Report Information

Report No.: 16-09701

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

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

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

Sample Retention and Disposal

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

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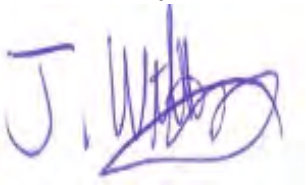
THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	16-09702
Issue:	1
Date of Issue:	01/12/2016
Contact:	Evangelos Kafantaris
Customer Details:	Concept Engineering Consultants Ltd Unit 8, Warple Mews Warple Way London W3 0RF
Quotation No:	Q16-00716
Order No:	CL855
Customer Reference:	16/2900
Date Received:	28/11/2016
Date Approved:	01/12/2016
Details:	London City Airport
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 16-09702

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
81757	BH10 11.80	24/11/2016	28/11/2016		
81758	BH10 12.50	24/11/2016	28/11/2016	Stones + Loamy sand	
81759	BH10 13.50	24/11/2016	28/11/2016	Sand + Stones	
81760	BH06 0.60	24/11/2016	28/11/2016	Sandy loam	
81761	BH06 1.00	24/11/2016	28/11/2016	Loamy sand	
81762	BH06 1.50	26/11/2016	28/11/2016		
81763	BH06 2.50	26/11/2016	28/11/2016	Sand	

Results Summary

Report No.: 16-09702

	ELAB Reference	81758	81759	81760	81761	81763
	Customer Reference					
	Sample ID					
	Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
	Sample Location	BH10	BH10	BH06	BH06	BH06
	Sample Depth (m)	12.50	13.50	0.60	1.00	2.50
	Sampling Date	24/11/2016	24/11/2016	24/11/2016	24/11/2016	26/11/2016
Determinand	**Codes** / **Units** / **LOD**					
Metals						
Arsenic	M / mg/kg / 1	^ 38.9	^ 5.5	14.0	12.3	7.7
Cadmium	M / mg/kg / 0.5	^ < 0.5	^ < 0.5	0.7	< 0.5	< 0.5
Chromium	M / mg/kg / 5	^ 24.6	^ 16.9	21.4	25.1	19.8
Copper	M / mg/kg / 5	^ 19.7	^ < 5.0	29.0	10.3	5.7
Lead	M / mg/kg / 5	^ 27.3	^ < 5.0	462	33.2	8.1
Mercury	M / mg/kg / 0.5	^ 0.9	^ < 0.5	< 0.5	< 0.5	< 0.5
Nickel	M / mg/kg / 5	^ 12.3	^ 8.9	20.2	21.8	19.3
Zinc	M / mg/kg / 5	^ 55.3	^ 14.0	875	72.5	24.6
Anions						
Water Soluble Sulphate	M / g/l / 0.02	^ 0.15	^ 0.06	0.14	0.06	0.05
Inorganics						
Total Cyanide	M / mg/kg / 1	^ < 1.0	^ < 1.0	1.6	< 1.0	< 1.0
Water Soluble Boron	N / mg/kg / 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Miscellaneous						
Acid Neutralisation Capacity	N / mol/kg / 0.1	n/t	n/t	n/t	n/t	< 0.1
Loss On Ignition (450°C)	M / % / 0.01	n/t	n/t	n/t	n/t	0.40
pH	M / pH units / 0.1	n/t	n/t	n/t	n/t	7.8
Soil Organic Matter	U / % / 0.1	0.7	0.2	0.3	0.8	0.1
Total Organic Carbon	N / % / 0.01	n/t	n/t	n/t	n/t	0.07
Phenols						
Total Phenols	N / mg/kg / 6	< 6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons						
Naphthalene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	0.3	< 0.1	< 0.1
Anthracene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M / mg/kg / 0.1	^ 0.1	^ < 0.1	0.7	< 0.1	< 0.1
Pyrene	M / mg/kg / 0.1	^ 0.2	^ < 0.1	0.4	< 0.1	< 0.1
Benzo(a)anthracene	M / mg/kg / 0.1	^ 0.1	^ < 0.1	0.1	< 0.1	< 0.1
Chrysene	M / mg/kg / 0.1	^ 0.2	^ < 0.1	0.4	< 0.1	< 0.1
Benzo (b) fluoranthene	M / mg/kg / 0.1	^ 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M / mg/kg / 0.1	^ 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Benzo (a) pyrene	M / mg/kg / 0.1	^ 0.2	^ < 0.1	0.3	< 0.1	< 0.1
Indeno (1,2,3-cd) pyrene	M / mg/kg / 0.1	^ 0.2	^ < 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M / mg/kg / 0.1	^ < 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M / mg/kg / 0.1	^ 0.1	^ < 0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M / mg/kg / 0.4	^ 1.6	^ < 0.4	2.2	< 0.4	< 0.4
Total PAH (Including Coronene)	N / mg/kg / 2	n/t	n/t	n/t	n/t	< 2
BTEX						
Benzene	M / ug/kg / 10	^ < 10.0	^ < 10.0	n/t	n/t	< 10.0
Toluene	M / ug/kg / 10	^ < 10.0	^ < 10.0	n/t	n/t	< 10.0
Ethylbenzene	M / ug/kg / 10	^ < 10.0	^ < 10.0	n/t	n/t	< 10.0
Xylenes	M / ug/kg / 10	^ < 10.0	^ < 10.0	n/t	n/t	< 10.0
MTBE	N / ug/kg / 10	< 10.0	< 10.0	n/t	n/t	< 10.0
Total BTEX	M / mg/kg / 0.01	n/t	n/t	n/t	n/t	< 0.01

