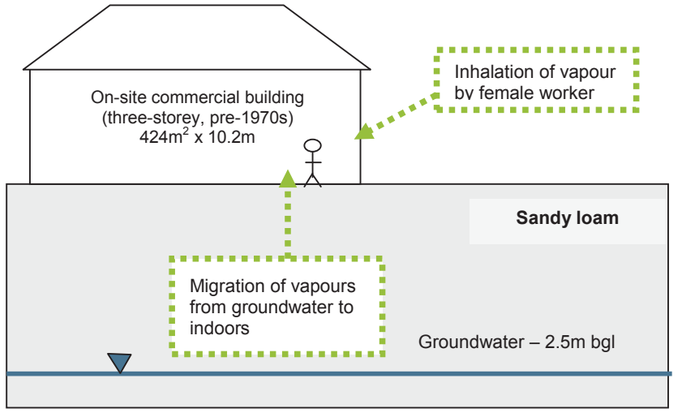

Table 3: Commercial – RBCA inputs

□a□am□□□□	□n□□	□al□□	□□□□□□a□on
Receptor			
Averaging time	□ears	49	From □ox 3.5, SR3[5]
Receptor weight	kg	70	Female adult, Table 4.□, SR3[5]
Exposure duration	□ears	49	From □ox 3.5, SR3[5]
Exposure fre□uency	□ays□yr	□□.25	□ eighted using occupancy period of 9 hours per day for 230 days of the year ((9hours x 230 days)□24 hours)
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. □arameters for sandy loam from Table 4.4, SR3[5]
□olumetric water content	-	0.33	
□olumetric air content	-	0.20	

□a□am□□□□	□n□□	□al□□	□□□□□□a□on
□ry bulk density	g cm^{-3} or kg□L	1.21	
□ertical hydraulic conductivity	cm s^{-1}	3.5□E-3	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3[5] e□uivalent to 307 cm□day
□apour permeability	m^2	3.05E-12	Calculated for sandy loam using e□uations in Appendix 1, SR3[5]
Capillary □one thickness	m	0.1	□rofessional □udgement
□uilding			
□uilding volume□area ratio	m	9.□	Table 3.10, SR3[5]
Foundation area	m^2	424	Table 3.10, SR3[5]
Foundation perimeter	m	□2.40	□ased on s□uare root of building area being 20.59m
□uilding air exchange rate	d^{-1}	24	Table 3.10, SR3[5] □uilding air exchange rate e□uivalent to 2.□E-04 s^{-1}
□epth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	Table 3.10, SR3[5]
Foundation crack fraction	-	3.□9E-04	Calculated from floor crack area of 0.1□5m^2 and building footprint of 424m^2 in Table 4.21, SR3[5]
□olumetric water content of cracks	-	0.33	Assumed e□ual to underlying soil type in assumption that cracks become filled with soil over time. □arameters for sandy loam from Table 4.4, SR3[5]
□olumetric air content of cracks	-	0.2	
Indoor□outdoor differential pressure	□a	4.4	From Table 3.10, SR3[5] E□uivalent to 44 g□cm□s^2

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RSK

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (µg/l)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals										
Arsenic	(a,b)	-	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Cadmium	(a)	-	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR
Chromium (III) - trivalent	(c)	-	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	-	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR
Copper		-	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	-	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg^0)	(d)	5.60E+01	NR	3.26E+01	NR	1.07E+01	NR	5.80E+01	NR	2.58E+01
Inorganic Mercury (Hg^{2+})		-	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR
Methyl Mercury (Hg^{2+})		1.00E+05	3.38E+02	3.87E+03	3.11E+02	1.42E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	-	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	-	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Zinc	(b)	-	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide (free)		-	6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR
Volatile Organic Compounds										
Benzene	(a)	1.36E+05	1.09E+03	5.19E+01	4.96E+01	2.26E+03	1.09E+03	5.19E+01	4.96E+01	4.71E+03
Toluene		5.90E+05	4.24E+05	1.43E+05	1.07E+05	1.92E+03	4.24E+05	1.43E+05	1.07E+05	4.36E+03
Ethylbenzene		1.80E+05	1.91E+05	1.38E+04	1.28E+04	1.22E+03	1.91E+05	1.38E+04	1.28E+04	2.84E+03
Xylene - m		2.00E+05	3.43E+05	1.47E+04	1.41E+04	1.47E+03	3.43E+05	1.47E+04	1.41E+04	3.46E+03
Xylene - o		1.73E+05	3.43E+05	1.57E+04	1.50E+04	1.12E+03	3.43E+05	1.57E+04	1.50E+04	2.62E+03
Xylene - p		2.00E+05	3.43E+05	1.41E+04	1.36E+04	1.35E+03	3.43E+05	1.41E+04	1.36E+04	3.17E+03
Total xylene		1.73E+05	3.43E+05	1.41E+04	1.36E+04	1.47E+03	3.43E+05	1.41E+04	1.36E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		4.80E+07	5.72E+05	1.22E+05	1.01E+05	3.31E+04	5.72E+05	2.31E+05	1.65E+05	6.27E+04
Trichloroethene		3.73E+03	9.93E+02	2.59E+00	2.57E+00	3.22E+03	9.53E+02	5.72E+00	5.69E+00	7.14E+03
Tetrachloroethene		3.43E+04	4.17E+01	4.16E+01	4.16E+01	9.51E+02	1.12E+04	1.88E+01	1.88E+01	4.24E+02
1,1,1-Trichloroethane		1.30E+06	1.14E+06	1.35E+03	1.35E+03	2.92E+03	1.14E+06	6.60E+02	6.60E+02	1.43E+03
1,1,2,2-Tetrachloroethane		1.60E+05	1.10E+04	2.53E+02	2.47E+02	6.02E+03	1.10E+04	1.09E+02	1.08E+02	2.60E+03
Carbon Tetrachloride		1.63E+05	1.10E+04	5.75E+02	5.46E+02	5.46E+03	1.10E+04	2.81E+02	2.74E+02	2.67E+03
1,2-Dichloroethane		5.47E+03	7.62E+03	6.29E+00	6.28E+00	3.32E+03	7.62E+03	2.87E+00	2.87E+00	1.52E+03
Vinyl Chloride		5.71E+03	2.29E-02	9.71E-01	9.67E-01	4.91E+03	2.29E-02	6.73E-01	6.71E-01	3.41E+03
1,2,4-Trimethylbenzene		3.82E+02	2.67E+01	7.70E-02	7.67E-02	1.76E+03	2.67E+01	5.95E-02	5.94E-02	1.36E+03
1,3,5-Trimethylbenzene	(e)	5.59E+04	-	NR	NR	1.16E+03	NR	3.29E+02	NR	4.74E+02
				NR	NR	5.52E+02	NR	NR	NR	2.30E+02
Semi-Volatile Organic Compounds										
Acenaphthene		4.11E+03	1.10E+05	5.36E+06	1.08E+05	1.41E+02	1.10E+05	2.75E+06	1.06E+05	5.70E+01
Acenaphthylene		7.95E+03	1.10E+05	5.23E+06	1.07E+05	2.12E+02	1.10E+05	2.68E+06	1.05E+05	8.61E+01
Anthracene		-	5.46E+05	2.35E+07	5.36E+05	2.91E+00	5.46E+05	1.13E+07	5.23E+05	1.17E+00
Benzo(a)anthracene		-	2.94E+02	4.47E+02	1.74E+02	4.28E+00	2.94E+02	4.08E+02	1.67E+02	1.71E+00
Benzo(b)fluoranthene		-	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.17E+02	4.43E+01	1.22E+00
Benzo(g,h,i)perylene		-	6.29E+03	1.06E+04	3.95E+03	3.85E+02	6.29E+03	1.05E+04	3.93E+03	1.54E+02
Benzo(k)fluoranthene		-	1.68E+03	3.17E+03	1.18E+03	1.72E+00	1.68E+03	3.11E+03	1.17E+03	6.87E+01
Chrysene		-	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	8.89E+02	3.46E+02	4.40E+01
Dibenzo(a,h)anthracene		-	5.67E+00	9.52E+00	3.55E+00	9.82E-03	5.67E+00	9.64E+00	3.57E+00	3.93E-03
Fluoranthene		-	2.29E-04	2.73E-06	2.27E-04	4.73E-01	2.29E-04	3.33E-06	2.27E-04	1.13E-02
Fluorene		-	7.31E+04	1.06E-06	6.84E+04	7.65E+01	7.31E+04	2.24E-06	7.08E+04	1.83E+02
Indeno(1,2,3-cd)pyrene		-	8.10E+02	1.35E+03	5.06E+02	1.53E+01	8.10E+02	1.37E+03	5.09E+02	3.68E+01
Phenanthrene		-	2.28E-04	1.09E+06	2.24E+04	8.96E+01	2.28E-04	1.86E+06	2.25E+04	2.14E+02
Pyrene		-	5.49E+04	6.46E+06	5.44E+04	5.49E+00	5.49E+04	7.91E+06	5.45E+04	1.32E+01
Benzo(a)pyrene	(a)	-	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.68E+01	5.46E+00
Naphthalene		1.90E+04	3.64E+04	4.39E+03	3.92E+03	1.83E+02	3.64E+04	9.94E+03	7.81E+03	4.32E+02
Phenol		-	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 4
Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	GrAC (µg/l)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
			Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Total petroleum hydrocarbons										
Aliphatic hydrocarbons EC5-EC6		3.59E+04	4.77E-06	5.86E-03	5.86E-03	5.58E+02	4.77E-06	1.21E+04	1.21E+04	1.15E-03
Aliphatic hydrocarbons >EC6-EC8		5.37E+03	4.77E-06	1.74E+04	1.74E+04	3.22E+02	4.77E+06	3.97E+04	3.98E+04	7.36E-02
Aliphatic hydrocarbons >EC8-EC10		4.27E+02	9.53E-04	4.91E+03	4.85E+03	1.90E+02	9.53E+04	1.17E-04	1.13E-04	4.51E+02
Aliphatic hydrocarbons >EC10-EC12		3.39E+01	9.53E-04	2.47E+04	2.29E+04	1.18E+02	9.53E+04	5.89E-04	4.79E+04	2.83E+02
Aliphatic hydrocarbons >EC12-EC16		7.59E-01	9.53E-04	2.04E+05	8.17E+04	5.91E+01	9.53E+04	4.81E+05	9.02E+04	1.42E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	-	1.58E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	-	1.58E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC9 (styrene)		2.90E+05	2.29E+04	8.39E+04	1.80E+04	1.44E+03	2.29E+04	1.93E+05	2.04E+04	3.35E+03
Aromatic hydrocarbons >EC_9-EC_{10}		6.46E+04	3.81E+04	8.66E+03	8.11E+03	1.50E+03	3.81E+04	2.05E+04	1.70E+04	3.58E+03
Aromatic hydrocarbons >EC10-EC12		2.45E+04	3.81E+04	4.69E+04	2.79E+04	8.99E+02	3.81E+04	1.10E+05	3.42E+04	2.15E+03
Aromatic hydrocarbons >EC12-EC16		5.75E+03	3.81E+04	4.76E+05	3.73E+04	4.19E+02	3.81E+04	1.03E+06	3.70E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	-	2.85E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	-	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	-	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. GrAC - groundwater screening value. SAC - soil screening value.
The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%. This shading has also been used for the RBCA output where the theoretical solubility limit has been exceeded.
Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.
Calculated SAC does not exceed the soil saturation limit.

For consistency where the theoretical solubility limit within RBCA has been exceeded in production of the GrAC, these cells have also been hatched red and the GrAC set at the solubility limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.
SAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, MTBE, BTEX and trimethylbenzene compounds were produced using a attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)
(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.
(b) SAC for selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.
(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)
(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.
(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL

Table 5
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	GrAC for Groundwater (µg/l)	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals				
Arsenic	-	640	640	640
Cadmium	-	410	410	410
Chromium (III) - trivalent	-	8,600	8,600	8,600
Chromium (VI) - hexavalent	-	49	49	49
Copper	-	68,000	68,000	68,000
Lead	-	2,300	2,300	2,300
Elemental Mercury (Hg^0)	56	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg^{2+})	-	1,120	1,120	1,120
Methyl Mercury (Hg^{2+})	100000	290 (73)	310 (142)	320
Nickel	-	980	980	980
Selenium	-	12,000	12,000	12,000
Zinc	-	740,000	740,000	740,000
Cyanide (free)	-	650	650	650
Volatile Organic Compounds				
Benzene	136190	27	50	98
Toluene	590000	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	180000	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	200000	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	173000	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	200000	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	173000	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	48000000	67,000 (20,400)	101,000 (33,100)	165,000 (62,700)
Trichloroethene	3730	1	3	6
Tetrachloroethene	34310	20	40	90
1,1,1-Trichloroethane	1300000	700	1,300	3,000
1,1,1,2 Tetrachloroethane	160000	110	250	560
1,1,2,2-Tetrachloroethane	162840	270	550	1,130
Carbon Tetrachloride	5470	2.9	6.3	14.2
1,2-Dichloroethane	5710	0.67	0.97	1.65
Vinyl Chloride	382	0.06	0.08	0.12
1,2,4-Trimethylbenzene	55900	330	640	1,040
1,3,5-Trimethylbenzene	-	NR	NR	NR
Semi-Volatile Organic Compounds				
Acenaphthene	4110	110,000	110,000	110,000
Acenaphthylene	7950	110,000	110,000	110,000
Anthracene	-	520,000	540,000	540,000
Benzo(a)anthracene	-	170	170	180
Benzo(b)fluoranthene	-	44	45	45
Benzo(g,h,i)perylene	-	3,900	3,900	4,000
Benzo(k)fluoranthene	-	1,200	1,200	1,200
Chrysene	-	350	350	350
Dibenzo(a,h)anthracene	-	3.5	3.6	3.6
Fluoranthene	-	23,000	23,000	23,000
Fluorene	-	63,000 (31)	68,000	71,000
Indeno(1,2,3-cd)pyrene	-	500	510	510
Phenanthrene	-	22,000	22,000	23,000
Pyrene	-	54,000	54,000	54,000
Benzo(a)pyrene	-	77	77	77
Naphthalene	19000	1,800 (76)	3,900 (183)	7,800 (432)
Phenol	-	440*	690*	1,300*
Total Petroleum Hydrocarbons				
Aliphatic hydrocarbons EC_5-EC_6	35900	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC_6-EC_8	5370	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC_8-EC_{10}	427	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC_{10}-EC_{12}	34	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC_{12}-EC_{16}	0.759	59,000 (24)	82,000 (59)	90,000 (142)
Aliphatic hydrocarbons >EC_{16}-EC_{35}	-	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC_{35}-EC_{44}	-	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC_8-EC_9 (styrene)	290000	14,000 (626)	18,000 (1,440)	20,000 (3,350)
Aromatic hydrocarbons >EC_9-EC_{10}	64600	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC_{10}-EC_{12}	24500	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC_{12}-EC_{16}	5750	36,000 (169)	37,000	38,000
Aromatic hydrocarbons >EC_{16}-EC_{21}	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{21}-EC_{35}	-	28,000	28,000	28,000
Aromatic hydrocarbons >EC_{35}-EC_{44}	-	28,000	28,000	28,000

Notes:

'-' Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.
NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used
EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.
* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)
** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.
1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC and GrAC for TPH fractions, PAHs napthalene, acenaphthene and acenaphthylene, MTBE, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.

(VALUE IN BRACKETS) The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

For consistency where the GrAC exceeds the solubility limit, GrAC has been set at the solubility limit. The GrAC is conservative since concentrations of the chemical are very unlikely to be at sufficient concentration to result in an exceedance of the health criteria value at the point of exposure (i.e. indoor air) provided free-phase product is absent.

APPENDIX N
GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75m below finished ground levels, sample results from depths between 0.5m and 1.5m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

The Hope Lease Ltd
Geo-environmental site assessment: The Hope Project, Camden
371475-01 (05)

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		GAC □□ □□□□□	
	P□□□□ □□□□□□□□	PE	P□C
1	Extended V□C suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	• BTE□ □ MTBE	0.1	0.03
2	SV□Cs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C_5□C_{10}) (Not including compounds within group 2e and 2f)	2	1.4
2e	• Phenols	2	0.4
2f	• Cresols and chlorinated phenols	2	0.04
3	Mineral oil C_{11}□C_{20}	10	Suitable
4	Mineral oil C_{21}□C_{40}	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
S□□□□□□□ □□□□ □□□□□□□□ □□ □□□□□□□□□□□ □□□ □□□□ □□□□□□□□□□□			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
□	Amines	Not suitable	Suitable
Notes: where indicated as □suitable□, the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX O
COMPARISON OF WATER LABORATORY DATA TO CONTROLLED WATERS GAC

The Hope Lease Ltd
Geo-environmental site assessment: The Hope Project, Camden
371475-01 (05)

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

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The water environment in the United Kingdom is protected under a number of regulatory regimes. The relevant environmental regulator is consulted where there may be a risk that pollution of 'controlled waters' may occur or may have occurred in the past.

The term 'controlled waters' refers to coastal waters, inland freshwaters and groundwater. The EU Water Framework □irective (WF□) (2000/□0/EC) is implemented via domestic regulations and guidance, covering aspects of groundwater and surface water protection as well as drinking water supply policy. □omestic legislation and guidance will vary across the United Kingdom. Therefore, the relevant legislation for England, Wales, Northern Ireland and Scotland should be reviewed, alongside guidance provided by the Environment Agency (EA), Natural Resource Wales (NRW), the Scottish Environmental Protection Agency (SEPA) or the Northern Ireland Environment Agency (NIEA), as appropriate.

The main objectives of the protection and remediation of groundwater under threat from land contamination are set out in the Environment Agency's Groundwater Protection: Principles and Practice (GP3) guidance document(1). When assessing risks to groundwater the following need to be taken into consideration:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to:
    - ***prevent*** *the input of* ***hazardous*** *substances into groundwater (see description of hazardous substances below)*
    - ***limit*** *the entry of other (non-hazardous) pollutants into groundwater so as to avoid pollution, and to avoid deterioration of the status of groundwater bodies or sustained, upward trends in pollutant concentration.*
- Where hazardous substances or non-hazardous pollutants have already entered groundwater, the priority is to
    - ***minimise*** *further entry of* ***hazardous substances*** *and non-hazardous pollutants into groundwater*
    - *take* ***necessary and reasonable measures*** *to* ***limit the pollution*** *of groundwater or impact on the status of the groundwater body from the future expansion of a contaminant 'plume', if necessary by actively reducing its extent if the economic, social and environmental benefits of doing so outweigh the costs.*

DEFINITIONS AND SUBSTANCE CLASSIFICATIONS

Risks to surface waters:

When assessing risks to surface waters, the following list of definitions should be understood:

Priority substances (PS) are harmful substances originally identified under the Water Framework Directive (WFD) 2000/60/EC as substances 'presenting a significant risk to or via the aquatic environment' at a European level. Member States are required to incorporate the identified **PS** into their country-wide monitoring programmes. There are currently 33 **PS** defined within the Priority Substances Directive (2013/39/EU; Annex 1), with a further 12 additional substances due to come into force from 22 December 2018. Directive 2013/39/EU has been transposed into domestic legislation for England and Wales by The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Under the umbrella of **PS**, there is a sub-set of substances identified as being "hazardous", and these are referred to as **Priority hazardous substances (PHS).** The list of **PHS** is defined at EU level within the Priority Substances Directive (2013/39/EU). The WFD defines hazardous substances as 'substances (or groups of substances) that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.' There are currently 15 **PHS**, with a further 6 additional substances due to come into force from 22 December 2018.

There is also another group of substances defined at EU level and which are referred to as **other pollutants (OP)** in Directive 2013/39/EU**.** These are additional substances which although not **priority substances**, have EQS which are identical to those laid down in the legislation which applied prior to 13 January 2009 (Directive 2008/105/EU). The **OP** are listed along with the **priority substance (PS)** within the Priority Substances Directive (2013/39/EU),and their associated EQS are also listed therein. There are 6 **OP** defined within the Priority Substances Directive (2013/39/EU).

In addition to the EU level substances, there are also a group of pollutants defined at a Member State level, referred to as **Specific pollutants (SP)**. These substances are pollutants which are released in significant quantities into water bodies in each of the individual European Member States. Under the WFD, Member States are required to set their own EQS for these substances. An indicative list of **SP** is given in Annex VIII of the WFD. Many of the substances categorised as **SP** in the UK were formerly List 2 substances under the old Groundwater Directive (80/68/EEC). The **SP** are defined within Part 2 (Table 1) of The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Risks to groundwater:

When assessing risks to groundwater, the following definitions should be understood:

Under the requirements of the Groundwater Daughter Directive (2006/118/EU), the UK has published a list of substances it considers to be **hazardous substances** with respect to groundwater. In their advisory capacity to the government, this list has been derived by the UK Joint Agencies Groundwater Directive Advisory Group (JAGDAG), of which the Environment Agency is a member. Although currently under review, the existing list of groundwater hazardous substances is largely based on the former List 1 substances which were defined under the (now repealed) Groundwater Directive (80/68/EEC), with the addition of radioactive substances which are also now classed as **hazardous substances**. The JAGDAG list of **hazardous substances** is extensive, and can be found in full at:
http://www.wfduk.org/sites/default/files/Media/Substances%20transferred%20from%20List%20I%20%26%20II%20to%20hazardous%20or%20non%20hazardous.pdf

Given the above classifications**,** any other pollutant which has not been classified as a hazardous substance by JAGDAG**,** is referred to as a **non-hazardous pollutant (NHP).**

Selecting the appropriate assess□ent criteria

When assessing the risks to controlled waters, various assessment criteria apply, depending on the nature of the assessment and the conceptual site model.

Where a surface water body is involved, then Environmental Quality Standards (EQS) are the relevant assessment criteria as they are designed to be protective of surface water ecology.

Where a public water supply or a Principal aquifer is involved, then the standards defined in The Water Supply (Water Quality) Regulations[2] are the primary source of assessment criteria. The Private Water Supplies Regulations[3] may also be applicable in some cases. For instances where there are no UK assessment criteria, then the World □ealth □rganisation (W□□) drinking water guidelines[1] may be used.

This appendix presents the generic assessment criteria (GAC) that RSK considers suitable for assessing risks to controlled waters for our most commonly encountered determinants. A full list of EQS for England and Wales are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

The RSK GAC for controlled waters are presented in **Table □**. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The appropriate target concentrations should be selected with consideration to:

- the site conceptual model (i.e. the receptor at potential risk);
- whether the substance is already present in groundwater at the site;
- whether or not the substance is classified as a priority hazardous substance under the Priority Substances Directive (2013/39/EC) (see above), or as a hazardous substance according to the current list of JAGDAG determinations[5]; and
- background concentrations in the aquifer (if applicable).