Results Summary

Report No.: 16-09702

			ELAB Reference	81758	81759	81760	81761	81763
			Customer Reference					
			Sample ID					
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH10	BH10	BH06	BH06	BH06
			Sample Depth (m)	12.50	13.50	0.60	1.00	2.50
			Sampling Date	24/11/2016	24/11/2016	24/11/2016	24/11/2016	26/11/2016
Determinand	**Codes**	**Units**	**LOD**					
TPH CWG								
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	7.8	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	23.1	1.1	9.9	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	76.6	7.1	47.3	2.6	4.3
>C35-C40 Aliphatic	N	mg/kg	1	9.2	1.3	7.3	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	2.1	< 1.0	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	13.8	< 1.0	5.6	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	55.9	7.4	49.7	2.0	2.6
>C35-C40 Aromatic	N	mg/kg	1	8.0	2.4	17.6	1.2	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	196	19.4	138	5.7	6.9
Total Petroleum Hydrocarbons								
Mineral Oil	U	mg/kg	5	n/t	n/t	n/t	n/t	< 5
PCB (ICES 7 congeners)								
PCB (Total of 7 Congeners)	M	mg/kg	0.03	n/t	n/t	n/t	n/t	< 0.03

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 16-09702

			ELAB Reference	81758	81759	81763
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	BH10	BH10	BH06
			Sample Depth (m)	12.50	13.50	2.50
			Sampling Date	24/11/2016	24/11/2016	26/11/2016
Determinand	**Codes**	**Units**	**LOD**			
VOC						
Heptane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Benzene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Toluene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Ethylbenzene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
m+p-xylene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
o-xylene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
cis-1,2-dichloroethene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1-Dichloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Chloroform	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Tetrachloromethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1,1-Trichloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Trichloroethylene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Tetrachloroethylene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Chlorobenzene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Bromobenzene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Bromodichloromethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Methylethylbenzene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,2-Dichloropropane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	^ < 10.0	^ < 10.0	< 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0	< 10.0

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Results Summary

Report No.: 16-09702

			ELAB Reference	81758	81759	81763
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	BH10	BH10	BH06
			Sample Depth (m)	12.50	13.50	2.50
			Sampling Date	24/11/2016	24/11/2016	26/11/2016
Determinand	**Codes**	**Units**	**LOD**			
SVOC						
Phenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Aniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroethyl)ether	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Chlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1,3-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1,4-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzyl Alcohol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroisopropyl)ether	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
3 and 4-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
N-Nitrosodi-n-propylamine	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Hexachloroethane	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Nitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Isophorone	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2,4-Dimethylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Bis(2-chloroethoxy)methane	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1,3,5-Trichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Naphthalene	N	mg/kg	0.01	0.06	< 0.01	< 0.01
3-Chloroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Hexachloro-1,3-butadiene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
4-Chloro-3-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Methylnaphthalene	N	mg/kg	0.01	0.03	< 0.01	< 0.01
1-Methylnaphthalene	N	mg/kg	0.01	0.02	< 0.01	< 0.01
Hexachlorocyclopentadiene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2,4,5-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1-Chloronaphthalene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1,4-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dimethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1-3-dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2-6-dinitrotoluene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	N	mg/kg	0.01	0.08	< 0.01	< 0.01
1,2-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
3-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	N	mg/kg	0.01	0.02	< 0.01	< 0.01
4-nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dibenzofuran	N	mg/kg	0.01	0.02	< 0.01	< 0.01
2,3,5,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
2,3,4,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Diethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1-chloro-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Fluorene	N	mg/kg	0.01	0.02	< 0.01	< 0.01
4-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dinitro-o-cresol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Diphenylamine	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Azobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
1-bromo-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Pentachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01