It is important to remember that the WFD and GP3[1] guidance allow a risk-based and a cost-benefit approach to be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is required either on a technical or cost-benefit basis.

Table □: Target concentrations for controlled waters

Target concentrations shaded in green are statutory values	Target concentrations shaded in orange are non-statutory values

Note: Units □g/l throughout

Substance classification		Deter□inant	Target concentrations (□g/l)			
			□ini□u□ reporting □alue	U□ drinking water standard (or best e□ui□alent)	E□S or best e□ui□alent	
□roundwater receptors[1]	Surface water receptors[1]				Freshwater	Transitional (estuaries) and coastal waters
□etals □ other inorganics						
-	Specific pollutant	Arsenic	-	10[2]	50[6a]	25[6a]
Hazardous substance	Priority substance	Cadmium	0.1[1]	5[2]	≤0.08, 0.08, 0.09, 0.15, 0.25 [6b]	0.2[6a]
-	-	Chromium (total)	-	50[2]	Sum values for chromium III and VI	
-	Specific pollutant	Chromium (III)	-	Use value for total chromium	□.□[6a]	-
-	Specific pollutant	Chromium (VI)			3.□[6a]	0.6[6a]
-	Specific pollutant	Copper	-	2,000[2]	1 bioavailable[6a]	3.□6 dissolved, where D□C ≤1mg/l[6a]
						3.76µg/l + (2.677µg/l x ((D□C/2) – 0.5µg/l)) dissolved, where D□C □1mg/l[6a]

Substance classification		Deter□inant	Target concentrations (□g□l)			
			□ini□u□ reporting □alue	U□ drinking water standard (or best e□ui□alent)	E□S or best e□ui□alent	
□roundwater receptors(□)	Surface water receptors(□)				Freshwater	Transitional (estuaries) and coastal waters
-	Priority substance	Lead	-	10(2)	1.2 bioavailable(6a)	1.3(6a)
Hazardous substance	**Priority hazardous substance**	Mercury	0.01(□)	1(2)	0.0□(6c)	0.0□(6c)
-	Priority substance	□ickel	-	20(2)	□.0 bioavailable(6a)	8.6(6a)
-	-	Selenium	-	10(2)	-	-
-	Specific pollutant	□inc	-	3,000(□)	10.9 bioavailable(6a)	6.8 dissolved (6a)
-	Specific pollutant	Iron	-	200(2)	1000(6a)□1	1000(6a))□1
-	Specific pollutant	Manganese	-	50(2)	123 bioavailable(6a)	-
-	-	Aluminium	-	200(2)	-	-
Hazardous substance	**Priority hazardous substance**	Tributyltin compounds (Tributyltin-cation)	0.001(□)	-	0.0002(6a)	0.0002(6a)
-	-	Sodium	-	200,000(2)	-	-
-	Specific pollutant	Cyanide (□ydrogen cyanide)	-	50(2)	1(6a)	1(6a)
-	-	Total ammonia□ (ammonium (as □□□□) plus ammonia (□□3)	-	50(2)	300(6f)	-
-	Specific pollutant	Ammonia un-ionised (□□3)	-	-	-	21(6a)
-	Specific pollutant	Chlorine	-	-	2(6a)	10(6d)
-	-	Chloride	-	250,000(2)	-	-

Substance classification		Deter□inant	Target concentrations (□g□l)			
			□ini□u□ reporting □alue	U□ drinking water standard (or best e□ui□alent)	E□S or best e□ui□alent	
□roundwater receptors(□)	Surface water receptors(□)				Freshwater	Transitional (estuaries) and coastal waters
-	-	Sulphate	-	250,000(2)	-	-
-	-	□itrate (as □□3)	-	50,000(2)	-	-
-	-	□itrite (as □□2)	-	100(2)	10(9)	-
□olatile organic compounds (VOC)						
Hazardous substance	Other pollutant	Tetrachloroethene (tetrachloroethylene)	0.1(7)	10(2)	10(6a)	10(6a)
Hazardous substance	Other pollutant	Trichloroethene (trichloroethylene)	0.1(7)	10(2)	10(6a)	10(6a)
Hazardous substance	Specific pollutant	Tetrachloroethane	-	-	140(6a)	-
Hazardous substance	Other pollutant	Carbon tetrachloride (tetrachloromethane)	0.1(7)	3.0(2)	12(6a)	12(6a)
Hazardous substance	Priority substance	1,2-Dichloroethane	1.0(7)	3.0(2)	10(6a)	10(6a)
Hazardous substance	**-**	Vinyl chloride (chloroethene)	-	0.5(2)	-	-
Hazardous substance	Priority substance	Dichloromethane	-	20(4)	20(6a)	20(6a)
Hazardous substance	Priority substance	Trichlorobenzenes	0.01(7)	-	0.4(6a)	0.4((6a)
Hazardous substance	-	Trihalomethanes	-	0.1(2a)	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	Drinking water standard (or best equivalent)	AA or best equivalent	
Groundwater receptors(1)	Surface water receptors(1)				Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Trichloromethane (Chloroform)	0.1(7)	(see "Trihalomethanes" above)	2.5(6a)	2.5(6a)
-	**Priority Hazardous substance**	Di(2-ethylhexyl) phthalate (bis(2-ethylhexyl) phthalate, DEHP)	-	(4)	1.3(6a)	1.3(6a)
-	Specific pollutant	Benzyl butyl phthalate	-	-	7.5(6a)	0.75(6e)
Hazardous substance	**Priority Hazardous substance**	Hexachlorobutadiene	0.005(7)	0.6(4)	0.6(6c)	0.6(6c)
Semi-volatile organic compounds (SVOC)						
Hazardous substance	-	Acenaphthylene (C12-C16)	-	-	5.(10)	
Hazardous substance	**Priority Hazardous substance**	Anthracene (C16-C35)	-	-	0.1(6a)	0.1(6a)
Hazardous substance	Priority substance	Naphthalene (C10-C12)	-	-	2(6a)	2(6a)
Hazardous substance	Priority substance	Fluoranthene (C16-C35)	-	-	0.0063(6a)	0.0063(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
			Minimum reporting value	Drinking water standard (or best equivalent)	AA or best equivalent	
Groundwater receptors(1)	Surface water receptors(1)				Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	**Priority Hazardous substance(s)**	Benzo(a)pyrene (C16-C35)	-	0.01(2)	0.00017(6a)	0.00017(6a)
Hazardous substance		Benzo(b)fluoranthene (C16-C35)	-	0.1(2)	No EQS for these substances. B(a)P should be used as the indicator compound instead.	
Hazardous substance		Benzo(k)fluoranthene (C16-C35)	-			
Hazardous substance		Benzo(g,h,i)perylene (C16-C35)	-			
Hazardous substance		Indeno(1,2,3-cd) pyrene (C16-C35)	-			
-	Specific pollutant	Phenol	0.5(7)	-	7.7(6a)	7.7(6a)
Hazardous substance	Specific pollutant	2,4-Dichlorophenol	0.1(7)	-	4.2(6a)	0.42(6a)
Hazardous substance	Priority substance	Pentachloro-phenol (PCP)	0.1(7)	(4)	0.4(6a)	0.4(6a)
Petroleum Hydrocarbons						
Hazardous substance	-	Total petroleum hydrocarbons	-	10(11)		
Hazardous substance	Priority substance	Benzene	1(7)	1(2)	10(6a)	(6a)
Hazardous substance	Specific pollutant	Toluene	4(7)	700(4)	74(6a)	74(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors(1)	Surface water receptors(1)		Minimum reporting value	Drinking water standard (or best equivalent)	Freshwater or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	-	Ethylbenzene	-	300(4)	-	-
Hazardous substance	-	Xylene	3(7)	500(4)	-	-
-	-	Ethyl tertiary butyl ether (ETBE)	-	15(12)	-	
Pesticides, biocides, insecticides and herbicides						
Hazardous substance	Other pollutant (Cyclodiene pesticides)	Aldrin	0.003(7)	0.03(2)	0.01(6a)	0.005(6a)
Hazardous substance		Dieldrin	3(7)	0.03(2)		
Hazardous substance		Endrin	0.003(7)	0.1(2b)		
Hazardous substance		Isodrin[2]	0.003(7)	0.1(2b)		
Hazardous substance	Other pollutant	DDT (total)	0.006(7)	1(4)	0.025(6a)	0.025(6a)
Hazardous substance	-	Total pesticides	-	0.5(2)	-	-
Hazardous substance	-	Other individual pesticides	-	0.1(2)		
Hazardous substance	Specific pollutant	Carbendazim	-	-	0.15(6a)	-

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Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors(1)	Surface water receptors(1)		Minimum reporting value	Drinking water standard (or best equivalent)	Freshwater or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Chlorothalonil	-	-	0.035(6a)	-
Hazardous substance	Specific pollutant (until 22/12/15, after which it becomes a Priority substance)	Cypermethrin	-	-	0.0001(6a) from 22/12/15 0.00-5(6a)	0.0001(6a) from 22/12/15 0.00-6(6a)
Hazardous substance	Specific pollutant	Dimethoate	0.01(7)	-	0.4(6a)	0.4(6a)
-	Specific pollutant	Glyphosate	-	-	16(6a)	16(6a)
Hazardous substance	Specific pollutant	Linuron	0.1(7)	-	0.5(6a)	0.5(6a)
-	Specific pollutant	Mecoprop	0.04(7)	-	1(6a)	1(6a)
-	Specific pollutant	Methiocarb	-	-	0.01(6a)	-
-	Specific pollutant	Pendimethalin	-	20(4)	0.3(6a)	-
Hazardous substance	Specific pollutant	Permethrin	0.001(7)	-	0.001(6a)	0.0002(6a)
Hazardous substance	Priority substance	Alachlor	-	20(4)	0.3(6a)	0.3(6a)
Hazardous substance	Priority substance	Atrazine	0.03(7)	100(4)	0.6(6a)	0.6(6a)
Hazardous substance	Priority substance	Diuron	-	-	0.2(6a)	0.2(6a)

Substance classification		Determinant	Target concentrations (AA)			
Groundwater receptors[1]	Surface water receptors[1]		Minimum reporting value	Drinking water standard (or best equivalent)	AA or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	**Priority hazardous substance**	Endosulphan	0.005[7]	-	0.005[6a]	0.0005[6a]
-	Priority substance	Isoproturon	-	[4]	0.3[6a]	0.3[6a]
Hazardous substance	Priority substance	Simazine	0.03[7]	2[4]	1[6a]	1[6a]
Hazardous substance	**Priority hazardous substance**	Trifluralin	0.01[7]	20[4]	0.03[6a]	0.03[6a]
-	From 22/12/13 Priority substance	Dichlorvos	-	-	From 22/12/13 6.0E-4[6a]	From 22/12/13 6.0E-5[6a]
Hazardous substance	From 22/12/13 Priority substance	Heptachlor and heptachlor epoxide	-	0.03[2]	From 22/12/13 2.0E-7[6a]	From 22/12/13 1.0E-08[6a]
Miscellaneous						
-	Specific pollutant	Triclosan (antibacterial agent)	-	-	0.1[6a]	0.1[6a]
-	**From 00/00/0000 Priority hazardous substance**	Perfluoro-octane sulfonic acid (and its derivatives) (PFOS)	-	-	From 22/12/13 6.5E-4[6a]	From 22/12/13 1.3E-4[6a]
-	**From 00/00/0000 Priority hazardous substance**	Hexabromocyclododecane (HBCDD)	-	-	From 22/12/13 0.0016[6a]	From 22/12/13 0.0016[6a]

Note: '-' A target concentration is not available.

[3] Please note that total ammonia (NH_4^+ and NH_3) is equivalent to ammoniacal nitrogen in laboratory reports

[1] Please note that although iron is listed in the 2015 Direction as 1.000 mg/l, the EQS remains at 1mg/l in Scotland and it is assumed this is a mistake and should read either 1,000 or 1000mg/l.

[2] Please note that although isodrin is not listed in name within the group of "Cyclodiene pesticides" in Table 1 of Schedule 3 Part 3 of the 2015 Direction[6], the CAS number for isodrin (465-73-6) is listed and therefore it is assumed that it has been missed off the named list of substances.

"Bioavailable" in relation to copper, zinc, nickel and manganese (but not lead) is the generic EQSbioavailable[6a] derived from the Metal Bioavailability Assessment Tool (M-BAT) developed by the Water Framework Directive UK Technical Advisory Group (UKTAG). Exceedance of this value should prompt a site-specific assessment using the M-BAT with pH, DOC and Ca to derive a site-specific EQS termed the $PNEC_{dissolved}$. http://www.fdu.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat. For zinc, if there is an exceedance of the EQSbioavailable in an initial RAM, Tier 2 required that the EQS for zinc should also have the ambient background concentration of zinc added as well (as listed by catchment in Table 2).

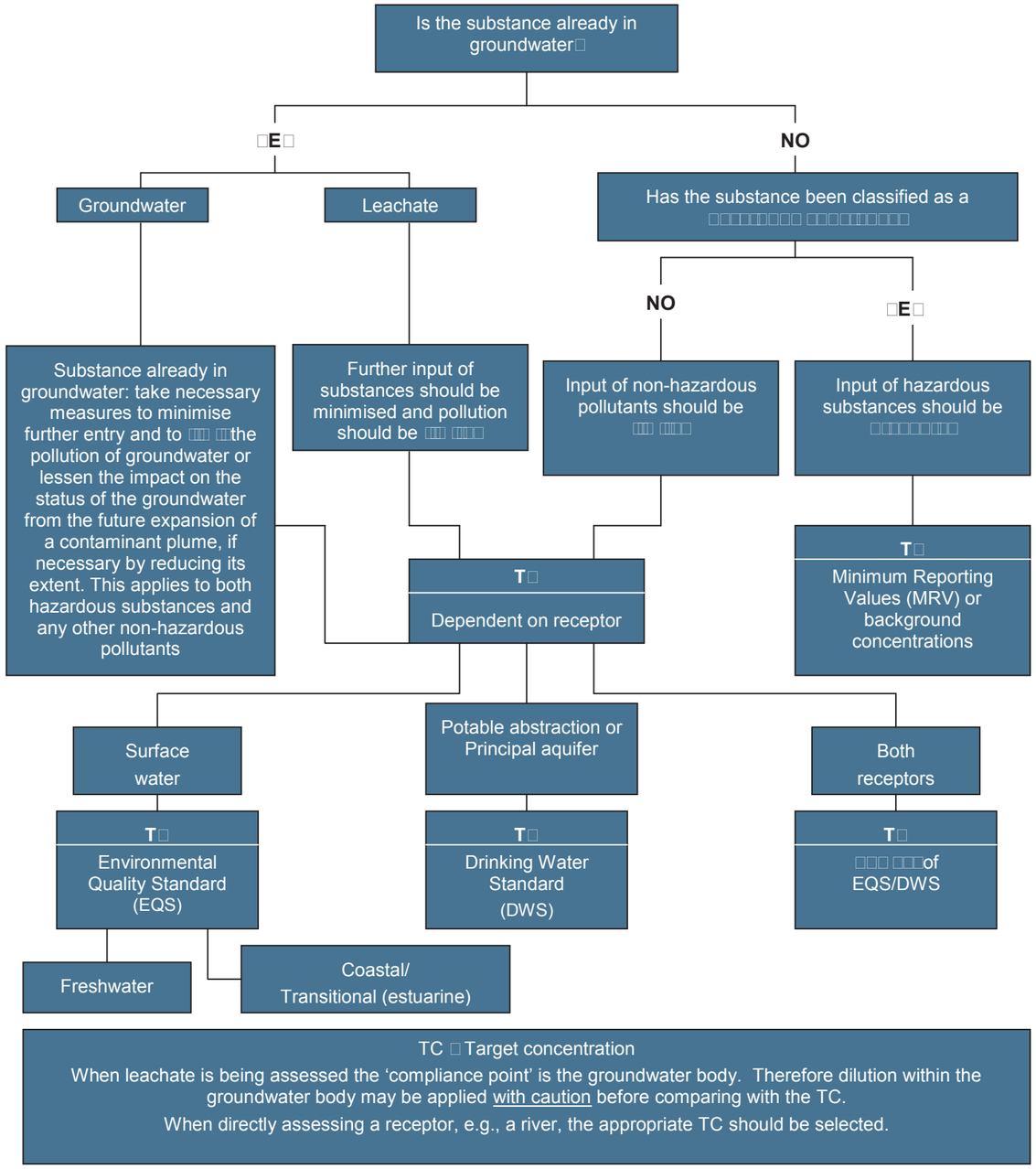
References

1. Environment Agency (2013), ‘Groundwater Protection: Principles and Policy (GP3) v1.1’.
2. The □ ater Supply (□ ater □uality) □e□ulations 2000 (S□2000□31□4), as amended by S□ 2001□2□□5, S□2002□246□, S□2005□2035, S□2007□2734 and S□2010□□□1
    2a. Sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane
    2b. Standard applies to indi□idual pesticides e□cept aldrin, dieldrin, heptachlor and heptachlor epo□ide, for □hich a separate standard is defined.
3. The Pri□ate □ ater Supplies (□n□land) □e□ulations 2016. S□2016 □61□
4. □ □O (2011), □ □□□□□□□□□□ □□□□□□□□□□□□-□ □□□□□□□□□□□□, 4th edn
5. □□□D□□ list of Substances transferred from □ist □□ □□to hazardous or non hazardous. □lthou□h currently under re□ie□, the e□istin□ list of □round□ater hazardous substances and non-hazardous pollutants is lar□ely based on the former □ist 1 and □ist 2 substances □hich □ere defined under the old (no□ repealed) □round□ater Directi□e (□0□6□□□□C). These ha□e been ta□en to be hazardous substances and non-hazardous pollutants respecti□ely, thou□h these may be re□ie□ed if ne□ information is made a□ailable. □□□D□□ has de□eloped on a methodolo□y for substance determination to fulfil the re□uirements of the □ □D and the □round□ater Dau□hter Directi□e, □hich □as finalised follo□in□ consultation. The current list of substances can be found at□ http□□□□□□.□fdu□or□sites□default□files□□edia□Substances□20transferred□20from□20□ist□20□□20□26□20□□□20to□20hazardous□20or□20non□20hazardous.pdf
6. The □ ater □rame□or□Directi□e (Standards and Classification) Directions (□n□land and □ ales) 2015.
    6a. The □□S for these substances are based on a “long term mean” or an “annual average (AA)” EQS.
    6b. For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO3/l, Class 2: 40 to < 50 mg CaCO3/l, Class 3: 50 to < 100 mg CaCO3/l, Class 4: 100 to < 200 mg CaCO3/l and Class 5: ≥ 200 mg CaCO3/l).
    6c. The EQS for Mercury and hexachlorobutadiene are based on a “maximum acceptable concentration (MAC)” EQS in absence of an “annual average (AA)” EQS.
    6d. The EQS for chlorine in saltwater is based on the 95th percentile concentration of total residual oxidant, which refers to the sum of all oxidising agents existing in water, expressed as available chlorine.
    6e. The recommended saltwater standard is derived using a safety factor of 100. Where the standard is failed, it is recommended that supporting evidence of ecological damage should be obtained before committing to expensive action.
    6f. EQS for total ammonia is as per Schedule 3, Part 1, Table 7 of of the above directions. EQS applies to river types 1, 2 and 4 and 6 (namely upland and low alkalinity). The EQS for a lowland and high alkalinity rivers (types 3, 5 and 7) is 600µg/l (0.6mg/l).

    Additional information on the Metal Bioavailability Assessment Tool (M-BAT) is available at http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat
7. Minimum reporting values listed in Annex (J) of Horizontal Guidance Note H1 (H1 Environmental Risk Assessment Framework, Environment Agency, April 2010 v2.0). Note target concentration for xylenes is 0.003mg/l each for o-xylene and m/p xylene)
8. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001
9. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)
10. WRc plc (2002), R&D Technical Report P45.
11. Environment Agency (2009), ‘Petroleum hydrocarbons in groundwater: supplementary guidance for hydrogeological risk assessment’.

    NOTE: EA advice in the above document should be referred to with respect to risk rankings of TPH CWG fractions. It may be possible to eliminate low risk fractions and/or those not detected above LMDL from concern
12. Drinking Water Inspectorate (London, UK). Environmental Information Request on MTBE in drinking water. Ref. DWI 1/10/18; dated 28 November 2006. Value is based on the odour threshold for MTBE, which is lower than a health-based guideline value

FLOW CHART TO ASSIST WITH SELECTION OF TARGET CONCENTRATIONS



Controlledwaters_GAC_Rev08

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envirolab

Haswaste, developed by Dr. Iain Haslock.