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Results Summary

Report No.: 16-09702

ELAB Reference				81758	81759	81763
Customer Reference						
Sample ID						
Sample Type				SOIL	SOIL	SOIL
Sample Location				BH10	BH10	BH06
Sample Depth (m)				12.50	13.50	2.50
Sampling Date				24/11/2016	24/11/2016	26/11/2016
Determinand	**Codes**	**Units**	**LOD**			
SVOC						
Phenanthrene	N	mg/kg	0.01	0.12	< 0.01	< 0.01
Anthracene	N	mg/kg	0.01	0.09	< 0.01	< 0.01
Carbazole	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Dibutyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	N	mg/kg	0.01	0.64	< 0.01	< 0.01
Pyrene	N	mg/kg	0.01	0.53	< 0.01	< 0.01
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Bis-2-ethylhexyladipate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01	0.19
Benzo(a)anthracene	N	mg/kg	0.01	0.41	< 0.01	< 0.01
Chrysene	N	mg/kg	0.01	0.31	< 0.01	< 0.01
Bis(2-ethylhexyl)phthalate	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	N	mg/kg	0.01	0.39	< 0.01	< 0.01
Benzo(k)fluoranthene	N	mg/kg	0.01	0.30	< 0.01	< 0.01
Benzo(a)pyrene	N	mg/kg	0.01	0.36	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.01	0.14	< 0.01	< 0.01
Dibenz(ah)anthracene	N	mg/kg	0.01	0.05	< 0.01	< 0.01
Benzo[g,h,i]perylene	N	mg/kg	0.01	0.20	< 0.01	< 0.01

Results Summary

Report No.: 16-09702

WAC Analysis								
Elab Ref:	81763					**Landfill Waste Acceptance Criteria Limits**		
Sample Date:	26/11/2016					**Inert Waste Landfill**	**Stable Non-reactive Hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:	BH06							
Depth (m)	2.5							
Site:	London City Airport							
Determinand		**Code**	**Units**					
Total Organic Carbon		N	%		0.07	3	5	6
Loss on Ignition		M	%		0.4	--	--	10
Total BTEX		M	mg/kg		< 0.01	6	--	--
Total PCBs (7 congeners)		M	mg/kg		< 0.03	1	--	--
TPH Total WAC		M	mg/kg		< 5	500	--	--
Total (of 17) PAHs		N	mg/kg		< 2	100	--	--
pH		M			7.8	--	>6	--
Acid Neutralisation Capacity		N	mol/kg		< 0.1	--	To evaluate	To evaluate
Eluate Analysis			**10:1**		**10:1**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
			mg/l		**mg/kg**			
Arsenic		N	< 0.005		< 0.05	0.5	2	25
Barium		N	< 0.005		< 0.05	20	100	300
Cadmium		N	< 0.001		< 0.01	0.04	1	5
Chromium		N	< 0.005		< 0.05	0.5	10	70
Copper		N	< 0.005		< 0.05	2	50	100
Mercury		N	< 0.005		< 0.01	0.01	0.2	2
Molybdenum		N	< 0.005		< 0.05	0.5	10	30
Nickel		N	0.002		< 0.05	0.4	10	40
Lead		N	< 0.001		< 0.05	0.5	10	50
Antimony		N	< 0.005		< 0.05	0.06	0.7	5
Selenium		N	< 0.005		< 0.05	0.1	0.5	7
Zinc		N	< 0.005		< 0.05	4	50	200
Chloride		N	6		60.00	800	15000	25000
Fluoride		N	< 5		< 10	10	150	500
Sulphate		N	8		76.00	1000	20000	50000
Total Dissolved Solids		N	< 100		1000.00	4000	60000	100000
Phenol Index		N	< 0.01		< 0.10	1	-	-
Dissolved Organic Carbon		N	14.200		142.00	500	800	1000
Leach Test Information								
pH		N	7.9					
Conductivity (uS/cm)		N	115					
Dry mass of test portion (g)			103.000					
Dry Matter (%)			95					
Moisture (%)			5					
Eluent Volume (ml)			993					

Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ELAB cannot be held responsible for any discrepencies with current legislation

2683

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Results Summary

Report No.: 16-09702

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
81758	12.50	BH10	Dirty stones	No asbestos detected	n/t	n/t	n/t	n/t
81759	13.50	BH10	Stones with sand	No asbestos detected	n/t	n/t	n/t	n/t
81760	0.60	BH06	Brown soil, with concrete, stones, brick	No asbestos detected	n/t	n/t	n/t	n/t
81761	1.00	BH06	Brown soil, with stones,	No asbestos detected	n/t	n/t	n/t	n/t
81763	2.50	BH06	Brown soil, with stones,	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 16-09702

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Aqua regia extractable metals	M	Air dried sample	30/11/2016	118	ICPMS
Phenols in solids	N	As submitted sample	29/11/2016	121	HPLC
PAH (GC-FID)	M	As submitted sample	29/11/2016	133	GC-FID
SVOC in solids	N	As submitted sample	29/11/2016	167	GC-MS
Water soluble anions	M	Air dried sample	30/11/2016	172	Ion Chromatography
VOC in solids	M	As submitted sample	29/11/2016	181	GC-MS
Water soluble boron	N	Air dried sample	30/11/2016	202	Colorimetry
Total cyanide	M	As submitted sample	29/11/2016	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	29/11/2016	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	30/11/2016	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	29/11/2016	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	30/11/2016	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	30/11/2016	214	GC-MS
Soil organic matter	U	Air dried sample	29/11/2016	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	29/11/2016	PMAN	Microscopy
Leachate					
Arsenic*	N		01/12/2016	101	ICPMS
Cadmium*	N		01/12/2016	101	ICPMS
Chromium*	N		01/12/2016	101	ICPMS
Lead*	N		01/12/2016	101	ICPMS
Nickel*	N		01/12/2016	101	ICPMS
Copper*	N		01/12/2016	101	ICPMS
Zinc*	N		01/12/2016	101	ICPMS
Mercury*	N		01/12/2016	101	ICPMS
Selenium*	N		01/12/2016	101	ICPMS
Antimony	N		01/12/2016	101	ICPMS
Barium*	N		01/12/2016	101	ICPMS
Molybdenum*	N		01/12/2016	101	ICPMS
pH Value*	N		01/12/2016	113	Electrometric
Electrical Conductivity*	N		01/12/2016	136	Probe
Dissolved Organic Carbon	N		01/12/2016	102	TOC analyser
Chloride*	N		01/12/2016	131	Ion Chromatography
Fluoride*	N		01/12/2016	131	Ion Chromatography
Sulphate*	N		01/12/2016	131	Ion Chromatography
Total Dissolved Solids	N		01/12/2016	144	Gravimetric
Phenol index	N		01/12/2016	121	HPLC
WAC Solids analysis	N				
pH Value**	M	Air dried sample	30/11/2016	113	Electrometric
Total Organic Carbon	N	Air dried sample	30/11/2016	210	IR
Loss on Ignition**	M	Air dried sample	01/12/2016	129	Gravimetric
Acid Neutralization Capacity to pH 7	N	Air dried sample	30/11/2016	NEN 737	Electrometric
Total BTEX**	M	As submitted sample	30/11/2016	181	GCMS
Mineral Oil**	U	As submitted sample	29/11/2016	117	GCFID
Total PCBs (7 congeners)	M	Air dried sample	30/11/2016	120	GCMS
Total PAH (17)**	N	As submitted sample	30/11/2016	133	GCFID

Tests marked N are not UKAS accredited

Report Information

Report No.: 16-09702

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

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

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

Sample Retention and Disposal

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

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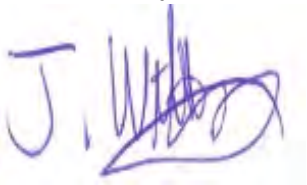
UKAS TESTING
2683

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	16-09774
Issue:	1
Date of Issue:	07/12/2016
Contact:	Evangelos Kafantaris
Customer Details:	Concept Engineering Consultants Ltd Unit 8, Warple Mews Warple Way London W3 0RF
Quotation No:	Q16-00716
Order No:	CL863
Customer Reference:	16/2900
Date Received:	30/11/2016
Date Approved:	07/12/2016
Details:	London City Airport
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 16-09774

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
82224	BH06 4.10	28/11/2016	01/12/2016	Sand + stones	
82225	BH06 4.50	28/11/2016	01/12/2016		
82226	BH06 5.70	28/11/2016	01/12/2016	Sand + stones	
82227	BH25R 12.30	28/11/2016	01/12/2016		
82228	BH25R 13.10	28/11/2016	01/12/2016		
82229	BH25R 13.90	28/11/2016	01/12/2016	Sand + stones	