The Hope Project
371475

			BH1	TP1	TP2	TP4	TP5	TP6	TP7	TP9	TP13a	TP14	
TP/WS/BH													
Depth (m)			1.10	0.70	0.50	0.60	0.50	0.80	0.35	0.40	0.30	0.20	
Envirolab reference			16/03976/1	16/04246/1	16/04010/1	16/04010/2	16/04078/1	16/04078/2	16/04167/1	16/04078/3	16/04207/1	16/04376/1	
% Moisture		%											
pH (soil)													
pH (leachate)													
Arsenic		mg/kg	13	16	19	12	20	11	9	6	9	9	
Cadmium		mg/kg	1.2	1.9	1.5	1.5	1.8	2.2	2.1	1.2	2.3	2.1	
Copper		mg/kg	115	94	75	45	84	24	39	22	25	35	
CrVI or Chromium	updated v5.4dii	mg/kg	16	21	16	19	22	30	30	20	33	39	
Lead		mg/kg	300	353	501	308	928	68	218	73	110	61	
Mercury		mg/kg	0.69	1.14	1.19	0.99	1.49	0.17	0.37	0.17	0.17	0.31	
Nickel		mg/kg	22	24	22	19	20	32	24	17	31	35	
Selenium		mg/kg	1	1	1	1	1	1	1	1	1	1	
Zinc		mg/kg	84	63	60	51	74	58	70	38	62	66	
Barium		mg/kg											
Beryllium		mg/kg											
Vanadium		mg/kg											
Cobalt		mg/kg											
Manganese		mg/kg											
Molybdenum		mg/kg											
Antimony		mg/kg											
Aluminium	NEW v5.4dii	mg/kg											
Bismuth	NEW v5.4dii	mg/kg											
CrIII	NEW v5.4dii	mg/kg											
Iron	NEW v5.4dii	mg/kg											
Strontium	NEW v5.4dii	mg/kg											
Tellurium	NEW v5.4dii	mg/kg											
Thallium	NEW v5.4dii	mg/kg											
Titanium	NEW v5.4dii	mg/kg											
Tungsten	NEW v5.4dii	mg/kg											
Ammoniacal N	NEW v5.4dii	mg/kg											
ws Boron	NEW v5.4dii	mg/kg											
PAH (Input Total PAH **OR** individual PAH results)													
Acenaphthene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Acenaphthylene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Anthracene		mg/kg	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	
Benzo(a)anthracene		mg/kg	0.04	0.04	0.04	0.06	0.08	0.04	0.04	0.04	0.04	0.04	
Benzo(a)pyrene		mg/kg	0.04	0.04	0.04	0.07	0.10	0.04	0.09	0.04	0.04	0.04	
Benzo(b)fluoranthene		mg/kg	0.05	0.05	0.05	0.09	0.12	0.05	0.12	0.05	0.05	0.05	
Benzo(ghi)perylene		mg/kg	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.07	
Benzo(k)fluoranthene		mg/kg	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	
Chrysene		mg/kg	0.06	0.06	0.06	0.06	0.08	0.06	0.06	0.06	0.06	0.04	
Dibenzo(ah)anthracene		mg/kg	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08	
Fluoranthene		mg/kg	0.08	0.08	0.08	0.12	0.08	0.08	0.08	0.08	0.08	0.01	
Fluorene		mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	
Indeno(123cd)pyrene		mg/kg	0.03	0.03	0.03	0.06	0.06	0.03	0.06	0.03	0.03	0.03	
Naphthalene		mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Phenanthrene		mg/kg	0.03	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.03	0.07	
Pyrene		mg/kg	0.07	0.07	0.07	0.09	0.07	0.07	0.10	0.07	0.07	0.08	
Coronene		mg/kg											
Total PAHs (16 or 17)		mg/kg											
TPH													
Petrol		mg/kg											
Diesel		mg/kg											
Lube Oil		mg/kg											
White Spirit / Kerosene		mg/kg											
Creosote		mg/kg											
Unknown TPH with ID		mg/kg	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	
Unknown TPHCWG		mg/kg											
Total Sulphide		mg/kg											
Complex Cyanide		mg/kg											
Free (or Total) Cyanide		mg/kg											
Thiocyanate		mg/kg											
Elemental/Free Sulphur		mg/kg											
Phenols Input Total Phenols HPLC **OR** individual Phenol results.													
Phenol		mg/kg											
Cresols		mg/kg											
Xylenols		mg/kg											
Resourcinol		mg/kg											
Phenols Total by HPLC		mg/kg											
BTEX Input Total BTEX **OR** individual BTEX results.													
Benzene		mg/kg											
Toluene		mg/kg											
Ethylbenzene		mg/kg											
Xylenes		mg/kg											
Total BTEX		mg/kg											
PCBs (POPs)													
PCBs Total (eg EC7/WHO12)		mg/kg											
PBBs (POPs)													
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)		mg/kg											
POPs Dioxins and Furans Input Total Dioxins and Furans **OR** individual Dioxin and Furan results.													
2,3,7,8-TeCDD		mg/kg											
1,2,3,7,8-PeCDD		mg/kg											
1,2,3,4,7,8-HxCDD		mg/kg											
1,2,3,6,7,8-HxCDD		mg/kg											
1,2,3,7,8,9-HxCDD		mg/kg											
1,2,3,4,6,7,8-HpCDD		mg/kg											
OCDD		mg/kg											
2,3,7,8-TeCDF		mg/kg											
1,2,3,7,8-PeCDF		mg/kg											
2,3,4,7,8-PeCDF		mg/kg											
1,2,3,4,7,8-HxCDF		mg/kg											
1,2,3,6,7,8-HxCDF		mg/kg											
2,3,4,6,7,8-HxCDF		mg/kg											
1,2,3,7,8,9-HxCDF		mg/kg											
1,2,3,4,6,7,8-HpCDF		mg/kg											
1,2,3,4,7,8,9-HpCDF		mg/kg											
OCDF		mg/kg											
Total Dioxins and Furans		mg/kg											
Some Pesticides (POPs unless otherwise stated)													
Aldrin		mg/kg											

HASWASTE v5.4dii extra. Envirolab's Contaminated Land Soil Hazardous Waste Assessment Tool for use with WM3. Envirolab, Sandpits Business Park, Mottram Road, Hyde, Cheshire SK14 3AR.

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			BH1	TP1	TP2	TP4	TP5	TP6	TP7	TP9	TP13a	TP14	
TP/WS/BH													
Depth (m)			1.10	0.70	0.50	0.60	0.50	0.80	0.35	0.40	0.30	0.20	
Envirolab reference			16/03976/1	16/04246/1	16/04010/1	16/04010/2	16/04078/1	16/04078/2	16/04167/1	16/04078/3	16/04207/1	16/04376/1	
α Hexachlorocyclohexane (alpha-HCH) *(leave empty if total HCH results used)*		mg/kg											
β Hexachlorocyclohexane (beta-HCH) *(leave empty if total HCH results used)*		mg/kg											
α Cis-Chlordane (alpha) ***OR*** *Total Chlordane*		mg/kg											
δ Hexachlorocyclohexane (delta-HCH) *(leave empty if total HCH results used)*		mg/kg											
Dieldrin		mg/kg											
Endrin		mg/kg											
χ Hexachlorocyclohexane (gamma-HCH) (lindane) ***OR*** *Total HCH*		mg/kg											
Heptachlor		mg/kg											
Hexachlorobenzene		mg/kg											
o,p'-DDT *(leave empty if total DDT results used)*		mg/kg											
p,p'-DDT ***OR*** *Total DDT*		mg/kg											
χ Trans-Chlordane (gamma) *(leave empty if total Chlordane results used)*		mg/kg											
Chlordecone (kepone)		mg/kg											
Pentachlorobenzene		mg/kg											
Mirex		mg/kg											
Toxaphene (camphechlor)		mg/kg											
Tin													
Tin *(leave empty if Organotin and Tin excl Organotin results used)*	updated v5.4dii	mg/kg											
Organotin													
Dibutyltin; DiBT	New v5.4dii	mg/kg											
Tributyltin; TriBT	New v5.4dii	mg/kg											
Triphenyltin; TriPT	New v5.4dii	mg/kg											
Tetrabutyltin; TeBT	New v5.4dii	mg/kg											
Tin excluding Organotin													
Tin excl Organotin	New v5.4dii	mg/kg											
Asbestos in Soil	Thresholds												
Asbestos detected in Soil (enter Y or N)	Y		N	N	N	N	N	N	N	N	N	N	
			Asbestos in Soil above is "**Y**", the soil is Hazardous Waste HP5 and HP7										
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below	%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%		If Asbestos in Soil above is "**Y**", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.									If Asbestos in Soil above is "**Y**", but Asbes	
Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y		If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "**Y**", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "**Y**", the soil is Hazardous Waste. Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres. All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.										

Hazardous Property	Thresholds	Cut Off Value										
Corrosive HP8	≥5%	<1%	0.00479	0.00614	0.00558	0.00523	0.00686	0.00721	0.00695	0.00463	0.00752	0.00868	0.00000
Irritant HP4	≥10%	<1%	0.00172	0.00211	0.00251	0.00158	0.00264	0.00145	0.00119	0.00079	0.00119	0.00119	0.00000
Irritant HP4	≥20%	<1%	0.01745	0.01548	0.01293	0.00894	0.01355	0.00919	0.00927	0.00593	0.00910	0.01104	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specifc Target Organ Toxicity HP5	≥20%		0.00000	0.00000	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000
Specifc Target Organ Toxicity HP5	≥1%		0.00444	0.00485	0.00444	0.00384	0.00422	0.00646	0.00576	0.00384	0.00634	0.00749	0.00000
Specifc Target Organ Toxicity HP5	≥10%		0.03000	0.03530	0.05010	0.03080	0.09280	0.00725	0.02180	0.00730	0.01100	0.00825	0.00000
Aspiration Toxicity HP5	≥10%		0.00100	0.00100	0.00100	0.00100	0.00100	0.00000	0.00100	0.00100	0.00100	0.00100	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00179	0.00223	0.00263	0.00168	0.00279	0.00147	0.00123	0.00081	0.00121	0.00122	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.00321	0.00417	0.00321	0.00379	0.00437	0.00590	0.00590	0.00398	0.00648	0.00763	0.00000
Acute Toxicity HP6	≥25%	<1%	0.05807	0.05885	0.07068	0.04627	0.11578	0.02346	0.04003	0.01811	0.02808	0.02560	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00007	0.00011	0.00012	0.00010	0.00015	0.00002	0.00004	0.00002	0.00002	0.00003	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00307	0.00403	0.00307	0.00365	0.00422	0.00576	0.00576	0.00384	0.00634	0.00749	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥55%	<1%	0.00012	0.00019	0.00015	0.00015	0.00018	0.00022	0.00021	0.00012	0.00023	0.00021	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00326	0.00434	0.00334	0.00390	0.00455	0.00600	0.00601	0.00398	0.00658	0.00773	0.00000
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00014	0.00000
Acute Toxicity HP6	≥22.5%	<1%	0.04494	0.04802	0.06204	0.04101	0.10609	0.02051	0.03540	0.01548	0.02501	0.02142	0.00000
Carcinogenic HP7	≥0.1%		0.03000	0.03530	0.05010	0.03080	0.09280	0.00680	0.02180	0.00730	0.01100	0.00749	0.00000
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00000	0.00000	0.00000	0.00001	0.00001	0.00000	0.00001	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		10.00	10.00	10.00	10.00	10.00	0.00	10.00	10.00	10.00	10.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		0.40000	0.40000	0.40000	0.70000	1.00000	#DIV/0!	0.90000	0.40000	0.40000	0.40000	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.03000	0.03530	0.05010	0.03080	0.09280	0.00725	0.02180	0.00730	0.01100	0.00825	0.00000
Toxic for Reproduction HP10	≥3%		0.00307	0.00403	0.00307	0.00365	0.00422	0.00576	0.00576	0.00384	0.00634	0.00749	0.00000
Mutagenic HP11	≥0.1%		0.00307	0.00403	0.00307	0.00365	0.00422	0.00576	0.00576	0.00384	0.00634	0.00749	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		10.00	10.00	10.00	10.00	10.00	0.00	10.00	10.00	10.00	10.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only)	≥0.01%		0.40000	0.40000	0.40000	0.70000	1.00000	#DIV/0!	0.90000	0.40000	0.40000	0.40000	#DIV/0!

Table 3.1 of the CLP, CL Inventory, ATPs, IARC, Concawe, MSDSs, REACH + Pesticide Properties databases. Worst case REACH + MSDS's used for *** STOT + Acute Toxicity.

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TP/WS/BH			BH1	TP1	TP2	TP4	TP5	TP6	TP7	TP9	TP13a	TP14	
Depth (m)			1.10	0.70	0.50	0.60	0.50	0.80	0.35	0.40	0.30	0.20	
Envirolab reference			16/03976/1	16/04246/1	16/04010/1	16/04010/2	16/04078/1	16/04078/2	16/04167/1	16/04078/3	16/04207/1	16/04376/1	
Mutagenic HP11	≥1%		0.00444	0.00485	0.00444	0.00384	0.00404	0.00646	0.00485	0.00343	0.00626	0.00707	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00444	0.00485	0.00444	0.00384	0.00422	0.00646	0.00576	0.00384	0.00634	0.00749	0.00000
Ecotoxic HP14	≥1.0	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.25286	0.26156	0.30666	0.20757	0.49237	0.12349	0.18926	0.09215	0.14362	0.13836	0.00000
Ecotoxic HP14	≥25%	<0.1%	0.06312	0.06529	0.07657	0.05180	0.12300	0.03088	0.04722	0.02294	0.03581	0.03450	0.00000
Ecotoxic HP14	≥25%	<0.1% (except CompCN + Thiocyanate + Xylene + BTEX 1%).	0.06411	0.06629	0.07757	0.05279	0.12399	0.03087	0.04821	0.02394	0.03681	0.03549	0.00000
Ecotoxic HP14 individual substance specific thresholds (Benzo(a)anthracene, Dibenz(ah)anthracene (or Total PAH if only used), Sn, TriPT)	≥0.0025%		0.000004	0.000004	0.000004	0.000006	0.000008	0.000004	0.000004	0.000004	0.000004	0.000008	0.000000
Ecotoxic HP14 individual substance specific thresholds (Co, γ-HCH, DiBT, TriBT)	≥0.025%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%		0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%		0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

Table 3.1 of the CLP, CL Inventory, ATPs, IARC, Concawe, MSDSs, REACH + Pesticide Properties databases. Worst case REACH + MSDS's used for *** STOT + Acute Toxicity.

Appendix F

Basement Impact Assessment (RSK)

HEYNE TILLETT STEEL

The Hope Lease Limited

The Hope Project

Basement Impact Assessment

371475-02 (04)

OCTOBER 2017

RSK GENERAL NOTES

Report No.: 371475-02 (04)

Title: Basement Impact Assessment for The Hope Project

Client: The Hope Lease Limited

Date: 26th October 2017

Office: RSK, 18 Frogmore Road, Hemel Hempstead, Hertfordshire, HP3 9RT, tel:+44 01442 437500, contact: Claire Siberry

Status: Final

Project Manager	Claire Siberry MSci FGS Senior Geotechnical Engineer	
Reviewed and Approved by	Shon Williams BSc PhD CEng MICE Director of Geotechnics	
Reviewed and Approved by	Matt Cheeseman BSc MSc MCIWEM Principal Hydrologist	
Reviewed and Approved by	Vivien Dent BSc MSc CGeol FGS Associate Technical Director - Hydrogeologist	

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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FIGURES

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NON-TECHNICAL SUMMARY

NON-TECHNICAL SUMMARY	
Site description	The site is located in Camden, London, NW1 7JE, at National Grid reference 529242, 183411. The site is occupied by Koko nightclub (formerly Camden Palace and Camden Hippodrome), the Hope and Anchor Pub and 1 Bayham Street and 64 Bayham Place. The site is bounded to the north by Bayham Place and Nos 2-4 Camden High Street, to the east by Bayham Street, Crowndale Road to the south, and Mornington Crescent LUL station to the west, with the Northern Line passing beneath Camden High Street into Eversholt Street.
Proposed development	Full planning and listed building consent is sought for the: “Demolition of 65 Bayham Place, 1 Bayham Street (retention of façade) and rebuilding to provide private members club (sui generis) with extension to the rear and basement; retention and refurbishment of the ground floor of the Hope & Anchor Public House (Use Class A4) with 1st/2nd floor internal demolition and replacement to provide restaurant and bar, minor reconfiguration to circulation space within KOKO. Use of the Flytower by the private members club with retention of original theatre equipment. Installation of fourth floor extension to provide amenity space with terrace restaurant and bar. The proposals also include for the conversion of the KOKO dome to a private bar and general refurbishment and restoration to the building, along with the installation new plant”.
Ground / Groundwater conditions	Made Ground was encountered across the site, ranging in thickness from 0.18m to 2.12m and typically comprised sandy gravelly clay with occasional brick, clinker, ash and slate, pottery, concrete and wood. The London Clay Formation was encountered beneath the Made Ground, extending to a depth of 25.40m (-2.65m AOD). The London Clay was initially encountered as firm to stiff, brown mottled grey silty clay (weathered) to depths of between 2.60m and 7.80m (14.95m to 15.05m AOD), becoming stiff to very stiff high to extremely high strength dark grey fissured silty clay, locally sandy, with depth. Hard ‘claystone’ bands were encountered locally within the London Clay. The Lambeth Group was encountered below the London Clay and extended to the full depth of the investigation of 30.00m (-7.25m AOD). The Lambeth Group comprised very stiff very high strength fissured yellowish brown, blue-grey and dark red mottled clay Observations made during the site works and the results of a groundwater monitoring programme reveal the presence of perched water within the Made Ground and shallow London Clay around foundations, and localised very slow seepages at depth within the London Clay, the latter being associated with the presence of perched water on ‘claystone’ bands.

Screening and scoping	**Subterranean (ground water):** No potential impacts identified beyond the scoping stage **Surface flow and flooding:** No potential impacts identified beyond the scoping stage **Land stability:** Potential impacts identified relate to ground movements associated with: • Shrink-swell of clay soils - no impact identified beyond the scoping stage; • Retaining wall installation and ground excavation; • Heave of the London Clay in the basement excavation; and • Site lies within LUL exclusion zone to Mornington Crescent Station.
Impact Assessment	The following nearby structures were identified as being potentially at risk from damaging ground movements: • The adjacent highways of Bayham Place and Bayham Street to the north/east • Building No's 2-4 Camden High Street, No's 48-56 Bayham Place and No 3 Bayham Street • Mornington Crescent LUL station and tunnels to the west of the site **Highway/Pedestrian Right of Way Assessment** The assessment predicts a maximum of 9mm of horizontal movement to the immediate east of the site along Bayham and 3mm to the immediate north of the site along Bayham Place, and maximum vertical movements of 1mm settlement during basement construction. It is considered the impact of such these relatively small ground movements on the adjacent highways is likely to be negligible. **Building Damage Category Assessment** The results of the assessment demonstrate that all of the adjacent properties fall into 'Category 0' defined as 'Negligible Damage'. The results therefore fulfil the requirements of CPG4 in that they do not exceed the damage category of 'slight' (Category 2). **LUL Asset Assessment** The assessment predicts ground movements at the tunnel crown are less than +/-1mm and the impact of such small ground movements are considered to be negligible.

1 INTRODUCTION

1.1 Instructions

On the instructions of Heyne Tillett Steel, on behalf of The Hope Lease Ltd (the 'Client'), RSK Environment Limited (RSK) have produced a Basement Impact Assessment for a proposed development known as The Hope Project, comprising land at Koko, The Hope and Anchor Pub and the adjacent buildings enclosed by Camden High Street, Crowndale Road, Bayham Street and Bayham Place. The site is located within the Regent's Park Ward of the London Borough of Camden.

1.2 Regulatory Context

This assessment is designed to be compliant with guidance provided by the London Borough of Camden (Camden) in their guidance document 'Camden Planning Guidance for Basements and Lightwells, CPG4' (amended July 2015) and its supporting study 'Camden Geological, Hydrogeological and Hydrological Study' produced for Camden by ARUP in November 2010. All the technical analysis and recommendations contained within the planning guidance are taken from this latter study, which is treated as the evidence base and technical advice when Camden is assessing Basement Impact Assessments.

This guidance applies to all developments in Camden that propose a new basement development, or an extension to existing basement accommodation where planning permission is required. In accordance with Camden's new Local Plan 2017 (Policy A5), Camden will only permit basement and other underground development where it can be demonstrated that it will not cause harm to the built and natural environment, including to the local water environment and ground conditions.

Addressing these issues requires the submission of a Basement Impact Assessment (BIA). A BIA will be specific to a particular site and proposed development, but includes the following stages:

- *Screening*; the identification of any matters of concern with regard to hydrogeology, hydrology or ground stability, which should be investigated.
- *Scoping*; production of a statement that defines further the matters of concern identified at the screening stage.
- *Site Investigation and Study*; undertaken to establish the baseline conditions. This can be done by utilising existing information and/or collecting new information.
- *Impact Assessment*; undertaken to determine the impact of the proposed basement on the baseline conditions, taking into account any mitigation measures proposed.
- *Review and Decision-Making*; this final stage is undertaken by Camden and consists of an audit of the information supplied and a decision on the acceptability of the impacts of the basement proposal.

The purpose of the BIA is to enable Camden Council to assess whether any predicted damage to neighbouring properties and the water environment is acceptable or can be satisfactorily ameliorated by the developer by preparing a Basement Construction Plan.

1.3 Background

By way of background to the current project, a desk study and intrusive site investigation have been undertaken at the site by RSK, as detailed in the report 'The Hope Project Geoenvironmental Site Assessment Report', reference no. 371475-01 (05), dated October 2017. The current assessment draws on the results of that report. For full details reference should be made to the original report.

1.4 Standards and Limitations

This report is subject to the RSK service constraints given in Appendix A.

This report is based on information available at the time of writing. This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory at the time. There may be conditions pertaining to the site that have not been previously disclosed by the investigation and therefore could not be taken into account. In addition, groundwater levels may vary from those reported due to seasonal, or other, effects.

2 SITE DETAILS

2.1 Site Description

The site is located in Camden, London, NW1 7JE, at National Grid reference 529242, 183411, as shown on Figure 1. The site is occupied by Koko nightclub (formerly Camden Palace and Camden Hippodrome), the Hope and Anchor Pub, and the adjacent buildings enclosed by Camden High Street, Crowndale Road, Bayham Street and Bayham Place.

The area around the site is predominantly occupied by a mix of commercial and residential development with Regents Park and the London Zoo approximately 645m to the west of the site. The site is bounded to the north by Bayham Place and Nos 2-4 Camden High Street, to the east by Bayham Street, Crowndale Road to the south, and Mornington Crescent LUL station to the west, with the Northern Line passing beneath Camden High Street into Eversholt Street.

The site is a roughly rectangular shaped plot of land and covers approximately 0.16 hectares at an elevation of approximately 22.80m above Ordnance Datum (AOD), covered by hardstanding in its entirety. The elevation of the pavement along Crowndale Road falls from 23.5m AOD in the west to 22.5m AOD in the east, with an overall gentle slope down towards the northeast of the site.

The Grade II listed Koko (nightclub) occupies the western half of the site and comprises 5 storeys with a roof terrace, lower ground floor levels and basement, the latter of which is used for storage. Lower ground floor level is at an elevation of approximately 19.40m AOD and the basement occupies the central portion of the club at an elevation of approximately 17.65m AOD. The northern/northeastern boundary of Koko shares a party wall with Nos 2-4 Camden High Street.

The Hope and Anchor pub is situated on the southeastern corner of the site on the corner of Bayham Street and Crowndale Road, and comprises one to three storeys with a cellar.

The Bayham Street property is on the northeastern corner of the site on the corner of Bayham Place and Bayham Street. The property is two to three storeys in height with a mansard roof and comprises No 1 Bayham Street and No 65 Bayham Place.

A small courtyard is present within the Hope and Anchor pub and abuts onto Koko.

Anecdotal evidence suggests that the site has had a long history of problems associated with water entries in the basement such that a series of connected sump chambers have been installed to accommodate the water, and is regularly pumped out of the final chamber.

In addition, a blocked sewer in April 2016 within the Hope and Anchor bounds caused the sewer to fail and water to seep through the walls of the party wall shared with Koko and flood the basement. Further visits to Koko revealed further flooding events within the basement and suggest that historical problems with water ingress into the basement may be associated with leakages within the existing building drainage system.

It is understood that the Mornington Crescent station is approximately 10m west of the site at the junction of Camden High Street, Crowndale Road and Hampstead Road. The Northern Line tunnels run in a north-south orientation with the crowns understood to be at elevations of circa 12 to 13m AOD.

The current site layout is shown in Figure 2.

A search of publicly available planning records (from 1926 to 2016) on Camden's planning website revealed:

- a number of planning permissions for minor alterations to Koko/Camden Palace/Camden Hippodrome.
- a number of applications pertaining to No 1 Bayham Street and No 65 Bayham Place, concerning the use of the properties as an office and minor alterations and additional storeys.
- an application in 1965 pertaining to the Hope and Anchor pub, concerning the rebuilding of the ground floor extension at the rear of the Hope and Anchor Public House (conditional).
- an application in 2001 pertaining to the Hope and Anchor pub, concerning the erection of a 4-storey side extension to provide a single family house (refused).
- a number of applications pertaining to Nos 3, 5, and 7 Bayham Street, concerning change of use and erection of rear extensions, including basements / lower ground floor levels at each property.
- an application in 1979 pertaining to Nos 2-6 Camden High Street, concerning the construction of an entrance hall within the existing building (granted)
- an application in 2015 pertaining to Nos 48-56 Bayham Place concerning the change of use from office to residential comprising 25 studio flats at ground, 1st and 2nd floor level (no basement) (granted).
- Most recently, Nos 48-56 Bayham Place have been subject to a number of applications seeking a change of use from office to residential (PEX0200987). Whilst the full applications were refused on a number of grounds, planning consent was eventually granted via permitted development rights for a change from office to residential (2013/7177/P, 2014/6652/P, 2015, 2021/P and 2015/4598/P). A number of schemes were submitted, but it is understood that a scheme for 13 studio apartments has been built out (2015/4598/P). This has been supplemented by a recent planning approval for two small side and rear extensions at first and second floor level. The application was approved on the 4th October 2016.

2.2 Proposed Development

The site in question is being considered for redevelopment as a new private members club (sui generis), roof terraces and a restaurant and bar venue. The full proposal description is:

Full planning and listed building consent is sought for the:

"Demolition of 65 Bayham Place, 1 Bayham Street (retention of façade) and rebuilding to provide private members club (sui generis) with extension to the rear and basement; retention and refurbishment of the ground floor of the Hope & Anchor Public House (Use Class A4) with 1st/2nd floor internal demolition and replacement to provide restaurant and bar, minor reconfiguration to circulation space within KOKO. Use of the Flytower by the private members club with retention of original theatre equipment. Installation of fourth floor extension to provide amenity space with terrace restaurant and bar. The proposals also include for the conversion of the KOKO dome to a private bar and general refurbishment and restoration to the building, along with the installation of new plant".

The proposed redevelopment will involve the retention of Koko and the part of the facade to the middle buildings on the Bayham Street frontage, and redevelopment of the surrounding site to provide new complementary facilities, linking to the existing venue. The existing buildings at 1 Bayham Street and 65 Bayham Place (herein called the Bayham Street property) and the upper floors of the Hope and Anchor pub, will be demolished and replaced by a new building with four storeys above ground, housing the private members club and dining rooms. The facade to the Hope and Anchor pub will be retained. Development of the Grade II listed Koko club will include a number of new roof extensions, predominantly on the northern side of the building on Bayham Place. Copies of the proposed development plans are presented in Appendix B.

A new core will be constructed to provide stability to the development, envisaged to be constructed from reinforced concrete frame supported on new piled foundations. New loads from the roof top extensions will be supported on piles. The existing buildings will also be refurbished with some internal walls removed.

A new lift core will extend through the southwest corner of the existing Bayham Street property and the courtyard behind the Hope and Anchor pub, down to existing basement level in Koko at 17.65m AOD, with a central lift pit extending a further 1.40m.

It is anticipated that the new basement will be constructed in part by secant piled walls and part underpinning of existing foundations. Column loads will be supported on cantilevered pile caps, using a combination of compression and tension piles to transmit the loads.

Proposed development plans and sections are shown in Appendix A.

2.3 Ground / Groundwater Conditions

2.3.1 British Geological Survey Data

The published 1:50,000 scale (Sheet No. 256 'North London') and 1:10 000 scale (Sheet TQ38SW) geological maps of the area indicate that the site is underlain directly by "Worked Ground" over the London Clay Formation.

The map data indicates that the base of the London Clay lies at an elevation between approximately –5mAOD and –10mAOD (i.e. the London Clay may only be of the order of 30m thick) in the site area. The London Clay is indicated to be underlain by the Lambeth Group, which comprises mottled clays with interbedded sand and pebble beds, and attains a maximum thickness of 15m.

There is a single published British Geological Survey (BGS) borehole log available for the immediate site area, at Mornington Crescent LUL Station, which indicates London Clay is present beneath a moderate thickness of made ground. In addition, a number of boreholes located within approximately 250m of the site indicate that the general site area is underlain by a nominal thickness of Made Ground, with the underlying London Clay being approximately 27m thick; the base of the London Clay is indicated to lie at an elevation of approximately -2.13mAOD. Where penetrated, the upper part of the Lambeth Group is described as mottled clay (probable Upper Mottled Clay of the Reading Formation), and extended to -20.72m AOD.

The BGS records indicate a groundwater table in the order of 22.50m below ground level, with seepages of groundwater within the London Clay typically associated with bands of claystone.

2.3.2 Site Specific Intrusive Investigation Data

A full site investigation was undertaken at the site by RSK in June/July 2016, as detailed in the report 'The Hope Project, Geoenvironmental Site Assessment Report', report no. 371475-01 (04), dated October 2017. The current assessment draws on the results of that report. For full details, reference should be made to the original report.

Made Ground was encountered across the site, ranging in thickness from 0.18m to 2.12m. In general, the Made Ground comprised cohesive sandy gravelly clay, locally containing abundant reworked weathered London Clay and horizons of very gravelly sand / sandy gravel with high cobble content, and with occasional brick, clinker, ash and slate, pottery, concrete and wood. No evidence of extensive deposits of 'Worked Ground' was recorded by the investigation.

The London Clay Formation was encountered beneath the Made Ground, extending to a depth of 25.40m (-2.65m AOD). The London Clay was initially encountered as firm to stiff, brown mottled grey silty clay (weathered) to depths of between 2.60m and 7.80m (14.95m to 15.05m AOD), becoming stiff to very stiff high to extremely high strength dark grey fissured silty clay, locally sandy, with depth. The silty clay was locally thinly laminated and contained occasional partings and laminae of coarse silt/very fine sand. Hard 'claystone' bands were encountered at 11.80m bgl (10.95m AOD) and 12.80m bgl (9.95m AOD) in BH1, and 1.25m (18.15m AOD) and 3.60m (15.80m AOD) in WS1. The basal 0.40m in BH1 (below -2.25m AOD) was sandy and glauconitic, indicating the presence of the Swanscombe Member of the Harwich Formation.

The Lambeth Group was encountered below the London Clay and extended to the full depth of the investigation of 30.00m (-7.25m AOD). The Lambeth Group comprised very stiff very high strength fissured yellowish brown, blue-grey and dark red mottled clay

Observations made during the site works and the results of a groundwater monitoring programme reveal the presence of perched water seepages within the Made Ground and shallow London Clay around foundations, and localised very slow seepages at depth within the London Clay, the latter being associated with the presence of perched water on 'claystone' bands.

The locations of the RSK boreholes and trial pits are shown on Figure 2.

3 STAGE 1 - SCREENING

This section of the report provides information for the purpose of screening in accordance with CPG4 and addresses all questions raised within the relevant sections of that document. Tables summarising the screening flowcharts are shown as Tables 1 to 3. In accordance with procedure, where a ‘yes’ or ‘unknown’ response is returned, the potential issue is taken to the scoping stage in Section 4.

Table 1: Subterranean (ground water) screening

Question		Answer	Evidence/Comment
1	Is the site located directly above an aquifer?	No	The site is underlain by 0.18m to 2.12m of Made Ground and approximately 24m of the London Clay Formation and 4.6m of cohesive Lambeth Group. The London Clay is classified as non-productive strata. p.19 of the ARUP guidance document (ref: 213923) which supports CPG4, ARUP states: *"Although groundwater is contained within the microscopic pores of the clayey strata of the London Clay, it permeates so slowly, due to the narrow pores, that in practice it is generally considered a barrier to groundwater".* Therefore, the site does not lie directly above an aquifer.
1a	Will the proposed basement extend beneath the water table surface?	No	Perched water has been encountered locally within the Made Ground and shallow London Clay around foundations and during monitoring at an elevation of approximately 18.50m AOD. However, some trial pits remained dry during excavation and published boreholes within the surrounding area do not record a shallow groundwater table, which indicates that any shallow water beneath the site is localised and perched. This does not constitute a water table. Within a few metres of the ground surface the London Clay can be assumed to be saturated i.e. all available pore space within the clay filled will water. Porosity within this material is so low as to not maintain significant volumes of water and to be 'unproductive'. In this case water recorded within the London Clay records pore water pressure and the concept of a 'groundwater table' does not really apply. Therefore the proposed basement with not penetrate any water tables that might affect groundwater levels or flows.
2	Is the site within 100m of a watercourse, well (used/disused) or potential spring line?	No	The nearest watercourse, well or potential spring line is 540m to the northeast of the site (Regent's Canal). Therefore, the site is not within 100m of such features.

Question		Answer	Evidence/Comment
3	Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site lies 3km southeast of the nearest Hampstead Heath drainage catchment and will therefore not impact any catchments.
4	Will the proposed basement development result in a change in the proportion of hard surfaced / paved areas?	No	The site is covered in its entirety by buildings and areas of hardstanding and remains unchanged in the proposed development plans.
5	As part of the site drainage, will more surface water (e.g. rainfall and run-off) than at present be discharged to the ground (e.g. via soakaways and/or SUDS)?	No	There are no SUDS/soakaway schemes proposed for the site that would increase discharge to the ground.
6	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level in any local pond (not just the pond chains on Hampstead Heath) or spring line?	No	There are no surface water features in the vicinity of the site, the nearest is Regent's Canal 540m to the northeast of the site.

Table 2: Surface flow and flooding screening

Question		Answer	Evidence/Comment
1	Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site lies 3km southeast of the nearest Hampstead Heath drainage catchment and will therefore not impact any catchments.
2	As part of the proposed site drainage, will surface water flows (e.g. volume of rainfall and peak run off) be materially changed from the existing route?	No	The ground conditions at the site (moderate thickness of Made Ground and impermeable London Clay) are not suitable for the use of SUDS/soakaways. The site is currently hardstanding or building covered and all drainage is conveyed to the existing sewer system. Therefore, surface water flow routes will not be materially changed.
3	Will the proposed basement development result in a change in the proportion of hard surfaced / paved external	No	The site is covered in its entirety by buildings and areas of hardstanding. The

Question		Answer	Evidence/Comment
	areas?		proposed development will cover the entire site with buildings.
4	Will the proposed basement result in changes to the profile of the inflows (instantaneous and long term) of surface water being received by adjacent properties or downstream watercourses?	No	The ground conditions at the site (moderate thickness of Made Ground and impermeable London Clay) are not suitable for the use of SUDS/soakaways. The site is currently hardstanding or building covered and all drainage is conveyed to the existing sewer system. Therefore, surface water flow routes will not be materially changed. There will be no change to the profile of inflows of surface water and there are no nearby watercourses that could be affected.
5	Will the proposed basement result in changes to the quality of surface water being received by adjacent properties or downstream watercourses?	No	The ground conditions at the site (moderate thickness of Made Ground and impermeable London Clay) are not suitable for the use of SUDS/soakaways. The site is currently hardstanding or building covered and all drainage is conveyed to the existing sewer system. Therefore, surface water flow routes will not be materially changed. There will be no change to the profile of inflows and there are no nearby watercourses that could be affected.
6	Is the site in an area known to be at risk from surface water flooding, or is it at risk from flooding, for example because the proposed basement is below the static water level of a nearby surface water feature?	No	Reference to the EA floodplain maps, North London Strategic Flood Assessment and The London Borough of Camden flood risk management strategy shows that the site does not lie within any known flood zones. BGS information indicates that the site does not lie within 50m of a groundwater flooding susceptibility area. The highest susceptibility to groundwater flooding, based on the underlying geological conditions, is indicated to be 'not prone'. There are no surface water features in the vicinity of the site that would pose a flood risk. Anecdotal evidence suggests that the site has suffered historical problems with water ingress into the basement, but it is considered likely these issues relate to leakages in the existing drainage on site/surrounding area and is not related to wider surface flow/flooding issues.

Table 3: Land Stability Screening

Question	Answer	Evidence/Comment
Does the existing site include slopes, natural or manmade, greater than 7°?	No	The site is essentially level, with a very gentle slope downwards of <1% towards the northeast. Observations made at the site have not revealed any issues associated with the stability of slopes.
Will the proposed re-profiling of landscaping at the site change slopes at the property boundary to more than 7°?	No	The site will be underlain in the majority by the basement and no re-grading of the site is proposed.
Does the development neighbour land, including railway cuttings and the like, with a slope greater than 7°?	No	The surrounding area is essentially level.
Is the site within a wider hillside setting in which the general slope is greater than 7°?	No	Reference to the site plans, ordnance survey mapping and the slope angle map produced as figure 16 of the ARUP report indicates that slope angles in the site vicinity are less than 7°. The 1:50,000 scale geological map for the area indicates that the site does not lie within an 'Area of Significant Landslide Potential'. The BGS landslide potential map is reproduced as figure 17 of the ARUP report.
Is the London Clay the shallowest stratum at the site?	Yes	See Section 4 (Scoping)
Will any tree/s be felled as part of the proposed development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	There are no soft landscaped areas or trees present on site and none are proposed. Two small trees are located in the pavement of Crowndale Road adjacent to the existing Koko building, but these are not to be removed as part of the development.
Is there a history of seasonal shrink-swell subsidence in the local area, and/or evidence of such effects at the site?	No	There is no evidence of seasonal shrink-swell effects on site. Given that the underlying natural ground is high volume change potential London Clay there is potential for such effects but it is not known whether there are any structures that have been affected in the wider area, and in any case, these would be unrelated to the subject site and proposed development.
Is the site within 100m of a watercourse or a potential spring line?	No	The nearest watercourse, well or potential spring line is 540m to the northeast of the site (Regent's Canal). Therefore, the site is not within 100m of such features.

Question	Answer	Evidence/Comment
Is the site within an area of previously worked ground?	No	The published BGS geological maps of the area indicate that the site is underlain directly by “Worked Ground”. However, a natural ground stability hazard dataset supplied by the BGS and historical and geological mapping (included in the previous RSK desk study and site investigation report) reveal that there are no recorded hazards associated with previously worked ground, landfilling or compressible and collapsible ground at the site that could lead to stability issues. The site investigations undertaken at the site confirm these ground conditions. Although between 0.18m and 2.12m of Made Ground have been recorded on the site, these soils appear to comprise reworked materials associated with previous development of the land and are not considered to present a risk with regard to land stability, particularly as much of this material will be removed as part of the development and the new structure will be supported on piled foundations. In addition, significantly thick deposits of worked ground were not encountered across the site which suggests that the deposits were either removed during a previous phase of construction or were not present.
Is the site within an aquifer? If so, will the proposed basement extend beneath the water table such that dewatering may be required during construction?	No	The site is underlain by non-productive strata. Perched water has been encountered locally within the Made Ground and shallow London Clay around foundations and during monitoring at an elevation of approximately 18.50m AOD. However, some trial pits remained dry during excavation and published boreholes within the surrounding area do not record a shallow groundwater table, which indicates that any shallow water beneath the site is localised and perched. This does not constitute a water table. Although seepage of this perched water is likely to require controlling (probably sump pumping) during the temporary works, this water does not constitute ground water with a ‘water table’, and its temporary exclusion from the basement excavation will have no effect on the groundwater regime or ground stability.

Question	Answer	Evidence/Comment
Is the site within 50m of the Hampstead Heath ponds?	No	The site lies 3km southeast of the nearest Hampstead Heath drainage catchment
Is the site within 5m of a highway or pedestrian right of way?	Yes	See Section 4 (Scoping)
Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	The current building on site and that proposed will be attached to Nos 2-4 Camden High Street at the western end of the development, and immediately adjacent to Mornington Crescent LUL Station to the west. Nos 48-56 Bayham Place and No 3 Bayham Street are considered to be near to the structure on the other side of Bayham Place. It is probable that nearby structures are founded on shallow foundations, with the exception of the LUL station box that will be supported on piles. The boundaries for the remainder of the building are adjacent to highways and widely separated from nearby structures. Notwithstanding the above, potential damaging movements could occur due to basement construction associated with retaining walls and excavation. See Section 4 (Scoping)
Is the site over (or within the exclusion zone of) any tunnels?	Yes	Enquiries have been made in relation to buried services at the site, including consultation with London Underground, whose responses are included as Appendix B. Mornington Crescent LUL station is located approximately 10.0m west of the site at the junction of Camden High Street, Crowndale Road and Hampstead Road. The northern tunnels enter the station from the north under Camden High Street and exits to the south beneath Crowndale Road. It is assumed that the tunnel exclusion zone is 15.0m wide and as such could be affected by the proposed redevelopment of the site.

4 STAGE 2 – SCOPING

As defined in CPG4, the scoping stage is used to identify the potential impacts of the proposed scheme for each of the matters of concern identified in the previous screening stage (i.e. those questions answered with a “yes” or “unknown” response). The sections below present statements that define further the matters of concern identified at the screening stage. The data summarised in Section 2 has been used to develop a conceptual ground model to carry out the scoping stage.

4.1 Subterranean (Ground water) Scoping

No potential impacts were identified as part of the subterranean (groundwater) screening stage.

4.2 Surface Flow and Flooding Scoping

No potential impacts were identified as part of the surface flow and flooding screening stage.

4.3 Land stability Scoping

4.3.1 QUESTION: Is the London Clay the shallowest stratum at the site?

POTENTIAL IMPACT: The London Clay is prone to seasonal shrink-swell (subsidence and heave)

The site is essentially fully occupied with buildings/hardcover with no vegetation/trees on site at present or proposed. The immediate surroundings are also covered by buildings/hard cover and also generally free from any significant vegetation/trees. Notwithstanding this, two small trees are located in the pavement of Crowndale Road adjacent to the existing Koko building, but these are not to be removed as part of the development and foundations to the building are located below basement level and at such a depth as not to be influenced by any seasonal shrinkage/swell movement that could arise from the influence of these trees.

Therefore seasonal shrink-swell effects are not considered to present a significant risk to the development.

4.3.2 Is the site within 5m of a highway or pedestrian right of way?

POTENTIAL IMPACT: Excavation for a basement may result in damage to the road, pavement or any underground services buried in trenches beneath the road or pavement.

Bayham Place, Crowndale Road, Bayham Street and Camden High Street and are located to the immediate north, south, east and west of the site, respectively.

There is the potential for ground movements associated with basement piled wall installation and basement excavation to impact the adjacent highways to Bayham Place and Bayham Street.

An impact assessment addressing this issue is reported in Section 6.

4.3.3 QUESTION: Will the proposed basement significantly increase the differential depth of foundations relative to neighbouring properties?

POTENTIAL IMPACT: Excavation for a basement may result in structural damage to neighbouring properties/structures if there is a significant differential depth between adjacent foundations.

It is probable that nearby structures (Nos 2-4 Camden High Street, Nos 48-56 Bayham Place and No 3 Bayham Street) are founded on relatively shallow foundations. As noted above, Koko shares a party wall with Nos 2-4 Camden High Street, whilst the remaining current buildings on site and that proposed, are detached from the remaining nearby structures and do not share any party walls. It should be noted that Nos 48-56 Bayham Place and No 3 Bayham Street are only approximately 6.5m from the site.

Where the site shares a party wall with Nos 2-4 Camden High Street, it is not proposed to lower the existing lower ground floor level; the proposed basement development is located on the eastern half of the site beneath Bayham Street property and The Hope and Anchor pub only.

Notwithstanding the above, potential damaging movements could occur due to basement construction. The identified hazards are associated with ground movements from perimeter retaining wall installation and ground excavation, and swelling of the London Clay in the basement excavation associated with stress release.

An impact assessment addressing this issue is reported in Section 6.

4.3.4 QUESTION: Is the site over (or within the exclusion zone of) any tunnels?

POTENTIAL IMPACT: Increased loading on existing buildings may result in structural damage to neighbouring tunnels and tube stations if there is significant lateral ground movements associated with the increased loading.

Mornington Crescent LUL station is located approximately 10.0m west of the site at the junction of Camden High Street, Crowndale Road and Hampstead Road. The northern line tunnels enter the station from the north under Camden High Street and exits to the south beneath Crowndale Road, as shown in Appendix C. It is assumed that the tunnel exclusion zone is 15.0m wide and as such, could be affected by the proposed redevelopment of the site.

However, the proposed basement construction is located at the opposing end of the site (east), such that it will be outside the limits of the tunnel exclusion zone. Additional loading to the Koko club, which is closer to the LUL infrastructure is anticipated to be towards the middle and north of the site and supported on piles, such that any associated settlement from the additional load on the LUL infrastructure is likely to be minimal.

An impact assessment is reported in Section 6 to confirm the above.

5 STAGE 3 – SITE INVESTIGATION AND STUDY

As previously noted, a full desk study, intrusive site investigation and monitoring programme was undertaken at the site by RSK in June/July 2016, as detailed in the report 'The Hope Project, Geoenvironmental Site Assessment Report', report no. 371475-01 (05), dated October 2017. The investigation was designed to be compliant with the data requirements as set out in Appendix G of 'Camden Geological, Hydrogeological and Hydrological Study' produced for Camden by ARUP in November 2010.

The results of report 371475-01 (05) have been utilised to inform the scoping stage of the BIA and the current assessment draws on the results of that report. For full details, reference should be made to the original report.

6 STAGE 4 - IMPACT ASSESSMENT

This stage is concerned with evaluating the direct and indirect implications of the proposed basement development. It involved describing, quantifying and aggregating the effects of the development on those attributes or features which have been identified in the scoping stage as being potentially affected.