Results Summary

Report No.: 16-09774

			ELAB Reference	82224	82226	82229
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	BH06	BH06	BH25R
			Sample Depth (m)	4.10	5.70	13.90
			Sampling Date	28/11/2016	28/11/2016	28/11/2016
Determinand	**Codes**	**Units**	**LOD**			
Metals						
Arsenic	M	mg/kg	1	^ 12.2	^ 44.5	^ 5.7
Cadmium	M	mg/kg	0.5	^ < 0.5	^ 0.7	^ < 0.5
Chromium	M	mg/kg	5	^ 26.9	^ 24.9	^ 19.3
Copper	M	mg/kg	5	^ 9.9	^ 60.9	^ 7.5
Lead	M	mg/kg	5	^ 13.3	^ 33.4	^ 5.1
Mercury	M	mg/kg	0.5	^ < 0.5	^ 1.7	^ < 0.5
Nickel	M	mg/kg	5	^ 22.6	^ 20.4	^ 10.3
Zinc	M	mg/kg	5	^ 36.3	^ 614	^ 32.8
Anions						
Water Soluble Sulphate	M	g/l	0.02	^ 0.08	^ 0.06	^ 0.09
Inorganics						
Total Cyanide	M	mg/kg	1	^ < 1.0	^ < 1.0	^ < 1.0
Water Soluble Boron	N	mg/kg	0.5	< 0.5	< 0.5	< 0.5
Miscellaneous						
Soil Organic Matter	U	%	0.1	0.2	0.3	0.4
Phenols						
Total Phenols	N	mg/kg	6	< 6	< 6	< 6
Polyaromatic hydrocarbons						
Naphthalene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Acenaphthylene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Acenaphthene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Fluorene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Phenanthrene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Anthracene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Fluoranthene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Pyrene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Benzo(a)anthracene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Chrysene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Benzo (b) fluoranthene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Benzo (a) pyrene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	^ < 0.1	^ < 0.1	^ < 0.1
Total PAH(16)	M	mg/kg	0.4	^ < 0.4	^ < 0.4	^ < 0.4

Results Summary

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Report No.: 16-09774

			ELAB Reference	82224	82226	82229
			Customer Reference			
			Sample ID			
			Sample Type	SOIL	SOIL	SOIL
			Sample Location	BH06	BH06	BH25R
			Sample Depth (m)	4.10	5.70	13.90
			Sampling Date	28/11/2016	28/11/2016	28/11/2016
Determinand	**Codes**	**Units**	**LOD**			
TPH CWG						
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	3.3	< 1.0	< 1.0
>C21-C35 Aliphatic	N	mg/kg	1	53.1	9.3	9.6
>C35-C40 Aliphatic	N	mg/kg	1	6.1	< 1.0	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	2.0	< 1.0	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	25.9	2.4	< 1.0
>C35-C40 Aromatic	N	mg/kg	1	2.5	< 1.0	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	92.9	11.7	9.6

2683

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Results Summary

Report No.: 16-09774

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
82224	4.10	BH06	Brown sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t
82226	5.70	BH06	Brown sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t
82229	13.90	BH25R	Grey sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t

2683

Method Summary

Report No.: 16-09774

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Aqua regia extractable metals	M	Air dried sample	06/12/2016	118	ICPMS
Phenols in solids	N	As submitted sample	05/12/2016	121	HPLC
PAH (GC-FID)	M	As submitted sample	02/12/2016	133	GC-FID
Water soluble anions	M	Air dried sample	06/12/2016	172	Ion Chromatography
Water soluble boron	N	Air dried sample	06/12/2016	202	Colorimetry
Total cyanide	M	As submitted sample	05/12/2016	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	02/12/2016	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	05/12/2016	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	02/12/2016	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	05/12/2016	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	05/12/2016	214	GC-MS
Soil organic matter	U	Air dried sample	07/12/2016	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	05/12/2016	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 16-09774

Key

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N	do not currently hold UKAS accreditation
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SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
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Deviation Codes

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

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

Sample Retention and Disposal

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Charges may apply to extended sample storage

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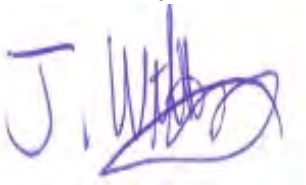
Facsimile: (01424) 729911
info@elab-uk.co.uk

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	16-09782
Issue:	1
Date of Issue:	07/12/2016
Contact:	Evangelos Kafantaris
Customer Details:	Concept Engineering Consultants Ltd Unit 8, Warple Mews Warple Way London W3 0RF
Quotation No:	Q16-00716
Order No:	CL864
Customer Reference:	16/2900
Date Received:	02/12/2016
Date Approved:	07/12/2016
Details:	London City Airport
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 16-09782

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
82327	BH24 11.50	29/11/2016	01/12/2016		
82328	BH24 12.00	29/11/2016	01/12/2016	wet silty loam	
82329	BH24 13.00	29/11/2016	01/12/2016	Sand	
82330	BH24 14.00	29/11/2016	01/12/2016		
82331	BH21 11.80	28/11/2016	01/12/2016		
82332	BH21 13.10	28/11/2016	01/12/2016	wet silty loam + stones	
82333	BH21 13.80	28/11/2016	01/12/2016	Sand	