The only potential impacts that have been identified by this assessment relate to ground stability hazards associated with:

- Retaining wall installation and ground excavation;
- Elastic heave of the London Clay in the basement excavation associated with stress release; and
- Elastic and longer term consolidation settlement of the London Clay across the site associated with additional loading on existing and from new buildings.

As part of this assessment the following nearby structures have been identified as being potentially at risk from damaging ground movements:

- Nos 2-4 Camden High Street
- Nos 48-56 Bayham Place
- No 3 Bayham Street
- Highways and public footpaths to Bayham Place and Bayham Street
- Mornington Crescent LUL tube station and tunnels to the west of the site beneath Camden High Street.

6.1 Ground Movement Assessment

The ground movement assessment has been carried out to determine whether the movements resulting from the demolition, piled wall installation, basement excavation and support, and the subsequent structural loading will have any adverse effects on the neighbouring properties or infrastructure.

Ground movements in the vicinity of the basement development of the type proposed at the site arise for a number of reasons including;

- Heave due to removal of load during part-demolition of the existing development;
- Lateral and vertical ground movements due to secant pile walls installation to facilitate the basement excavation for the new lift core and basement;
- Heave due to removal of overburden pressure by the basement excavation beneath the southwest corner of the Bayham Street property;
- Ground settlement due to loading from the new loadings within Koko and new superstructure to the Bayham Street property and Hope and Anchor pub;

The assessment of vertical ground movements (heave and settlement due to unloading and loading construction stages) has been carried out by numerical modelling using OASYS PDISP 19.3, while ground movements (vertical and lateral) resulting from installation of the secant piled walls and subsequent excavation have been obtained by reference to published empirical data within CIRIA C580 using the OASYS XDISP 19.4 software. The results of the analyses for the various stages of construction have been combined to estimate the resultant ground movements. In relation to the latter, it is worth noting at this stage that the magnitude of ground movements depends to a great extent upon the quality of workmanship. As such, large local ground movements may occur where construction problems are encountered. Such movements have not been predicted by this work.

6.1.1 Information on applied loadings

Information on the existing and new building loads has been provided by HTS and is included within Appendix B.

The loading information for the existing building has been used to assess ground movements resulting from the removal of load following demolition of the existing eastern portion of the site; No 1 Bayham Street, No 65 Bayham Place and the Hope and Anchor Public House. In considering the loads from these existing buildings the load applied on both the columns and walls has been spread assuming a 1.0m wide strip footing and 2.0m wide pad footings.

The excavation of the new basement level and lift pit to existing basement level (approximately 17.50m AOD) will result in a reduction in vertical stress at the base of the excavations of approximately 28kN/m^2 to 100kN/m^2 (assuming unit weight of 20kN/m^3).

The SLS column loadings provided for the roof top extensions to Koko and new superstructure to the Bayham Street property are indicated to range from 120kN to 1010kN. Tension piles have been omitted from the assessment. In order to model the transfer of load from the proposed piles to the soil a load spread of 1 in 4 from the vertical has been assumed around the pile perimeter, to a depth of two thirds of the length of the pile. This method has also been adopted for the piled wall that is present within the southwest corner of the Bayham Street property, with the total of the column loads distributed over the length of the wall. The pile lengths were estimated from the preliminary working loads provided in the previous report (ref 371475-01 (04)).

6.1.2 Ground Model

The ground profile and soil parameters adopted for use in the ground movement assessment are summarised in the following sections.

6.1.2.1 Ground Profile

Table 4 below summarises the simplified ground profile assumed for the purposes of the ground movement analysis. As all former and proposed basement excavations will only directly impact the London Clay Formation the properties of the overlying soils will have a limiting influence. A rigid boundary layer has been assumed within the Lambeth

Group at an elevation of -10mAOD below which movement is considered to be negligible.

Table 4: Ground Profile

Material	Top of Stratum (mAOD)	Thickness (m)
Made Ground	22.50	1.00
London Clay Formation	21.50	24.20
Lambeth Group	-2.70	>4.60

6.1.2.2 Soil Parameters

The distribution of Young's modulus and other soil parameters with depth have been based on the results of the site investigations previously undertaken, as detailed in Section 3.0.

A Young's modulus increasing with depth has been assumed for the purpose of this analysis. This has been calculated from the measured shear strength results using the correlation presented by Jamiolkowski, et al, contained within CIRIA Special Publication 27, Settlement of Structures on Clay Soils, 1983.

Jamiolkowski, et al, considered that for undrained soils of a known plasticity and over-consolidation ratio the following correlations with undrained shear strength could be adopted for estimating undrained soil stiffness:

$$E_u = 500\ c_u \text{ (U100 Samples)}$$

In the undrained condition Jamiolkowski recommended using the following equation to derive drained soil stiffness for the London Clay Formation:

$$E' = 0.6\ E_u$$

The resulting distribution of undrained and drained modulus values are presented in Figures 4 and 5.

The soil parameters adopted for the analysis are outlined in Table 5.

Table 5: Soil parameters

Material	Bulk Unit Weight (kN/m^3)	Young's Modulus (kN/m^2)	Young's Modulus – Increase with Depth ($kN/m^2/m$)	Poisson's Ratio
Made Ground – Drained	Not Considered			
London Clay Formation – Undrained	19	30,000	1,700	0.5
London Clay Formation – Drained	19	16,000	2,700	0.2
Lambeth Group – Undrained	19	100,000	0	0.5

Material	Bulk Unit Weight (kN/m^3)	Young's Modulus (kN/m^2)	Young's Modulus – Increase with Depth ($kN/m^2/m$)	Poisson's Ratio
Lambeth Group – Drained	19	60,000	0	0.2

6.1.2.3 Neighbouring Properties

The neighbouring properties include; 2 – 4 Camden High Street to the north west and 48 - 56 Bayham Place and 3 Bayham Street to the north / north east. Information assumed for the neighbouring properties is summarised in Table 6 below and shown on Figure 3.

Table 6: General details on construction/sub-structure to neighbouring properties

Property	Construction/Sub-structure Details	Underside of sub-structure (mAOD)
No 2-4 Camden High Street	Assumed masonry building.	22.50*
No 48-56 Bayham Place	Assumed masonry building.	22.50*
No 3 Bayham Street	Assumed masonry building.	22.50*
Notes: * Conservative assumption in the absence of detailed information		

A summary of the specific dimensions used for the purposes of the ground movement analyses are presented in Table 7.

Table 7: Specific dimensions used for analyses

Adjacent Property	Existing Wall Depth (m)	Existing Excavation Depth (m.bgl)	Proposed Wall Depth (m)	Proposed Excavation Depth (m.bgl)	Approximate Distance to Face of Property (m)	Approximate Length of Property Perpendicular to Basement (m)
No 2-4 Camden High Street	0.00	0.00	0.00	0.00	0.00	11.00
No 48-56 Bayham Place	0.00	0.00	Up to 10.00	Up to 3.20	7.00	23.00
No 3 Bayham Street	0.00	0.00	Up to 10.00	Up to 3.20	7.00	7.50

6.1.3 Method of Analysis

6.1.3.1 Numerical Modelling of Heave/Settlement from applied loadings

The calculations were carried out using the PDISP Version 19.3 computer package supplied by Oasys Ltd. adopting the Boussinesq method of elastic analysis. This

calculates the stresses and strains within the ground due to applied loads and then determines the displacements by integrating the vertical and horizontal strains. This package could not be used to consider the influence of piles, as the increased stiffness at each location could not be incorporated into the model.

The analyses have been undertaken to determine the conditions at key stages in the construction process as detailed in Table 8:

Table 8: Ground movement stages

No.	Construction Stage	Short term/Long term
1	Demolition of existing structure	Undrained – Short term
2	Demolition of existing structure	Drained – Long term
3	New basement excavation	Undrained – Short term
4	New basement excavation	Drained – Long term
5	Loading of new structure	Undrained – Short term
6	Loading of new structure	Drained – Long term

The vertical movements, as well as the vertical stresses, have been calculated at a level of 17.50mAOD.

6.1.3.2 Empirical assessment of ground movements from wall installation and basement excavation

The empirical approach adopted is well described in CIRIA C580 "*Embedded Retaining Walls – Guidance for Economic Design*". This document provides charts of vertical and horizontal ground movements resulting from installation of embedded retaining walls and excavation in front of the walls. These charts have been normalised with wall length and excavation depth to facilitate their use for new development.

The assessment of ground movements associated with basement wall construction and basement excavation were carried out using the XDISP computer package supplied by Oasys Ltd, which references the CIRIA 580 charts.

For the purposes of the analyses, a high stiffness retaining system, considered appropriate on basis that high level propping is to be installed as excavation progresses.

6.1.3.3 Assessment of combined movements

The results of the analyses outlined above have been combined in XDISP in order to estimate the resultant ground movements for the key stages of construction, i.e. demolition, basement excavation and final construction. The analyses adopted for each stage and how they have been combined for the purposes of this ground movement assessment is outlined below:

- **Demolition** – Short term heave movements estimated using PDISP;
- **Basement construction** – Short term heave movements determined above combined with the lateral and vertical ground movements estimated by XDISP using the C580 curves for wall installation and basement excavation;

- **Final construction** – Combination of short term heave movements from demolition, the lateral and vertical wall movements estimated in XDISP using C580 and long term heave/settlement movements estimated using PDISP;

Notwithstanding the above, 48 - 56 Bayham Place and 3 Bayham Street to the north / north east are understood to have been constructed prior to or at the same time as the existing development. It is therefore considered that ground movements associated with loading following original construction and subsequent unloading following demolition will essentially counteract each other. On this basis, the ground movements estimated for the demolition stage have been omitted when determining the resultant ground movements beneath both these properties.

6.1.4 Summary of ground movements

A summary of the resultant ground movements for the key stages of construction (i.e. demolition, basement excavation and final construction) are outlined in the following sections.

6.1.4.1 Demolition

The estimated short term and long term heave movements resulting from the demolition of No 1 Bayham Street, No 65 Bayham Place and the Hope and Anchor Public House are summarised below in Table 9 and contour plots provided in Appendix D. Settlements are defined as positive movements and heave as negative movements.

Table 9: Heave Movements - PDISP

Construction Stage	No 2-4 Camden High Street	No 48-56 Bayham Place	No 3 Bayham Street	Western Site Boundary	Northern Site Boundary	Eastern Site Boundary	Southern Site Boundary
Short Term (Undrained)	0	0	-1	0	-2	-3	-2
Long Term (Drained)	0	-1	-2	0	-5	-7	-5

The long term movements indicated above for the demolition stages would only arise if the construction works stalled for a number of years following the initial demolition. It is therefore considered extremely unlikely that this condition would ever arise in this instance

A summary of the estimated ground movements likely to be experienced during the demolition stage following combination with XDISP are presented in Table 10. The full results are provided in Appendix E. Only the displacement resulting from the short term or undrained condition have been imported as this is the considered to be the most realistic situation given the proposed construction sequence.

Table 10: Short Term (Undrained) Ground Movements - XDISP

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
No 2-4 Camden High Street	0	0	0	0
No 48-56 Bayham Place	NA	NA	NA	NA
No 3 Bayham Street	NA	NA	NA	NA

Notes:

- Lateral displacement recorded as movement along the line.
- Positive lateral displacement values indicate ground movement towards the excavation.
- Negative vertical displacement values indicate ground heave.

6.1.4.2 Basement Construction

The estimated short term and long term heave movements resulting from proposed basement excavation are summarised in Table 11 and contour plots provided in Appendix D. Settlements are defined as positive movements and heave as negative movements.

It should be noted that wall installation movements have not been assessed using the PDISP software and will be considered following the combination of displacements within the XDISP software.

Table 11: Heave Movements - PDISP

Construction Stage	No 2-4 Camden High Street	No 48-56 Bayham Place	No 3 Bayham Street	Western Site Boundary	Northern Site Boundary	Eastern Site Boundary	Southern Site Boundary
Short Term (Undrained)	0	0	0	0	0	-2	0
Long Term (Drained)	0	0	0	0	-1	-3	0

As noted previously the long term movements indicated above for the basement excavation stages would only arise if the construction works stalled for a number of years following the initial excavation stages.

A summary of the estimated ground movements likely to be experienced during the basement construction stage following combination with XDISP are presented in Table 12. The full results are provided in Appendix E. The displacement resulting from the short term or undrained condition only have been imported as this is the considered to be the most realistic situation given the proposed construction sequence.

Table 12: Short Term (Undrained) Ground Movements - XDISP

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
No 2-4 Camden High Street	0	0	0	0
No 48-56 Bayham Place	0	0	0	0
No 3 Bayham Street	0	0	0	0

Notes:

- Lateral displacement recorded as movement along the line.
- Positive lateral displacement values indicate ground movement towards the excavation.
- Negative vertical displacement values indicate ground heave.

6.1.4.3 Final Construction

The estimated short term and long term heave movements resulting from the final development construction are summarised below in Table 13 and contour plots provided in Appendix D. Settlements are defined as positive movements and heave as negative movements.

Table 13: Settlement / Heave Movements - PDISP

Construction Stage	No 2-4 Camden High Street	No 48-56 Bayham Place	No 3 Bayham Street	Western Site Boundary	Northern Site Boundary	Eastern Site Boundary	Southern Site Boundary
Short Term (Undrained)	0	0	0	0	1	4	1
Long Term (Drained)	1	0	1	0	3	9	2

A summary of the estimated ground movements likely to be experienced following the completion of the proposed development once combined with the displacement in XDISP are presented in Table 14. The full results are provided in Appendix E. The displacement resulting from the long term or drained condition only have been imported as this is the considered to be the most realistic situation given the proposed construction sequence.

Table 14: Long Term (Drained) Ground Movements - XDISP

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
No 2-4 Camden High Street	0	1	0	0
No 48-56 Bayham Place	1	0	0	0
No 3 Bayham Street	1	1	0	0

Adjacent Property	Ground Movement at Front of Adjacent Property		Ground Movement at Rear of Adjacent Property	
	Lateral (mm)	Vertical (mm)	Lateral (mm)	Vertical (mm)
Notes: • Lateral displacement recorded as movement along the line. • Positive lateral displacement values indicate ground movement towards the excavation. • Negative vertical displacement values indicate ground heave.				

6.2 Highway or Pedestrian Right of Way Assessment

An assessment of the horizontal and vertical ground movements that could impact on the highways to Bayham Place and Bayham Street to the north/east of the site has been undertaken. This assessment predicts a maximum of 9mm of horizontal movement to the immediate east of the site along Bayham Street and 3mm to the immediate north of the site along Bayham Place, and maximum vertical movements of 1mm settlement along Bayham Place during basement construction. It is considered the impact of these relatively small ground movements on the adjacent highways is likely to be negligible.

6.3 Building Damage Category Assessment

Following the combination of the displacements resulting from applied loading obtained from PDISP and those resulting from wall installation and basement excavation obtained from XDISP it is possible to undertake a building damage assessment using the methodology provided within CIRIA C580.

This guidance provides a methodology for assessing the potential damage to properties within the zone of influence of the basement excavation as summarised in Figures 2.16 and 2.18 of the document. This methodology uses the relationship between Damage Category, lateral strain and deflection ratio developed by Boscardin and Cording (1989) and Burland (2001). The definition of the categories given in C580 is reproduced in Table 15.

Table 15: Classification of damage category (from Table 2.5, CIRIA C580)

Category of damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (%)
0 Negligible	Hairline cracks of less than about 0.1mm are classed as negligible.	<0.1	0.0- 0.05
1 Very slight	Fine cracks that can easily be treated during normal decoration. Cracks in external brickwork visible on inspection.	<1	0.05–0.075
2 Slight	Cracks easily filled. Redecoration probably required. Cracks are visible externally and some repointing may be required externally to ensure watertightness. Doors and windows may stick slightly.	<5	0.075 – 0.15

Category of damage	Description of typical damage	Approximate crack width (mm)	Limiting tensile strain ε_{lim} (%)
3 Moderate	The cracks require some opening up and can be patched by a mason. Repointing of external brickwork and possibly a small amount of brickwork to be replaced. Doors and windows sticking. Service pipes may fracture. Weathertightness often impaired.	5 – 15 or a number of cracks >3	0.15 – 0.3
4 Severe	Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Windows and frames distorted, floor sloping noticeably. Walls leaning or bulging noticeably, some loss of bearing in beams. Service pipes disrupted.	15 – 25 but also depends on number of cracks	>0.3
5 Very severe	This requires a major repair involving partial or complete rebuilding. Beams lose bearings, walls lean badly and require shoring. Windows broken with distortion. Danger of instability.	Usually >25 but depends on number of cracks	

The maximum horizontal strains and deflection ratios calculated from the ground movements outlined in the previous section are presented in Table 16, along with the corresponding damage category.

Table 16: Maximum Calculated Horizontal Strains and Deflection Ratios

Adjacent Building	Horizontal Strain (%)	Deflection Ratio (%)	Damage Category
Demolition			
No 2-4 Camden High Street	NA	NA	NA
No 48-56 Bayham Place	NA	NA	NA
No 3 Bayham Street	0.000	440.19×10^{-6}	Negligible
Basement Construction			
No 2-4 Camden High Street	NA	NA	NA
No 48-56 Bayham Place	NA	NA	NA
No 3 Bayham Street	-281.55×10^{-6}	475.48×10^{-6}	Negligible
Final Construction			
No 2-4 Camden High Street	0.000	0.0015	Negligible
No 48-56 Bayham Place	0.009	125.52×10^{-6}	Negligible
No 3 Bayham Street	-0.0056	0.0019	Negligible

In summary, all of the adjacent properties fall into 'Category 0' defined as 'Negligible Damage'. The results therefore fulfil the requirements of CPG4 in that they do not

exceed the damage category of 'very slight' (Category 1) and reflect categories of slight cosmetic rather than structural damage.

6.4 LUL Asset Assessment

The predicted ground movements at tunnel crown level (indicated to be at circa 10.80m.bgl or 12.70mAOD) for the various phases of the development are detailed in the Table 17. Displacement graphs which detail the distinct phases of works and the potential movements at the closest LUL tunnel are also presented in Appendix F.

Table 17: PDISP Ground Movement Results

Stage	Assessment Methodology	Maximum Ground Movement at LUL Tunnel (mm)	Maximum Displacement Ratio of LUL Asset
Demolition	Immediate Undrained	0.03	1 in 2701214
Demolition	Long Term Drained	0.02	1 in 9243462
Basement Excavation	Immediate Undrained	0.02	1 in 5630159
Basement Excavation	Long Term Drained	0.01	1 in 16109446
Final Construction	Immediate Undrained	-0.05	1 in 1002169
Final Construction	Long Term Drained	-0.03	1 in 2733165
Final Construction	Net Loading	-0.04	1 in 2192196
Note:	Movements with a '–' prefix indicate positive or heave movement, those movements without a prefix indicate a downwards movement or settlement		

In summary, the impact of such small ground movements on the adjacent LUL infrastructure will be negligible.

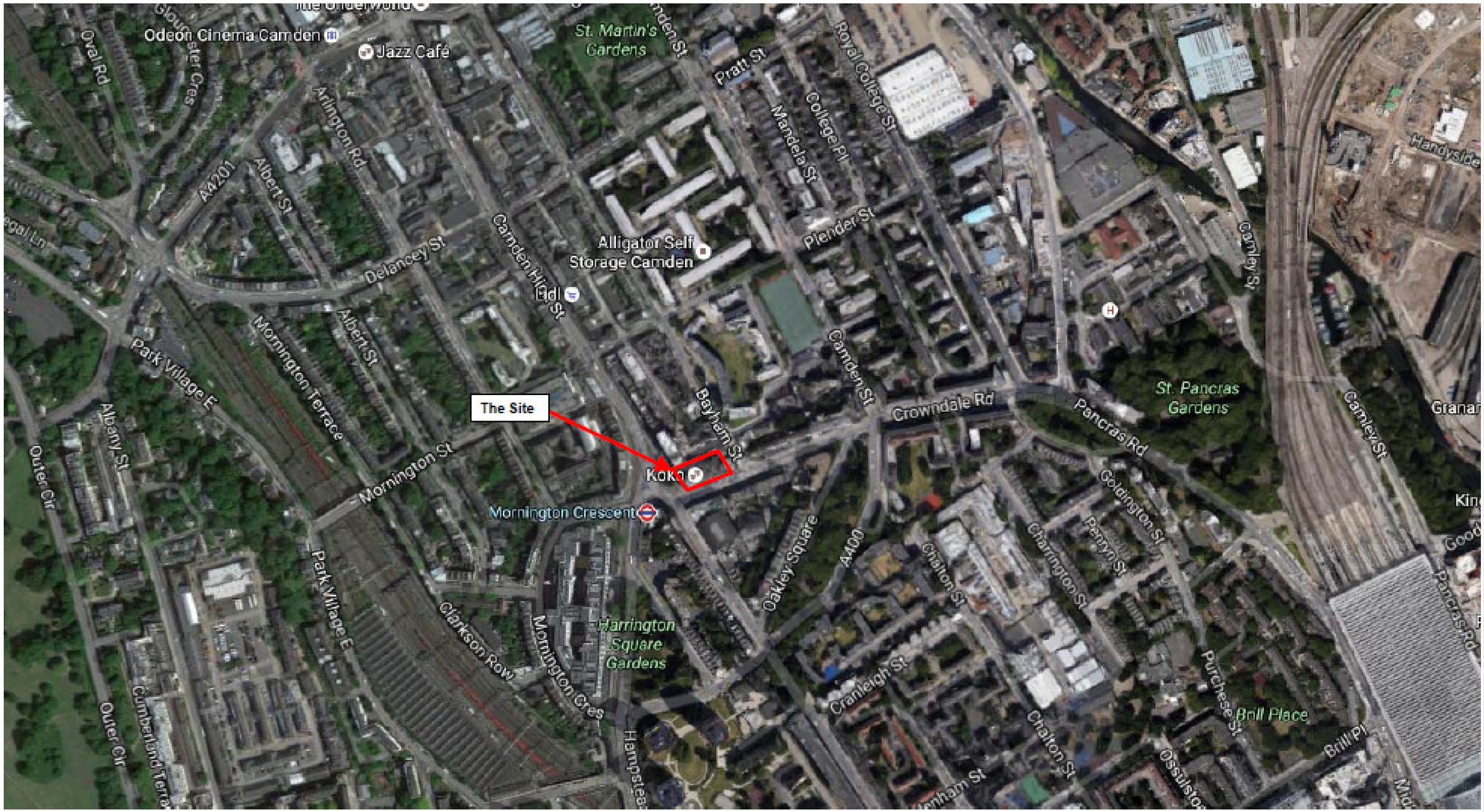
6.5 Control of Ground Movements and Monitoring

In order to reduce the potential for any movement over and above that expected, the following methods of safe practice should be considered prior to and during construction:

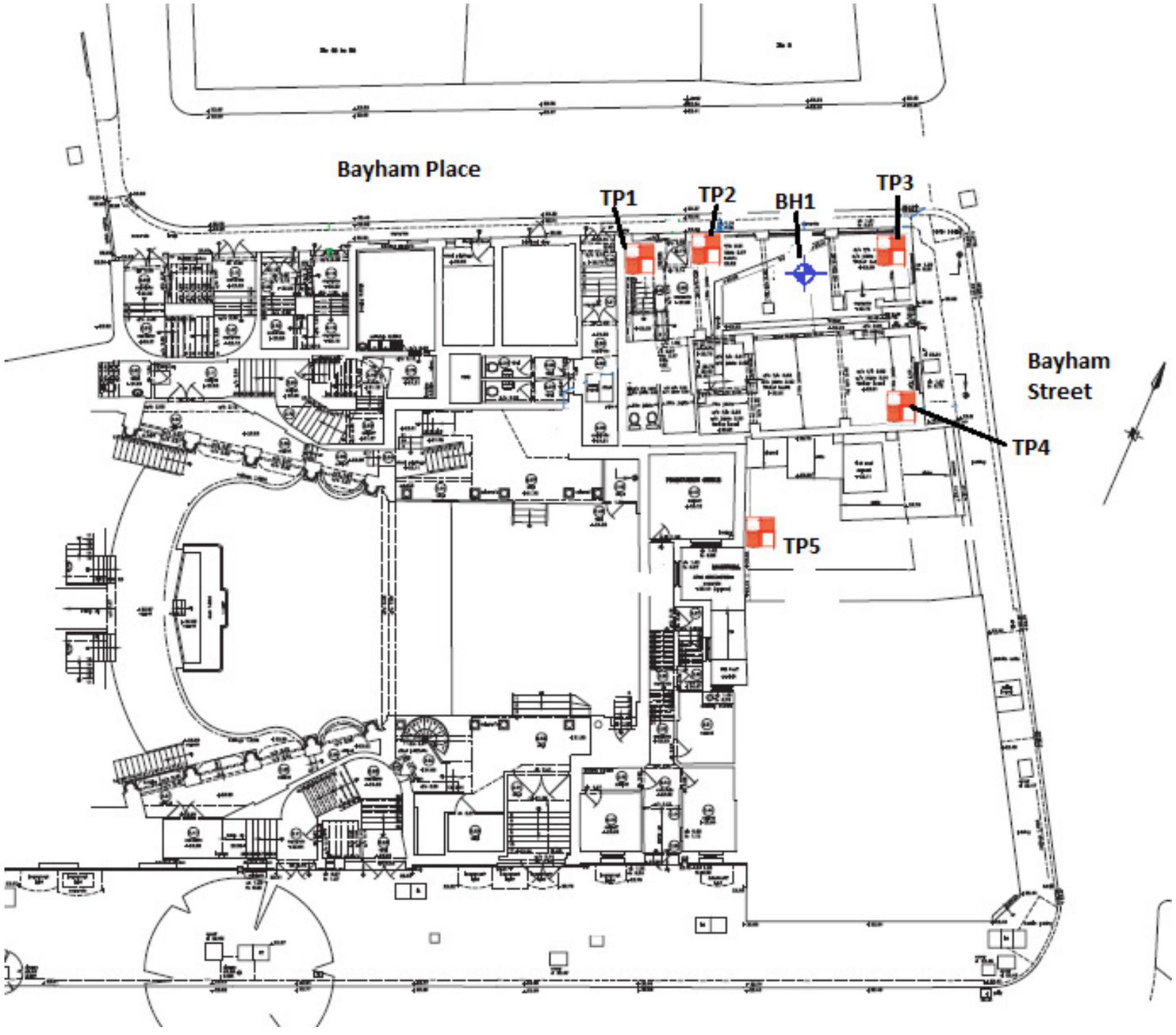
- Good workmanship will be required to ensure that pile installation induced settlements are kept to a minimum. It will be essential to ensure that the made ground is not destabilised during casting of the secant piled wall;
- The secant piled wall should be installed to a suitable depth and have adequate embedment in stiff strata for satisfactory vertical and lateral stability;
- It should be ensured that basement slab is cast as early as possible and tight to the piled retaining wall. Sufficient time should be given for the slab to cure and gain strength prior to continuation of excavation below;
- Where temporary props are required they should be designed to provide adequate restraint to limit lateral ground movements. Walings should be tied in so they do not rely on friction or adhesion between the prop end and waling to be held in place;

- The first stage of excavation should be minimised and the first (stiff) support should be installed as early as possible in the construction sequence;
- The construction of the wall and its support systems should not be delayed;
- Over-excavation should be avoided;
- Monitoring both above and below ground should be carried out to ensure that the expected displacements are not exceeded. Limits of lateral and vertical displacement should be set beyond which the method of construction should be re assessed.

FIGURES

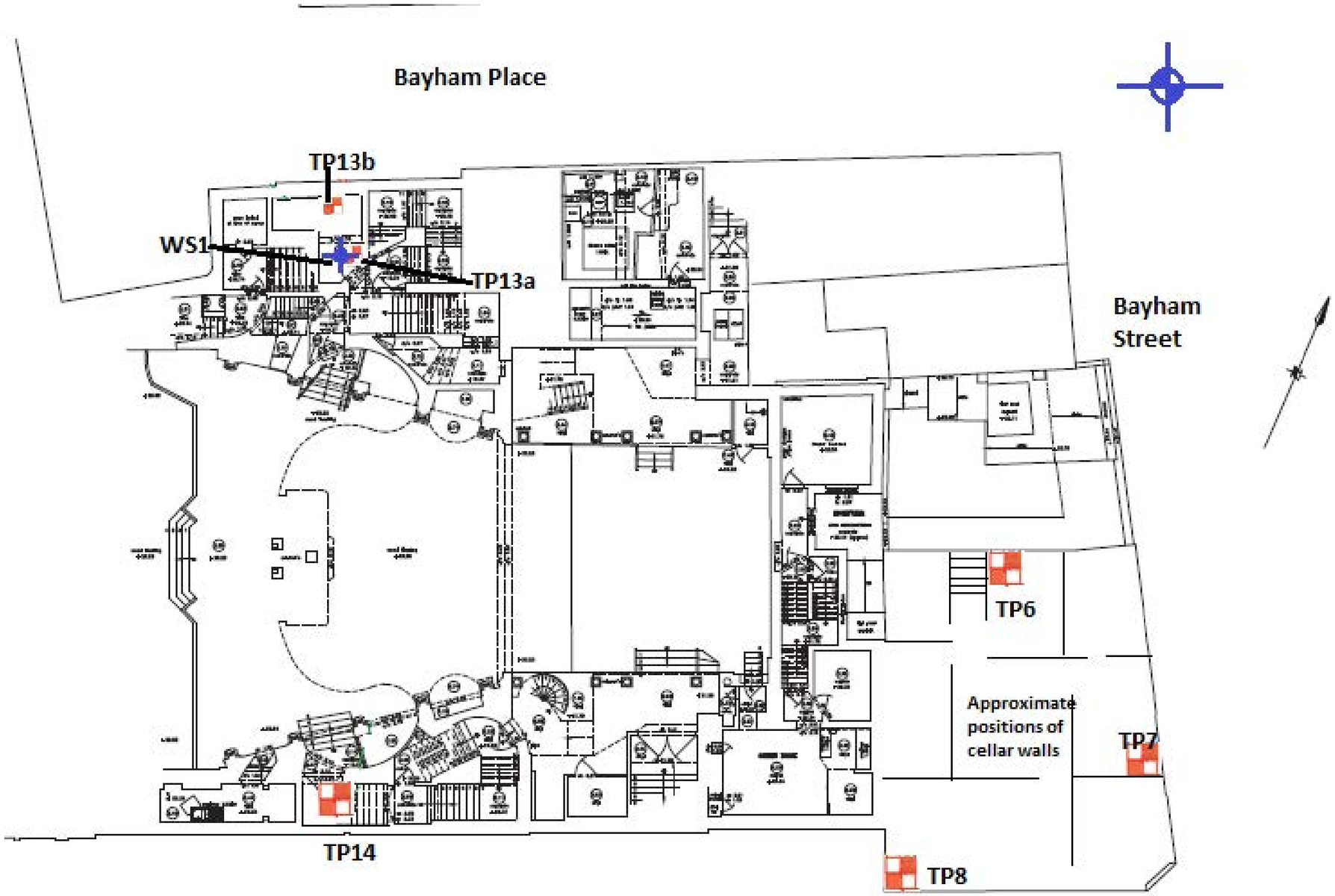


RSK	**SITE LOCATION PLAN**	**Client:**	The Hope Lease Limited	**Figure No:**	1
		Site:	The Hope Project, Camden, London	**Job No:**	371475
		Scale:	NTS	**Source:**	Google



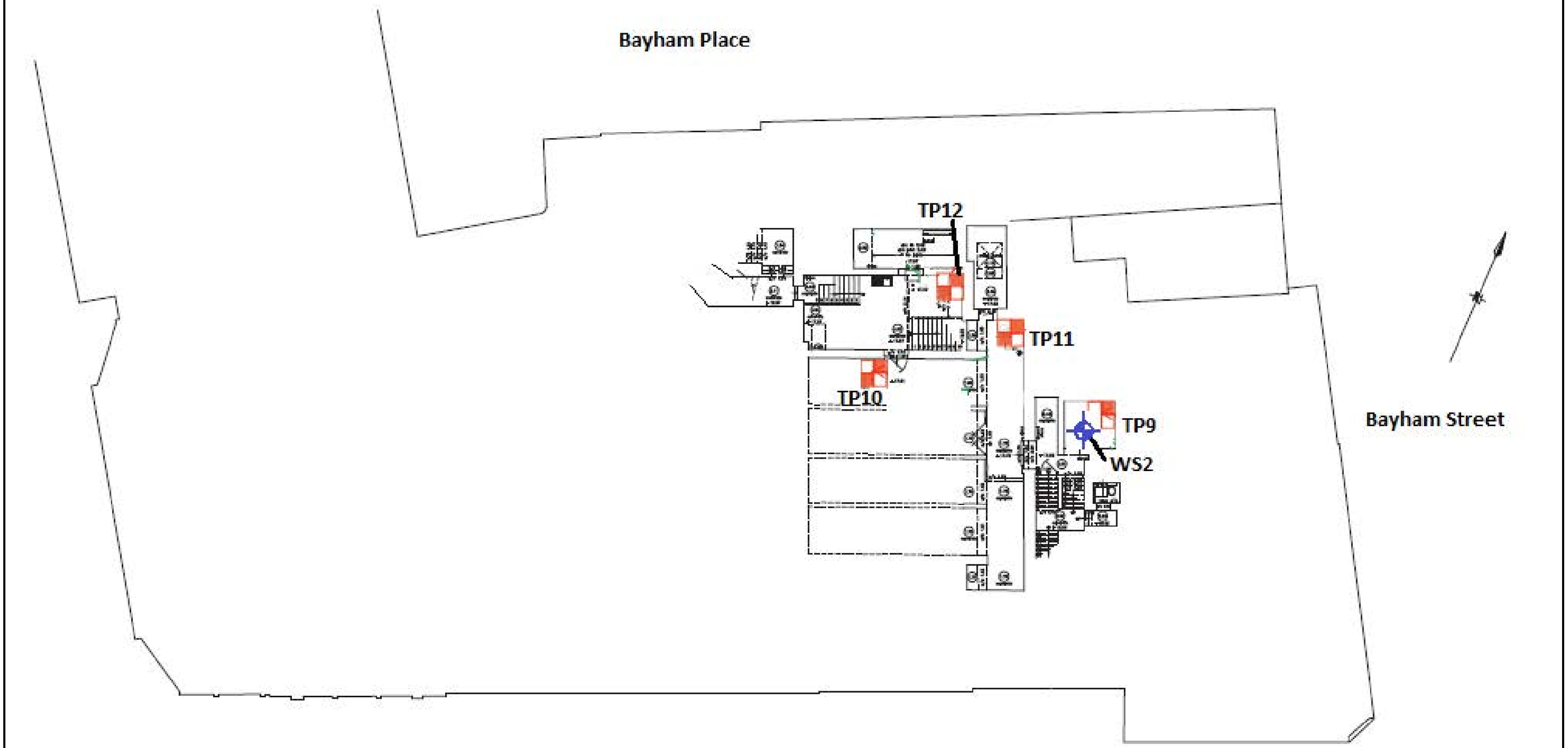
Ground floor level

RSK	**EXPLORATORY HOLE LOCATION PLAN**	**Client:**	The Hope Lease Limited	**Figure No:**	2a
		Site:	The Hope Project, Camden, London	**Job No:**	371475
		Scale:	NTS	**Source:**	Heyne Tillett Steel, The Hope Project, Geotechnical Investigations, Sk04 A



Lower ground floor level

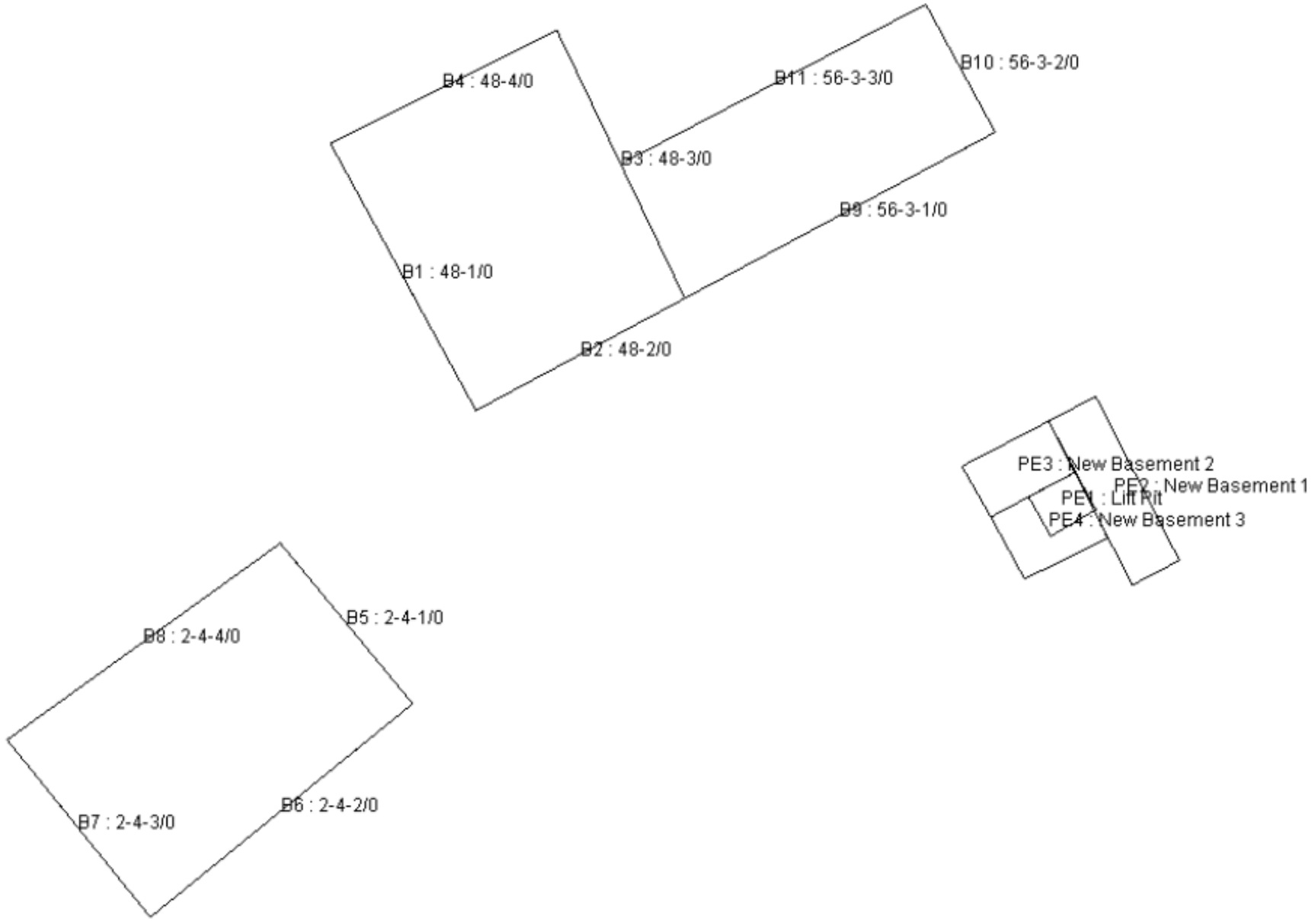
RSK	**EXPLORATORY HOLE LOCATION PLAN**	**Client:**	The Hope Lease Limited	**Figure No:**	2b
		Site:	The Hope Project, Camden, London	**Job No:**	371475
		Scale:	NTS	**Source:**	Heyne Tillett Steel, The Hope Project, Geotechnical Investigations, Sk04 A



Koko Club Basement Level

RSK	**EXPLORATORY HOLE LOCATION PLAN**	**Client:**	The Hope Lease Limited	**Figure No:**	2c
		Site:	The Hope Project, Camden, London	**Job No:**	371475
		Scale:	NTS	**Source:**	Heyne Tillett Steel, The Hope Project, Geotechnical Investigations, Sk04 A

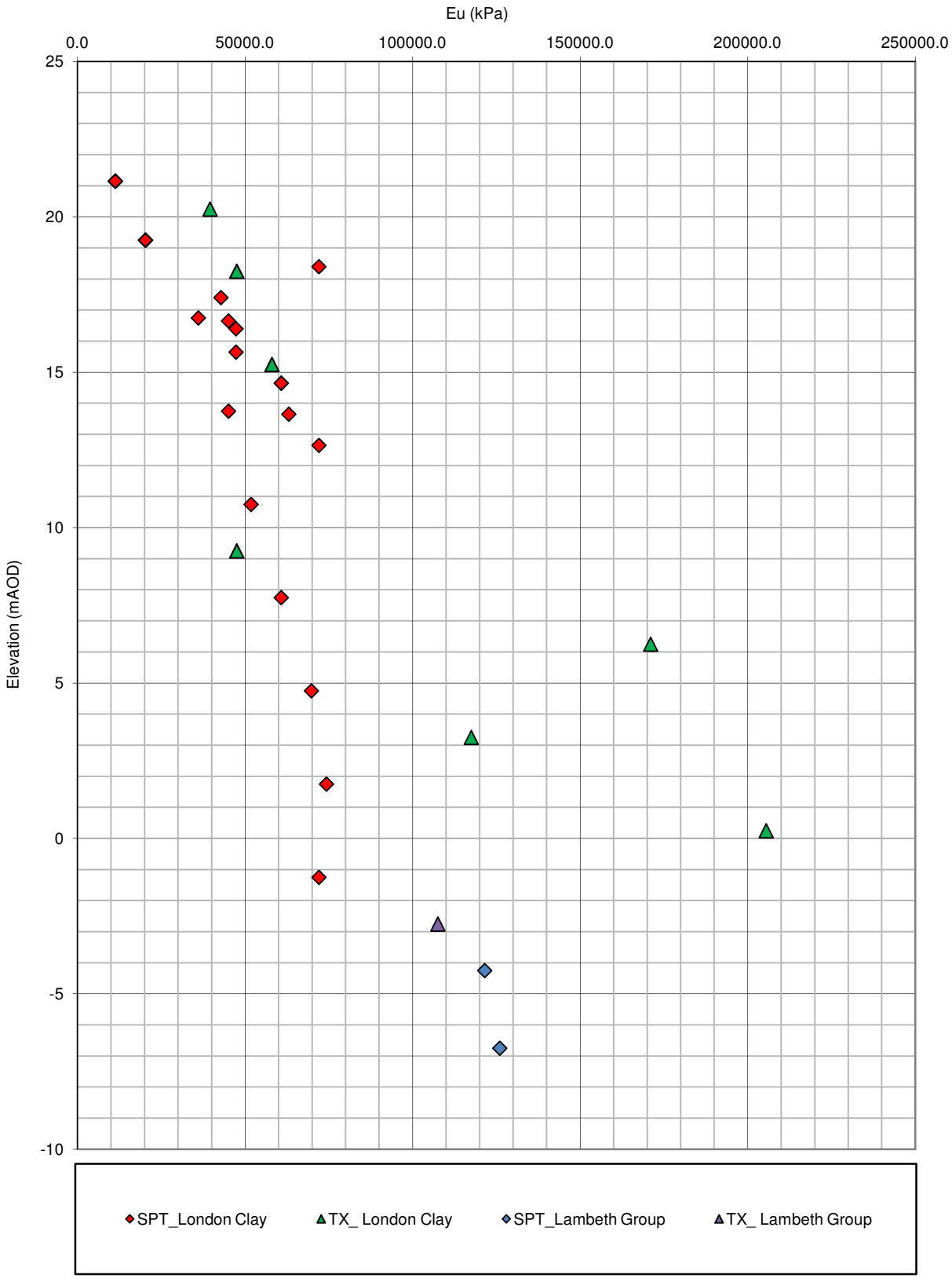
Approximate North



RSK	**ADJACENT PROPERTIES PLAN**	**Client:**	The Hope Lease Ltd	**Figure No:**	3
		Site:	The Hope Project	**Job No:**	371475
		Scale:	Not to scale	**Source:**	Client