Results Summary

Report No.: 16-09782

			ELAB Reference	82328	82329	82332	82333
			Customer Reference				
			Sample ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sample Location	BH24	BH24	BH21	BH21
			Sample Depth (m)	12.00	13.00	13.10	13.80
			Sampling Date	29/11/2016	29/11/2016	28/11/2016	28/11/2016
Determinand	**Codes**	**Units**	**LOD**				
Metals							
Arsenic	M	mg/kg	1	^ 88.5	9.8	^ 6.4	3.4
Cadmium	M	mg/kg	0.5	^ 8.3	< 0.5	^ < 0.5	< 0.5
Chromium	M	mg/kg	5	^ 156	24.3	^ 24.7	13.7
Copper	M	mg/kg	5	^ 448	14.3	^ 11.9	7.8
Lead	M	mg/kg	5	^ 652	78.6	^ 17.9	12.4
Mercury	M	mg/kg	0.5	^ 18.2	< 0.5	^ < 0.5	< 0.5
Nickel	M	mg/kg	5	^ 83.2	16.8	^ 11.8	6.7
Zinc	M	mg/kg	5	^ 1600	56.2	^ 31.4	29.1
Anions							
Water Soluble Sulphate	M	g/l	0.02	^ 0.68	0.11	^ 0.08	0.09
Inorganics							
Total Cyanide	M	mg/kg	1	^ < 1.0	< 1.0	^ < 1.0	< 1.0
Water Soluble Boron	N	mg/kg	0.5	7.7	0.5	< 0.5	< 0.5
Miscellaneous							
Soil Organic Matter	U	%	0.1	10	0.4	0.6	0.1
Phenols							
Total Phenols	N	mg/kg	6	< 6	< 6	< 6	< 6
Polyaromatic hydrocarbons							
Naphthalene	M	mg/kg	0.1	^ 0.6	< 0.1	^ < 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	^ 1.3	< 0.1	^ < 0.1	0.1
Acenaphthene	M	mg/kg	0.1	^ 0.6	< 0.1	^ < 0.1	< 0.1
Fluorene	M	mg/kg	0.1	^ 0.7	< 0.1	^ < 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	^ < 0.1	< 0.1	^ 0.1	0.1
Anthracene	M	mg/kg	0.1	^ < 0.1	< 0.1	^ < 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	^ 2.5	< 0.1	^ 0.2	0.9
Pyrene	M	mg/kg	0.1	^ 2.7	< 0.1	^ 0.2	0.3
Benzo(a)anthracene	M	mg/kg	0.1	^ 1.4	< 0.1	^ < 0.1	0.2
Chrysene	M	mg/kg	0.1	^ 2.7	< 0.1	^ 0.2	0.3
Benzo (b) fluoranthene	M	mg/kg	0.1	^ 2.1	< 0.1	^ 0.1	0.3
Benzo(k)fluoranthene	M	mg/kg	0.1	^ 2.4	< 0.1	^ 0.2	0.3
Benzo (a) pyrene	M	mg/kg	0.1	^ 2.1	< 0.1	^ < 0.1	0.2
Indeno (1,2,3-cd) pyrene	M	mg/kg	0.1	^ 3.8	< 0.1	^ < 0.1	0.3
Dibenzo(a,h)anthracene	M	mg/kg	0.1	^ 0.9	< 0.1	^ < 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	^ 3.1	< 0.1	^ < 0.1	0.3
Total PAH(16)	M	mg/kg	0.4	^ 26.8	< 0.4	^ 1.3	3.4
TPH CWG							
>C5-C6 Aliphatic	N	mg/kg	0.01	0.02	< 0.01	< 0.01	< 0.01
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aliphatic	N	mg/kg	1	102	< 1.0	1.7	< 1.0
>C16-C21 Aliphatic	N	mg/kg	1	314	< 1.0	5.4	1.7
>C21-C35 Aliphatic	N	mg/kg	1	771	3.5	18.8	6.2
>C35-C40 Aliphatic	N	mg/kg	1	90.1	1.2	1.5	< 1.0
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0
>C12-C16 Aromatic	N	mg/kg	1	51.5	< 1.0	< 1.0	< 1.0
>C16-C21 Aromatic	N	mg/kg	1	297	< 1.0	4.9	< 1.0
>C21-C35 Aromatic	N	mg/kg	1	960	3.4	23.6	5.1

^Tests marked N are not UKAS accredited.

Results Summary

Report No.: 16-09782

ELAB Reference			82328	82329	82332	82333
Customer Reference						
Sample ID						
Sample Type			SOIL	SOIL	SOIL	SOIL
Sample Location			BH24	BH24	BH21	BH21
Sample Depth (m)			12.00	13.00	13.10	13.80
Sampling Date			29/11/2016	29/11/2016	28/11/2016	28/11/2016
Determinand	**Codes**	**Units**	**LOD**			
>C35-C40 Aromatic	N	mg/kg	1	115	< 1.0	2.1	< 1.0
Total (>C5-C40) Ali/Aro	N	mg/kg	1	2700	8.1	58.0	12.9

Results Summary

Report No.: 16-09782

ELAB Reference	82328	82332
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	BH24	BH21
Sample Depth (m)	12.00	13.10
Sampling Date	29/11/2016	28/11/2016

Determinand	Codes	Units	LOD		
VOC					
Heptane	N	ug/kg	10	< 10.0	< 10.0
Octane	N	ug/kg	10	< 10.0	< 10.0
Nonane	N	ug/kg	10	< 10.0	< 10.0
Benzene	M	ug/kg	10	^ < 10.0	^ < 10.0
Toluene	M	ug/kg	10	^ < 10.0	^ < 10.0
Ethylbenzene	M	ug/kg	10	^ < 10.0	^ < 10.0
m+p-xylene	M	ug/kg	10	^ < 10.0	^ < 10.0
o-xylene	M	ug/kg	10	^ < 10.0	^ < 10.0
cis-1,2-dichloroethene	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1-Dichloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0
Chloroform	M	ug/kg	10	^ < 10.0	^ < 10.0
Tetrachloromethane	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1,1-Trichloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0
Trichloroethylene	M	ug/kg	10	^ < 10.0	^ < 10.0
Tetrachloroethylene	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1,1,2-Tetrachloroethane	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1,2,2-Tetrachloroetha	M	ug/kg	10	^ 25.8	^ < 10.0
Chlorobenzene	M	ug/kg	10	^ < 10.0	^ < 10.0
Bromobenzene	M	ug/kg	10	^ < 10.0	^ < 10.0
Bromodichloromethane	M	ug/kg	10	^ < 10.0	^ < 10.0
Methylethylbenzene	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0
Trans - 1-2 -dichloroethylene	N	ug/kg	10	< 10.0	< 10.0
2,2-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
Bromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichloroethane	N	ug/kg	10	< 10.0	< 10.0
Dibromomethane	M	ug/kg	10	^ < 10.0	^ < 10.0
1,2-Dichloropropane	M	ug/kg	10	^ < 10.0	^ < 10.0
cis-1,3-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0
trans-1,3-Dichloro-1-propene	M	ug/kg	10	^ < 10.0	^ < 10.0
1,1,2-Trichloroethane	N	ug/kg	10	< 10.0	< 10.0
Dibromochloromethane	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichloropropane	N	ug/kg	10	< 10.0	< 10.0
1,2-dibromoethane	M	ug/kg	10	^ < 10.0	^ < 10.0
Styrene	N	ug/kg	10	< 10.0	< 10.0
Propylbenzene	N	ug/kg	10	< 10.0	< 10.0
2-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
1,2,4-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
4-Chlorotoluene	N	ug/kg	10	< 10.0	< 10.0
t-butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,3,5-Trimethylbenzene	N	ug/kg	10	< 10.0	< 10.0
1-methylpropylbenzene	N	ug/kg	10	< 10.0	< 10.0
o-cymene	N	ug/kg	10	< 10.0	< 10.0
1,3-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Butylbenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dibromo-3-chloropropane	N	ug/kg	10	< 10.0	< 10.0
Hexachlorobutadiene	N	ug/kg	10	< 10.0	< 10.0
1,2,3-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Naphthalene	N	ug/kg	10	< 10.0	< 10.0
1,2,4-Trichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,4-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
1,2-Dichlorobenzene	N	ug/kg	10	< 10.0	< 10.0
Bromoform	N	ug/kg	10	< 10.0	< 10.0

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 16-09782

ELAB Reference	82328	82332
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	BH24	BH21
Sample Depth (m)	12.00	13.10
Sampling Date	29/11/2016	28/11/2016