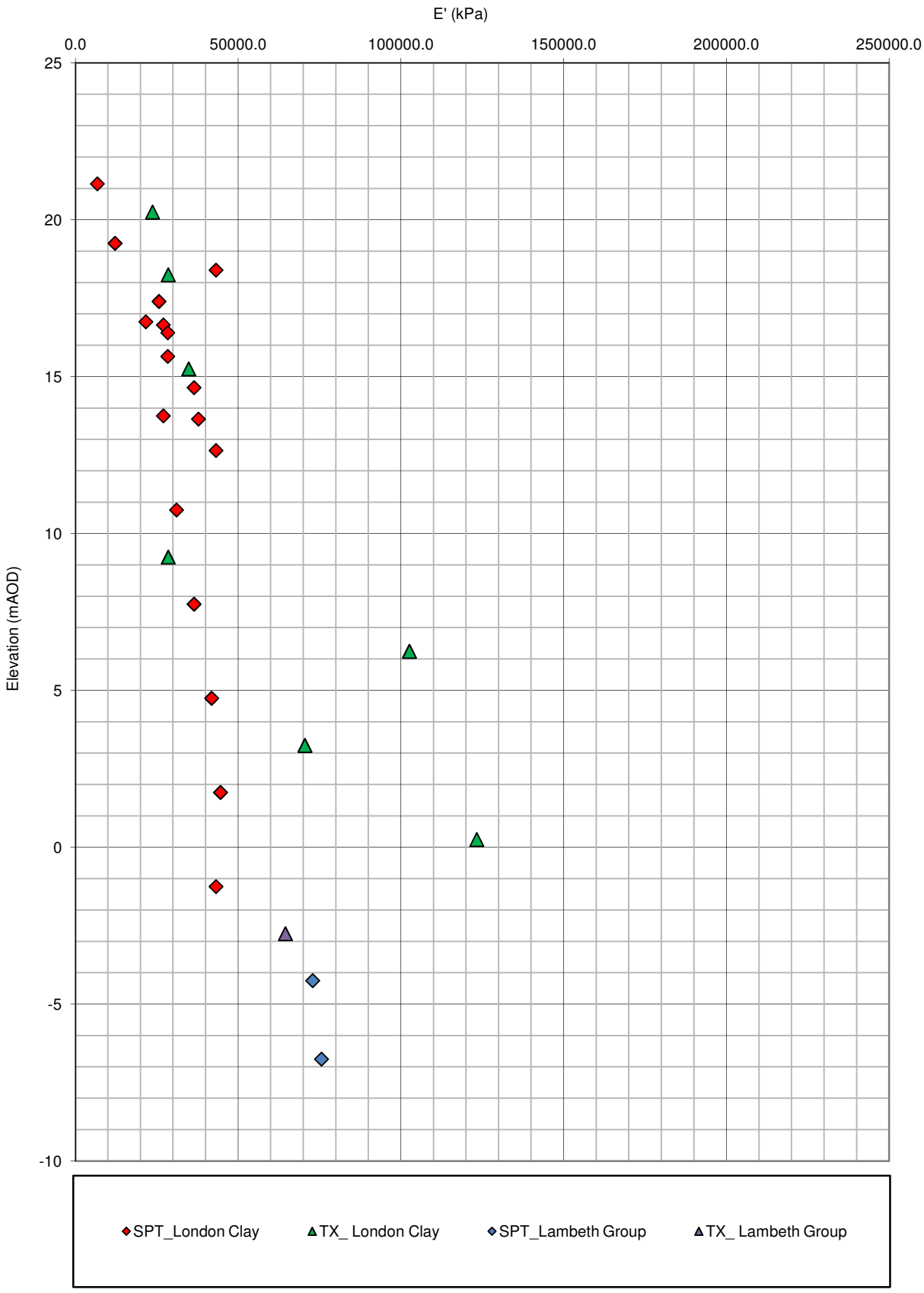
UNDRAINED YOUNGS MODULUS vs ELEVATION

Site:	Client:	Job Number:	371475
The Hope Project	The Hope Lease Limited	Figure:	4



DRAINED YOUNGS MODULUS vs ELEVATION

Site:	Client:	Job Number:	371475
Hope Project	The Hope Lease Limited	Figure:	5



APPENDIX A
SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for The Hope Lease Ltd (the "client") in accordance with the terms of a contract between RSK and the "client". The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B
PROPOSED DEVELOPMENT PLANS AND LOADING INFORMATION

BAYHAM STREET - EXISTING LOAD TAKEDOWN
SHEET 1/3

BAYHAM PLACE

DL = 33 kN/m
LL = 14 kN/m
ELEVATION A

TP1
TP2
TP3

65 BAYHAM PLACE

DL = 14 kN
LL = 44 kN
COLUMN A

DL = 14 kN
LL = 44 kN
COLUMN B

ELEVATION B
DL = 31 kN/m
LL = 9 kN/m

ELEVATION C
DL = 97 kN/m
LL = 11 kN/m

WALL D
DL = 165 kN/m
LL = 18 kN/m

WALL E
DL = 58 kN/m
LL = 29 kN/m

1 BAYHAM STREET

ELEVATION F
DL = 88 kN/m
LL = 14 kN/m

ELEVATION G
DL = 18 kN/m
LL = 11 kN/m

TP4

WALL H
DL = 51 kN/m
LL = 9 kN/m

WALL J
DL = 104 kN/m
LL = 19 kN/m

WALL K
DL = 106 kN/m
LL = 28 kN/m

TP5

THE HOPE & ANCHOR PUB - YARD

ELEVATION D
DL = 48 kN/m
LL = 2 kN/m

SEE BAYHAM STREET
LOWER GROUND FLOOR
LOAD TAKEDOWN

SEE ICOCO
LOAD TAKE DOWN

BAYHAM STREET

EXISTING LOAD TAKEDOWN - GROUND FLOOR

1:100 @ A3

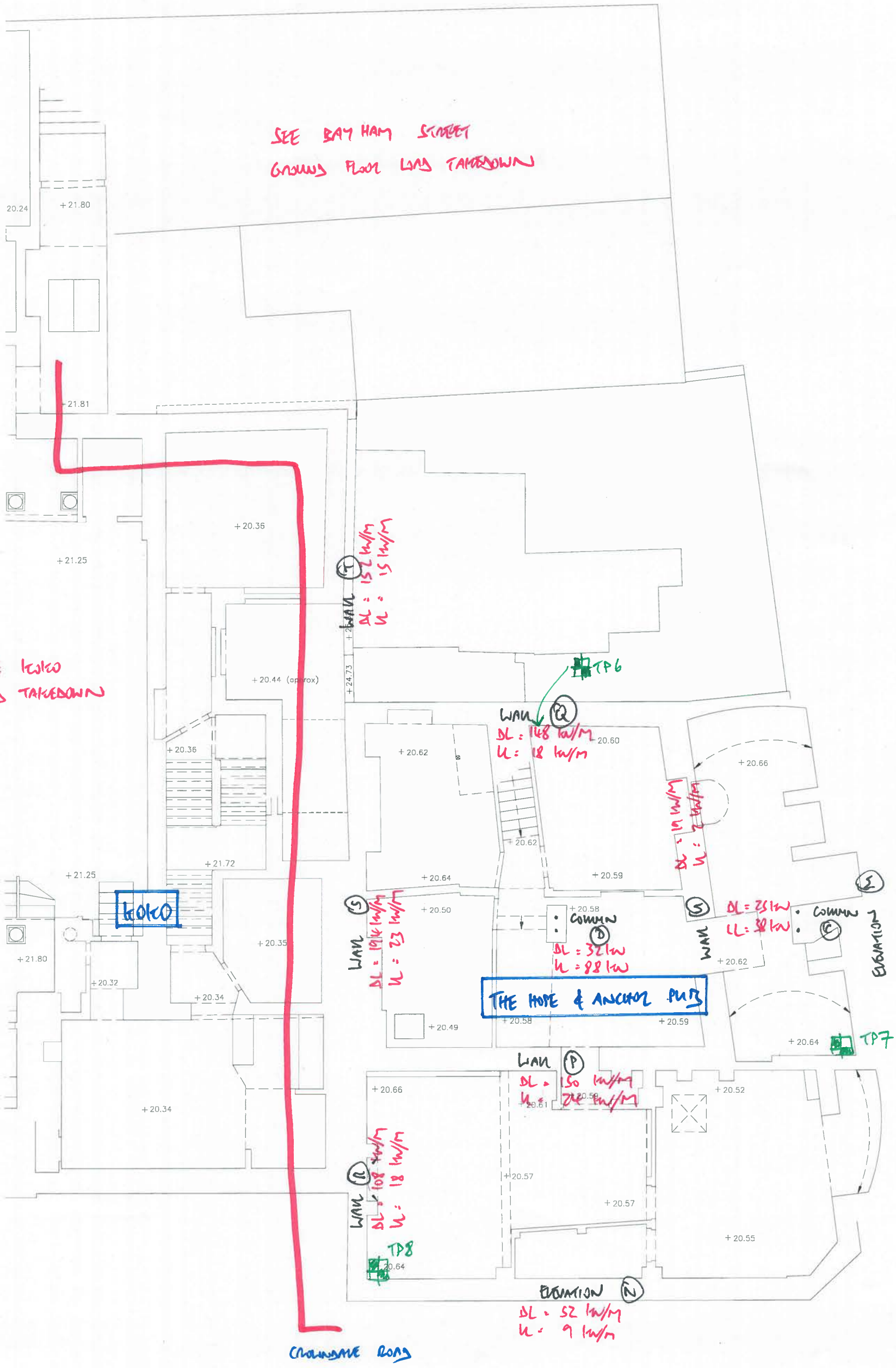
NOTE:

ALL LOADS ARE UNFACTORED.
DL = DEAD LOAD
LL = IMPOSED LOAD

HEYNE TILLETT STEEL

THE HOPE PROJECT
EXISTING LOAD TAKEDOWN
14444 AUG 2016 MST

BAYHAM STREET - EXISTING LOAD TAKEDOWN
SHEET 2/3



EXISTING LOAD TAKEDOWN - LOWER GROUND FLOOR

1:100 @ A3

HEYNE TILLETT STEEL

THE HOPE PROJECT
EXISTING LOAD TAKEDOWN
1444 AUG 2016 MJT

NOTE:
ALL LOADS ARE UNFACTORED.
DL = DEAD LOAD
LL = IMPOSED LOAD

KOKO - EXISTING LOAD TAKEDOWN
SHEET 3/3

BAYHAM PLACE

CAMDEN HIGH STREET

KOKO

(STAGE)

(WALL B OVER)

COLUMN L: DL = 63 kN, LL = 39 kN

COLUMN K: DL = 63 kN, LL = 39 kN

ELEVATION P: DL = 122 kN/M, LL = 15 kN/M

ELEVATION K: DL = 129 kN/M, LL = 16 kN/M

WALL R: DL = 113 kN/M, LL = 32 kN/M

WALL B: DL = 295 kN/M, LL = 32 kN/M

ELEVATION Q: DL = 99 kN/M, LL = 14 kN/M

WALL S: DL = 102 kN/M, LL = 17 kN/M

WALL C: DL = 179 kN/M, LL = 17 kN/M

WALL F: DL = 159 kN/M, LL = 12 kN/M

SEE BAYHAM STREET LOAD TAKEDOWN

WALL E: DL = 735 kN/M, LL = 20 kN/M

WALL G: DL = 243 kN/M, LL = 14 kN/M

WALL H: DL = 339 kN/M, LL = 26 kN/M

WALL J: DL = 339 kN/M, LL = 26 kN/M

WALL A: DL = 242 kN/M, LL = 32 kN/M

ELEVATION M: DL = 191 kN/M, LL = 14 kN/M

ELEVATION N: DL = 209 kN/M, LL = 14 kN/M

THE HOPE & ANCHOR PUB

COLINDALE ROAD

NOTE:
ALL LOADS ARE UNFACTORED
DL = DEAD LOAD
LL = IMPOSED LOAD

EXISTING LOAD TAKEDOWN
NTS

HEYNE TILLETT STEEL

THE HOPE PROJECT
EXISTING LOAD TAKEDOWN
1444 AUG 2016 MJT

Job:	The Hope Project		Date:	19/09/17
Title	Pile Schedule		Eng.	ACa
Job No:	1444	Sheet No:	Rev.	1

Ref	G	Q	W
	(kN)	(kN)	(kN)
P1	390	290	-
P2	390	290	-
P3	-200	-200	-
P4	-200	-200	-
P5	390	290	-
P6	390	290	-
P7	410	290	-
P8	410	290	-
P9	-190	-200	-
P10	-190	-200	-
P11	410	290	-
P12	410	290	-
P13	470	340	-
P14	470	340	-
P15	-30	-50	-
P16	-30	-50	-
P17	100	50	-
P18	100	50	-
P19	240	150	-
P20	240	150	-
P21	20	-20	-
P22	420	230	-
P23	420	230	-
P24	100	50	-
P25	100	50	-
P26	100	50	-
P27	100	50	-
P28	550	260	-
P29	550	260	-
P30	440	220	-
P31	440	220	-
P32	380	150	-
P33	380	150	-
P34	350	130	-
P35	350	130	-
P36	-150	-100	-
P37	-190	-200	-
P38	440	210	-
P39	440	210	-
P40	260	90	-
P41	260	90	-
P42	-100	-70	-
P43	270	110	-
P44	-450	-280	-

Notes:

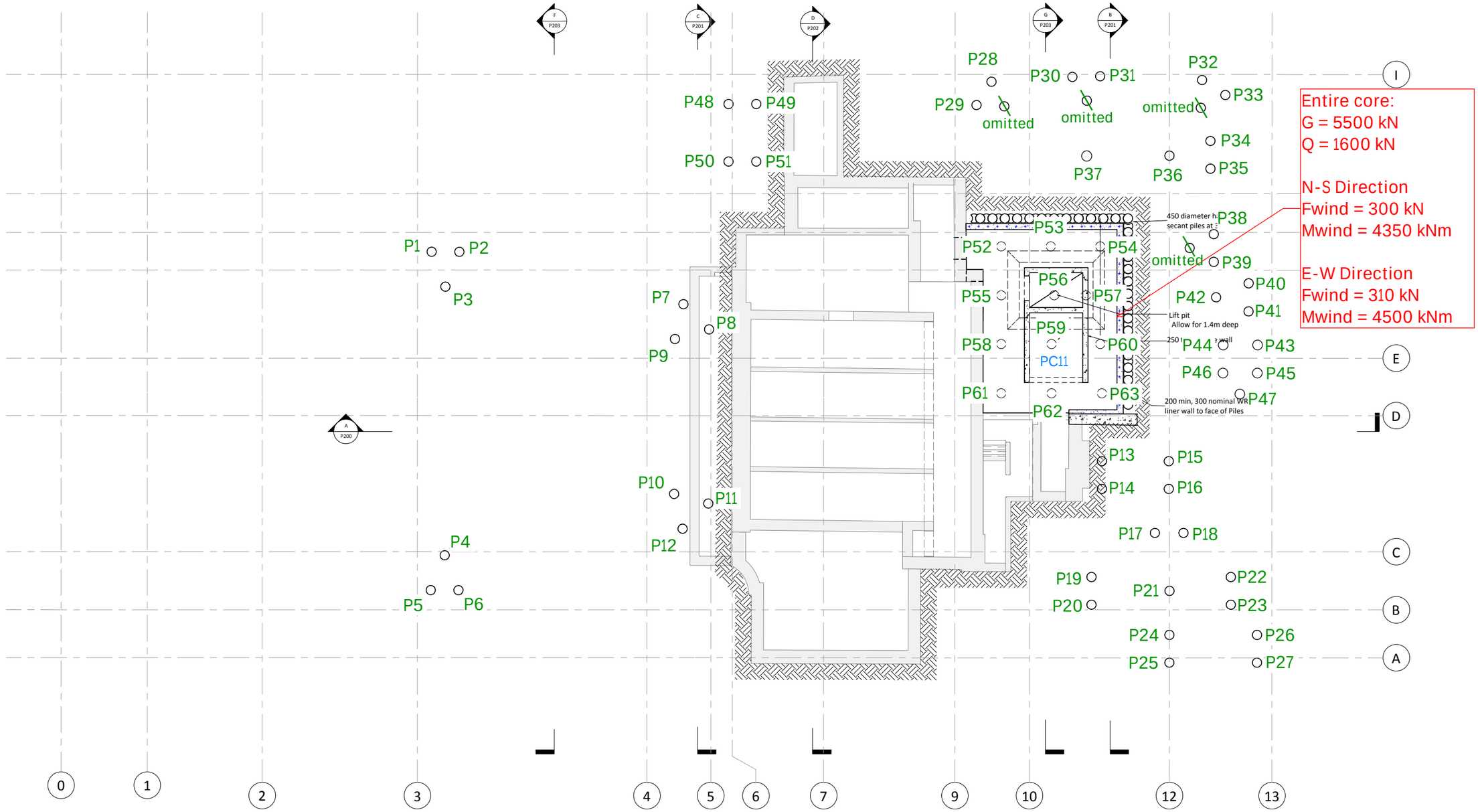
- All loads are unfactored.
- Dead load is denoted G.
- Live load is denoted Q.
- Wind load is denoted W.
- Loads are preliminary and are subject to further analysis.

Job:	The Hope Project	Date:	19/09/17
Title	Pile Schedule	Eng.	ACa
Job No:	1444	Sheet No:	Rev. 1

Ref	G	Q	W
	(kN)	(kN)	(kN)
P45	670	340	-
P46	-110	-90	-
P47	620	320	-
P48	280	260	240 / -240
P49	120	-	230 / -230
P50	240	200	-240 / 240
P51	70	-60	-230 / 230
P52			
P53			
P54			
P55			
P56			
P57			
P58			
P59			
P60			
P61			
P62			
P63			

Notes:

- All loads are unfactored.
- Dead load is denoted G.
- Live load is denoted Q.
- Wind load is denoted W.
- Loads are preliminary and are subject to further analysis.



100mm @ A1 (50mm @ A3)

1 This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

2 Do not scale from this drawing in either paper or digital form. Use written dimensions only. To check drawing has been printed to the intended scale the above bar should be 100mm

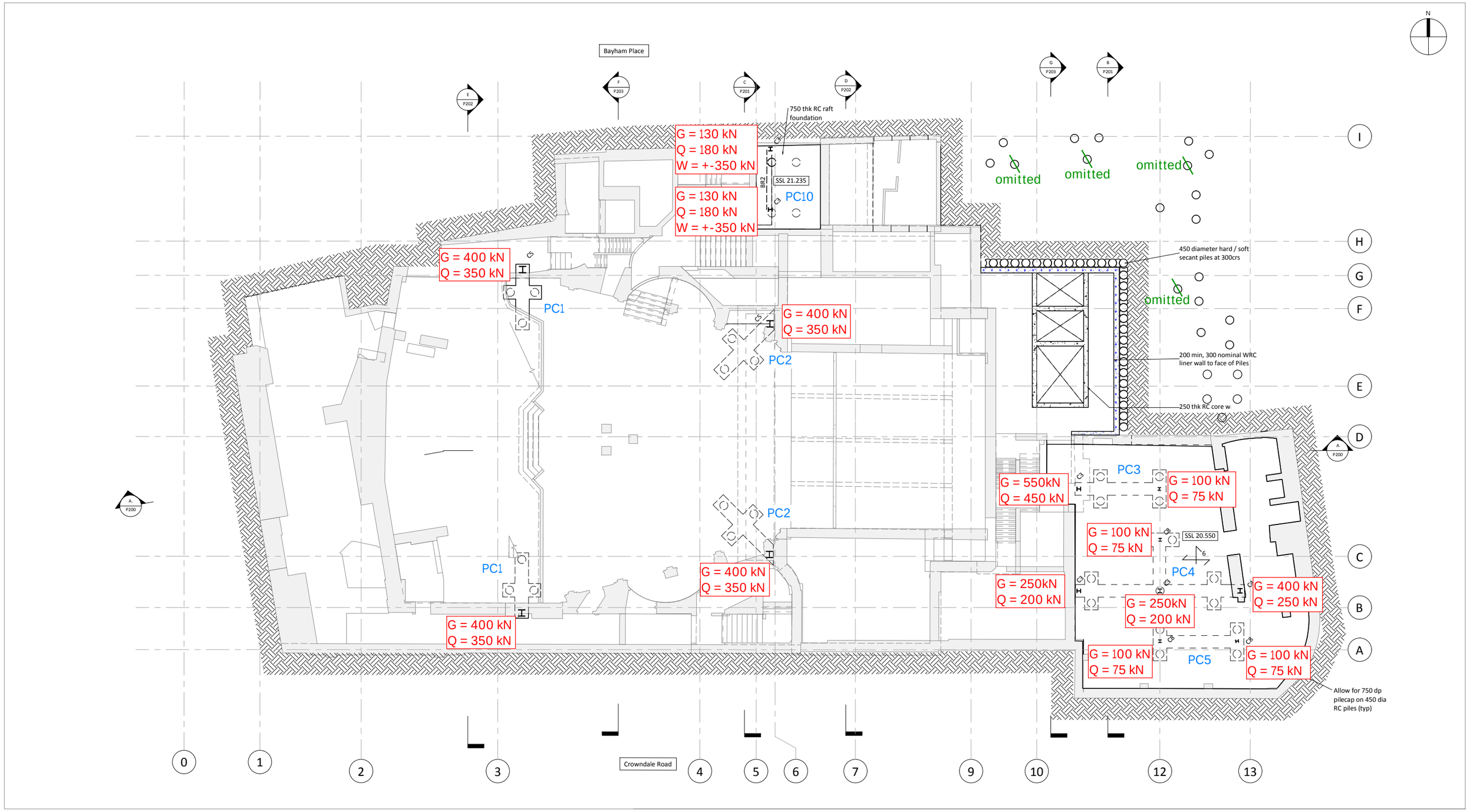
Notes:
- All loads are un-factored.
- Loads shown are at the base of the columns/walls.
- Dead load is denoted G and includes self weight and super imposed dead load.
- Imposed load is denoted Q.
- Wind load is denoted W.
- Pile cap references shown in blue.
- Pile references shown in green.

HEYNE TILLETT STEEL
STRUCTURAL ENGINEERS
hts.uk.com

The Hope Project

Proposed Load Take-down
Sub-basement

1444/SK105 Rev2
19/09/17



100mm @ A1 (50mm @ A3)

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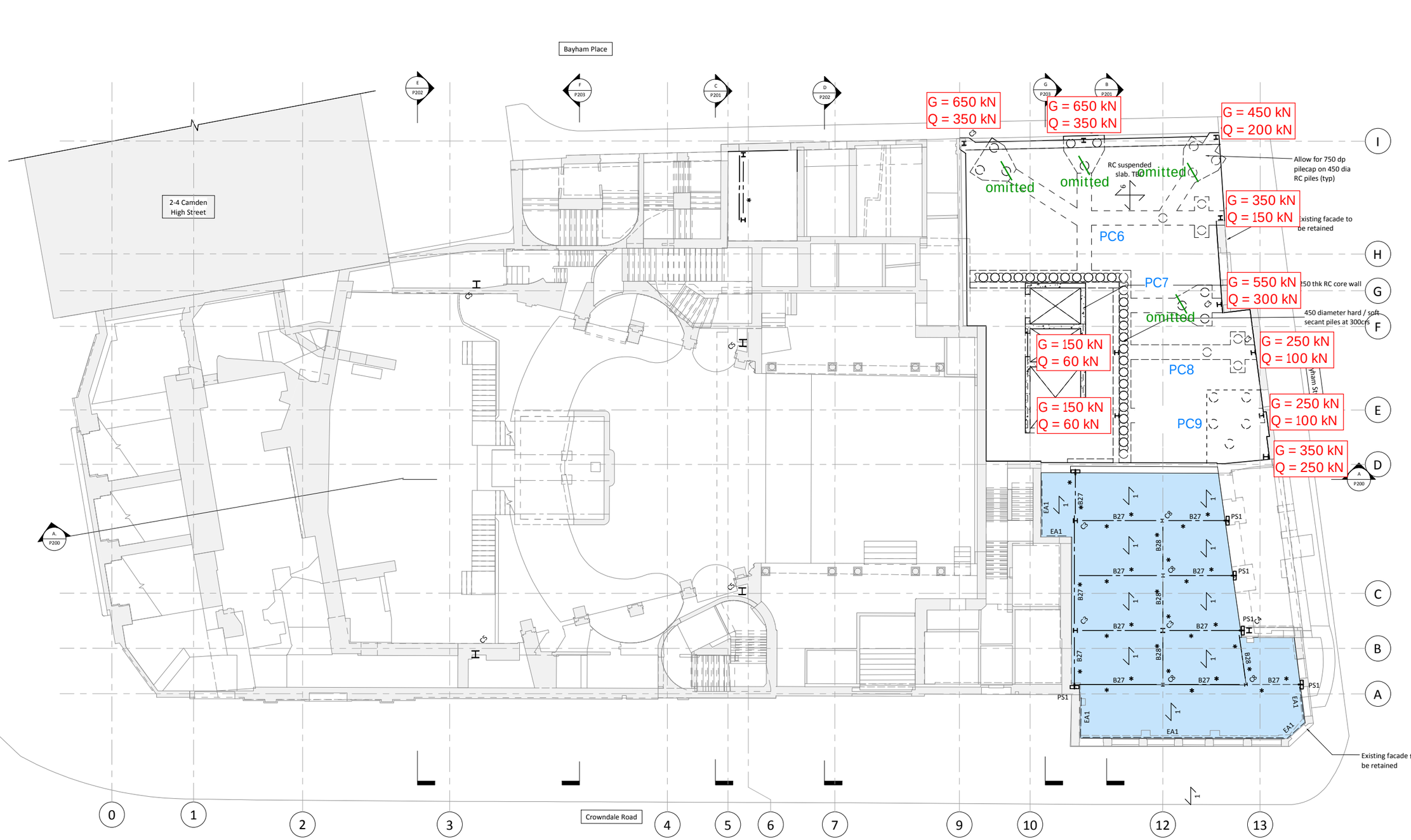
STRUCTURAL ENGINEERS
hts.uk.com

The Hope Project

Proposed Load Take-down Basement

1444/SK106 Rev2
19/09/17



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STRUCTURAL ENGINEERS
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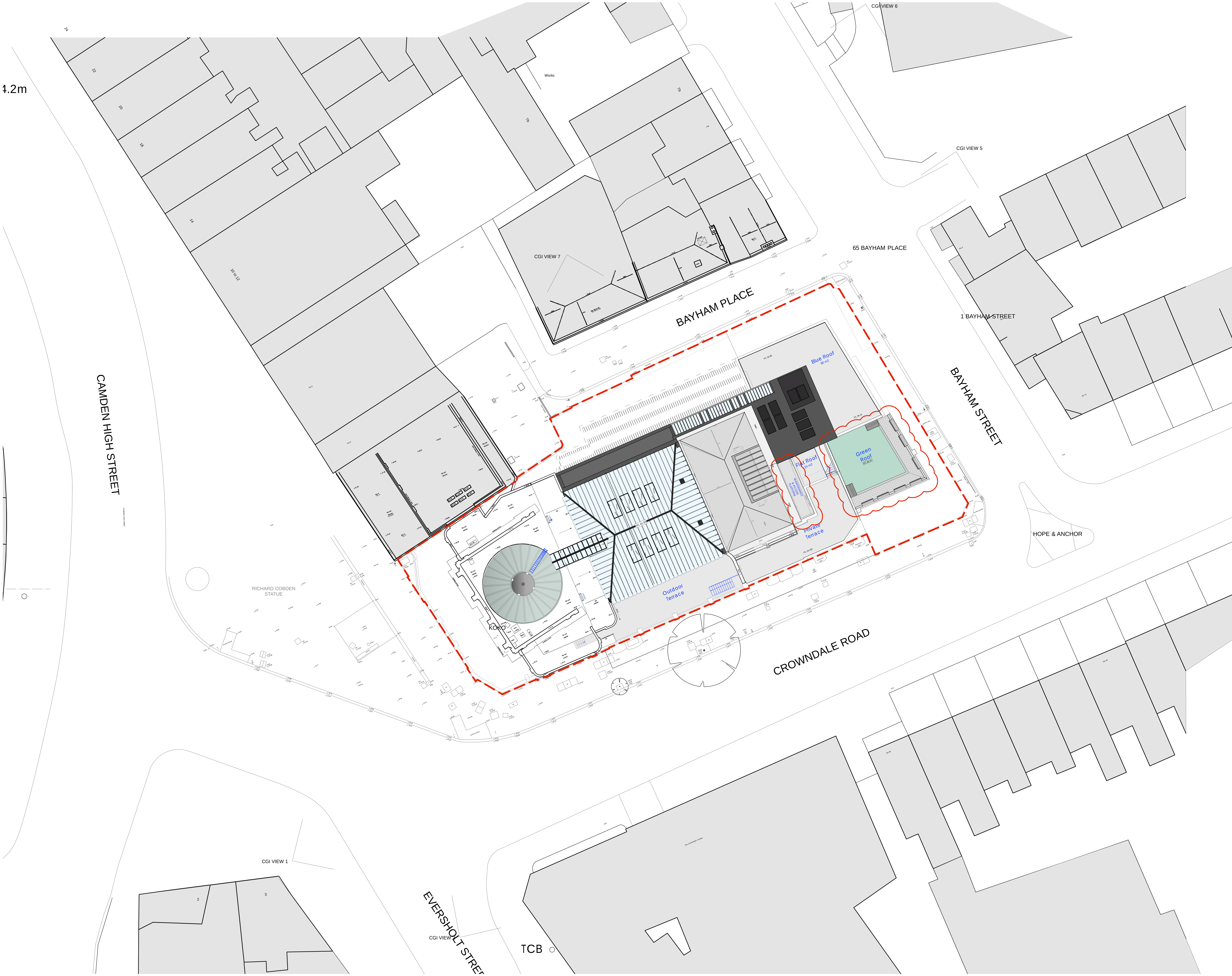
The Hope Project

Proposed Load Take-down
Ground Floor

1444/SK107 Rev2
19/09/17



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revision / date / amendments

DRAFT

17.10.17

PLANNING

Archer Humphryes Architects

Basement
Central House
142 Central Street
London, United Kingdom
EC1V 8AR
T : +44 (0) 20 7251 8555

project title
KOKO + Hope & Anchor + Bayham Place
Camden, London

drawing title	scale	date
Proposed Site Plan	1:200 @A1	26.05.17
	drawn EH	checked DA
drawing number AHA/ KKC / GA /001	revision -	

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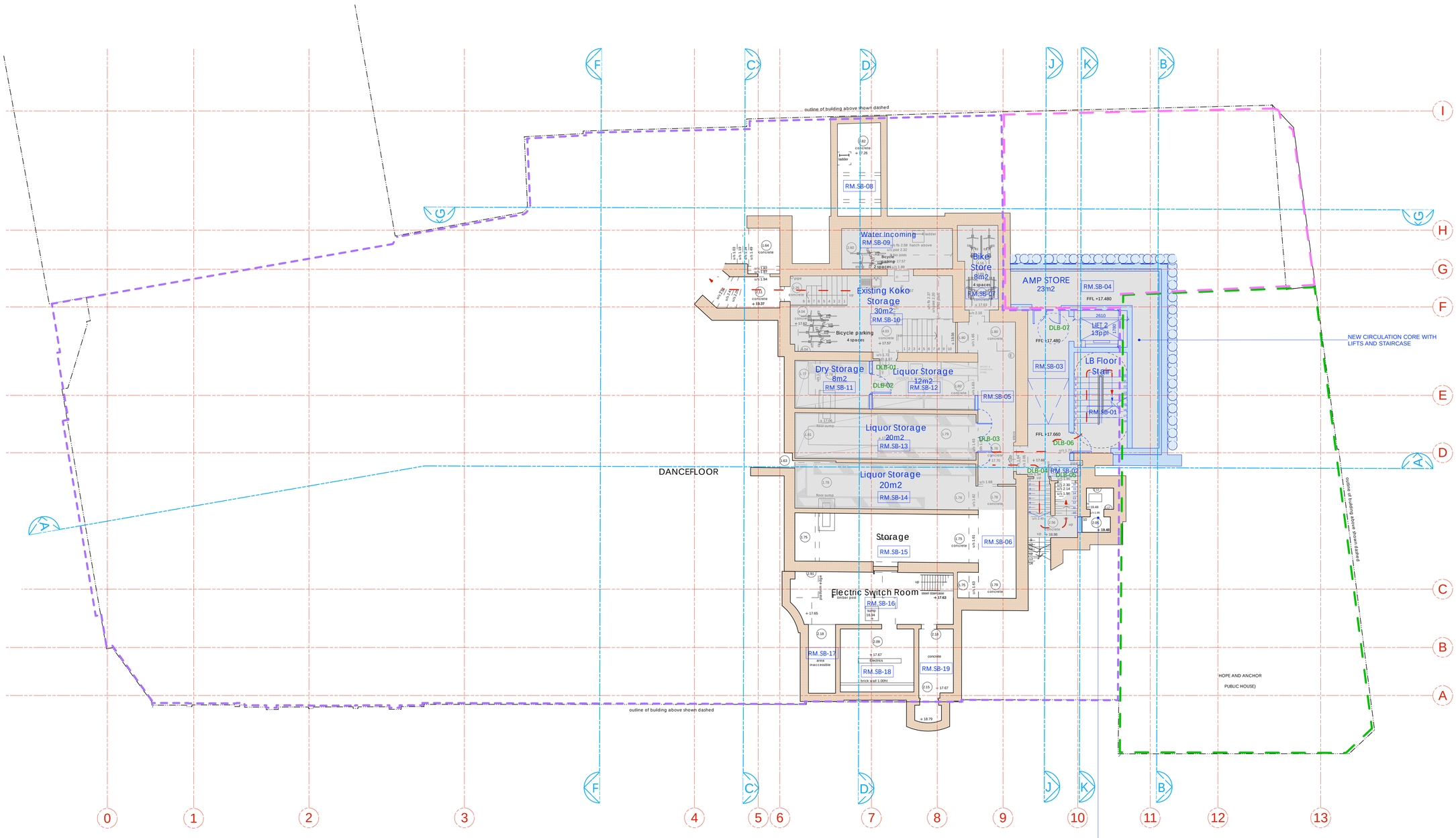
- / --/--/-- / -



LEGEND

- Proposed Works
- Existing Building Fabric KOKO née Camden Palace Theatre (1900)
- Existing Building Fabric Hope & Anchor (approx. 1850)
- Existing Building Fabric Bayham Place (from 1875)
- Existing Modern Building Fabric Bayham Place (from 2006)
- Building Fabric to be demolished
- Demolition of Flooring / Elevation / Wall
- Proposed Excavation
- Remove and retain in alternate location
- Retain and protect existing
- Retain, make good, ease and adjusted
- Means of escape Route
- Private Members Route
- Koko Customer Route
- Public Route
- Artist Route
- Proposed Riser
- Proposed Risers Above
- RM.4-06 Room Number
- D4-02 Door Number
- W4-05 Window Number
- Hope & Anchor Demise
- Koko Demise
- 1 Bayham Street & 65 Bayham Place Demise

17.10.17

DRAFT

0 1 2 3 4 5 8m

PLANNING

Archer Humphryes Architects

Basement
Central House
142 Central Street
London, United Kingdom
EC1V 8AR
T : +44 (0) 20 7251 8555

project title: KOKO + Hope & Anchor + Bayham Place Camden, London		
drawing title: Proposed Sub Basement Plan	scale: 1:100 @ A1	date: 13.04.17
	drawn: FR/PC	checked: DA
drawing number: AHA/KKC/GA/098	revision: -	

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revision / date / amendments
- / --/--/-- / -

GENT'S WC TO BE READ INCONJUNCTION WITH MEP CONSULTANT DETAILS.

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE . REFER TO ENGINEERS DRAWINGS

EXISTING PLANT ROOM LOCATION RETAINED WITH NEW EQUIPMENT

ELECTRICAL ROOM WITH NEW DOOR FOR MAINTENANCE WITH LOW LEVEL ACCESS

BAYHAM PLACE

BAYHAM STREET

CROWNDALE ROAD

No 4

No 2

No 48 to 56

No 3

OVERLAY

CROSS

LIGHTWELL

RM.BP-21

RM.BP-22

21.6m2

Gents WC

LADIES TOILETS

GENTS TOILETS

BAR

RM.BP-21

Catering Kitchen

RM.BP-20 22m2

Theatre Curtain

Stage

45 people

RM.B-17

FFL +21.240

FFL +21.780

FFL +21.800

Bar

DB-11 11m2

RM.B-19

Green Room

FFL +20.340

RM.B-18

Media Control Room 3m2

RM.B-17

KOKO STAIR

Shower

WC

RM.B-16

Dressing Room

Store

DB-12 6m2

RM.B-14

FFL +20.030

LIFT 1 SERVICE PITT

LIFT 2 13ppl

Basement Floor Sta

RM.B-15

RM.B-01

FFL 20.36 (New slab below current floor level TBC)

FFL +20.360

Void

Void

Void

Electrical Incoming

RM.B-11

Electric Access Room

RM.B-13

District Heating

RM.B-10

Mains Water Incoming

RM.B-12

Reduced Head Height

Dis.WC

RM.B-03

Ladies WC

RM.B-04

Mens WC

RM.B-05

RM.B-06

FFL +20.660

Cellar Hatch

Staff Change

RM.BP-07

Kids Store

31.51m2 (approx)

Storage

Area for safe / cash store

14.19m2

Safe

RM.B-08

NEW CIRCULATION CORE WITH LIFTS AND STAIRCASE

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE . REFER TO ENGINEERS DRAWINGS

NEW STAIR ACCESS TO SIDE OF STAGE AND STAGE FROM GREEN ROOM

NEW LAYOUT TO BASEMENT INLINE WITH STRUCTURAL DRAWINGS

DB-01 DB-02 DB-03 DB-04 DB-05 DB-06 DB-07 DB-08 DB-09 DB-10 DB-11 DB-12 DB-13 DB-14 DB-15 DB-16 DB-17 DB-18 DB-19 DB-20 DB-21 DB-22 DB-23 DB-24 DB-25 DB-26 DB-27 DB-28 DB-29 DB-30 DB-31 DB-32

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- Public Route
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- RM.4-06 Room Number
- D4-02 Door Number
- W4-05 Window Number
- Hope & Anchor Demise
- Koko Demise
- 1 Bayham Street & 65 Bayham Place Demise

17.10.17

DRAFT

0 1 2 3 4 5 8m

PLANNING

Archer Humphryes Architects

Basement
Central House
142 Central Street
London, United Kingdom
EC1V 8AR
T : +44 (0) 20 7251 8555

project title
KOKO + Hope & Anchor + Bayham Place
Camden, London

drawing title	scale	date
Proposed Basement Plan	1:100 @A1	13.04.17
	drawn FR/PC	checked DA
drawing number AHA/KKC/GA/099	revision -	

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revision / date / amendments
- / --/--/-- / -

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- RM.4-06 Room Number
- D4-02 Door Number
- W4-05 Window Number
- Hope & Anchor Demise
- Koko Demise
- 1 Bayham Street & 65 Bayham Place Demise
- Original brickwork exposed
- New brickwork exposed

17.10.17

DRAFT

0 1 2 3 4 5 8m

PLANNING

Archer Humphryes Architects

Basement
Central House
142 Central Street
London, United Kingdom
EC1V 8AR
T: +44 (0) 20 7251 8555

project title
KOKO + Hope & Anchor + Bayham Place
Camden, London

drawing title	scale	date
Proposed Ground Floor Plan	1:100 @ A1	13.04.17
	drawn FR/PC	checked DA
drawing number	revision	
AHA/ KKC /GA /100	-	

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revision / date / amendments
- / --/--/-- / -

No 48 to 56

No 3

No 4

No 2

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE. REFER TO ENGINEERS DRAWINGS

Royal Box
FFL 26.80

Artist's Box

Theatre Curtain

RM.B-11 Stage

RM.B-12

RM.B-42

Kitchen
79m2

Plant Room

Cold Store

FIRE CURTAIN

Charcole Grill

Pass Counter/ Bar

Dining
99m2

Dining
50m2

Function Room
62m2

Function Room
25m2

Artist's Gallery
40m2

KOKO STAIR

WC

First Floor Stair

LIFT 1
13ppl

LIFT 2
13ppl

Blue Roof
101 m2

FACADE SET BACK 200mm FROM ADJACENT HOPE & ANCHOR FACADE

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE. REFER TO ENGINEERS DRAWINGS

NEW OPENING TO NEW ARTISTS GALLERY FOR ACCESS TO ADJACENT FUNCTION ROOM

GLAZED CANOPY FOR PRIVATE MEMBER ENTRANCE

HOPE AND ANCHOR FACADE AND FENESTRATIONS TO BE RETAINED. FENESTRATION TO BE EASE AND ADJUSTED.

LEGEND

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- W4-05 Window Number
- Hope & Anchor Demise
- Koko Demise
- 1 Bayham Street & 65 Bayham Place Demise
- Blue Roof
- Original brickwork exposed
- New brickwork exposed

17.10.17

DRAFT

0 1 2 3 4 5 8m

PLANNING

Archer Humphryes Architects

Basement
Central House
142 Central Street
London, United Kingdom
EC1V 8AR
T : +44 (0) 20 7251 8555

project title
KOKO + Hope & Anchor + Bayham Place
Camden, London

drawing title	scale	date
Proposed First Floor Plan	1:100 @ A1	13.04.17
	drawn FR/PC	checked DA
drawing number AHA/KKC/ GA /101	revision -	

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Only the original drawing should be relied upon. Contractors, subcontractors and suppliers must verify all dimensions on site before commencing any work or making any shop drawings.

All shop drawings to be submitted to the architect for comment prior to fabrication.

This drawing is to be read in conjunction with the Architect's specification, bills of quantities / schedules, structural, mechanical & electrical drawings and all discrepancies are to be reported to the architect.

Do not scale from this drawing. Dimensions are in millimetres unless otherwise stated.

revision / date / amendments
- / --/--/-- / -

BAYHAM PLACE

BAYHAM STREET

CROWNDALE ROAD

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE . REFER TO ENGINEERS DRAWINGS

NEW STRUCTURAL COLUMN LOCATIONS CHASED INTO EXISTING STRUCTURE FOR GLAZED PAVILION ABOVE . REFER TO ENGINEERS DRAWINGS

No 48 to 56

No 3

No 4

No 2

Ladies WC
25m2
FFL +29.450

Mens WC
19m2
FFL +29.450

Staff WC
6m2

Plant Room
16m2

Pantry/ Maid room
30m2

Dis. WC
FFL +29.450

WC

Private Members 1
91m2
FFL +29.450

Gallery
FFL +27.440

Access to Box

Fly Tower

New retractable fabric (ceiling) curtain privacy to soundcheck

Gallery
58m2
FFL +27.440

Gallery/ Bar
55m2

FFL +28.450

Service Riser 1000 x 300

Dry Riser

LIFT 1 13ppl

LIFT 2 13ppl

Second Floor Stair

FFL +29.450

FFL +29.800

FFL +29.625

Private Members 2
45m2
FFL +29.625

Private Members 3
63m2
FFL +29.625

WC
FFL +29.800

KOKO STAIR

FFL +28.450

HOPE & ANCHOR EXTERNAL WALLS AMD FENESTRATIONS RETAINED

STAIR TO 212a UPPER

STAIR TO LOWER

RM.2-21
RM.2-20
RM.2-23
RM.2-22
RM.2-16
RM.2-17
RM.2-18
RM.2-19
RM.2-24
RM.2-15
RM.2-25
RM.2-14
RM.2-13
RM.2-12

D2-20
D2-19
D2-22
D2-21
D2-14
D2-13
D2-16
D2-17
D2-18
D2-15
D2-12
D2-11

W2-02
W2-03
W2-04
W2-05
W2-06
W2-07
W2-08
W2-09
W2-10
W2-11
W2-12
W2-13
W2-27
W2-28
W2-29
W2-30
W2-31
W2-32
W2-33
W2-34
W2-35
W2-36
W2-37
W2-38
W2-39
W2-40

OVERLAY
CROSS

LEGEND

- Proposed Works
- Existing Building Fabric KOKO née Camden Palace Theatre (1900)
- Existing Building Fabric Hope & Anchor (approx. 1850)
- Existing Building Fabric Bayham Place (from 1875)
- Existing Modern Building Fabric Bayham Place (from 2006)
- Building Fabric to be demolished
- Demolition of Flooring / Elevation / Wall
- Proposed Excavation
- Remove and retain in alternate location
- Retain and protect existing
- Retain, make good, ease and adjusted
- Means of escape Route
- Private Members Route
- Koko Customer Route
- Public Route
- Artist Route
- Proposed Riser
- Proposed Risers Above
- RM.4-06 Room Number
- D4-02 Door Number
- W4-05 Window Number
- Hope & Anchor Demise
- Koko Demise
- 1 Bayham Street & 65 Bayham Place Demise
- Blue Roof
- Original brickwork exposed
- New brickwork exposed

17.10.17

DRAFT

0 1 2 3 4 5 8m

PLANNING

Archer Humphryes Architects

Basement
Central House
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London, United Kingdom
EC1V 8AR
T : +44 (0) 20 7251 8555

project title
KOKO + Hope & Anchor + Bayham Place
Camden, London

drawing title	scale	date
Proposed Second Floor Plan	1:100 @ A1	13.04.17
	drawn FR/PC	checked DA
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