Determinand	Codes	Units	LOD		
SVOC					
Phenol	N	mg/kg	0.01	< 0.01	< 0.01
Aniline	N	mg/kg	0.01	< 0.01	< 0.01
Bis(2-chloroethyl)ether	N	mg/kg	0.01	< 0.01	< 0.01
2-Chlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
1,3-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01
1,4-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01
Benzyl Alcohol	N	mg/kg	0.01	< 0.01	< 0.01
1,2-Dichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01
2-Methylphenol	N	mg/kg	0.01	< 0.01	< 0.01
Bis(2-chloroisopropyl)ether	N	mg/kg	0.01	< 0.01	< 0.01
3 and 4-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01
N-Nitrosodi-n-propylamine	N	mg/kg	0.01	< 0.01	< 0.01
Hexachloroethane	N	mg/kg	0.01	< 0.01	< 0.01
Nitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01
Isophorone	N	mg/kg	0.01	< 0.01	< 0.01
2-Nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01
2,4-Dimethylphenol	N	mg/kg	0.01	< 0.01	< 0.01
Bis(2-chloroethoxy)methane	N	mg/kg	0.01	< 0.01	< 0.01
2,4-Dichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
1,3,5-Trichlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01
Naphthalene	N	mg/kg	0.01	0.23	< 0.01
3-Chloroaniline	N	mg/kg	0.01	< 0.01	< 0.01
Hexachloro-1,3-butadiene	N	mg/kg	0.01	< 0.01	< 0.01
4-Chloro-3-methylphenol	N	mg/kg	0.01	< 0.01	< 0.01
2-Methylnaphthalene	N	mg/kg	0.01	0.13	< 0.01
1-Methylnaphthalene	N	mg/kg	0.01	0.10	< 0.01
Hexachlorocyclopentadiene	N	mg/kg	0.01	< 0.01	< 0.01
2,4,6-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
2,4,5-Trichlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
1-Chloronaphthalene	N	mg/kg	0.01	< 0.01	< 0.01
2-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01
1,4-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01
Dimethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01
1-3-dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01
2-6-dinitrotoluene	N	mg/kg	0.01	< 0.01	< 0.01
Acenaphthylene	N	mg/kg	0.01	0.57	0.02
1,2-Dinitrobenzene	N	mg/kg	0.01	< 0.01	< 0.01
3-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01
Acenaphthene	N	mg/kg	0.01	0.20	0.01
4-nitrophenol	N	mg/kg	0.01	< 0.01	< 0.01
Dibenzofuran	N	mg/kg	0.01	0.11	< 0.01
2,3,5,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
2,3,4,6-Tetrachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01
Diethyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01
1-chloro-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01
Fluorene	N	mg/kg	0.01	0.10	0.01
4-Nitroaniline	N	mg/kg	0.01	< 0.01	< 0.01
Dinitro-o-cresol	N	mg/kg	0.01	< 0.01	< 0.01
Diphenylamine	N	mg/kg	0.01	< 0.01	< 0.01
Azobenzene	N	mg/kg	0.01	< 0.01	< 0.01
1-bromo-4-phenoxybenzene	N	mg/kg	0.01	< 0.01	< 0.01
Hexachlorobenzene	N	mg/kg	0.01	< 0.01	< 0.01
Pentachlorophenol	N	mg/kg	0.01	< 0.01	< 0.01

Tests marked N are not UKAS accredited.

Results Summary

Report No.: 16-09782

ELAB Reference	82328	82332
Customer Reference		
Sample ID		
Sample Type	SOIL	SOIL
Sample Location	BH24	BH21
Sample Depth (m)	12.00	13.10
Sampling Date	29/11/2016	28/11/2016

Determinand	Codes	Units	LOD		
SVOC					
Phenanthrene	N	mg/kg	0.01	0.68	0.08
Anthracene	N	mg/kg	0.01	0.77	0.03
Carbazole	N	mg/kg	0.01	< 0.01	< 0.01
Dibutyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01
Fluoranthene	N	mg/kg	0.01	5.01	0.18
Pyrene	N	mg/kg	0.01	4.15	0.14
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01
Bis-2-ethylhexyladipate	N	mg/kg	0.01	< 0.01	< 0.01
Butyl benzyl phthalate	N	mg/kg	0.01	< 0.01	< 0.01
Benzo(a)anthracene	N	mg/kg	0.01	1.77	0.09
Chrysene	N	mg/kg	0.01	2.60	0.07
Bis(2-ethylhexyl)phthalate	N	mg/kg	0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	N	mg/kg	0.01	4.77	0.09
Benzo(k)fluoranthene	N	mg/kg	0.01	2.39	0.07
Benzo(a)pyrene	N	mg/kg	0.01	4.65	0.13
Indeno(1,2,3-cd)pyrene	N	mg/kg	0.01	3.31	0.09
Dibenz(ah)anthracene	N	mg/kg	0.01	1.42	0.03
Benzo[g,h,i]perylene	N	mg/kg	0.01	3.53	0.09

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Results Summary

Report No.: 16-09782

Asbestos Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #)
in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
82328	12.00	BH24	Grey soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t
82329	13.00	BH24	Brown sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t
82332	13.10	BH21	Brown sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t
82333	13.80	BH21	Brown sandy soil, with stones	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 16-09782

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Aqua regia extractable metals	M	Air dried sample	06/12/2016	118	ICPMS
Phenols in solids	N	As submitted sample	05/12/2016	121	HPLC
PAH (GC-FID)	M	As submitted sample	05/12/2016	133	GC-FID
SVOC in solids	N	As submitted sample	05/12/2016	167	GC-MS
Water soluble anions	M	Air dried sample	06/12/2016	172	Ion Chromatography
VOC in solids	M	As submitted sample	05/12/2016	181	GC-MS
Water soluble boron	N	Air dried sample	06/12/2016	202	Colorimetry
Total cyanide	M	As submitted sample	05/12/2016	204	Colorimetry
Aliphatic hydrocarbons in soil	N	As submitted sample	05/12/2016	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	06/12/2016	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	05/12/2016	214	GC-FID
Low range Aliphatic hydrocarbons soil	N	As submitted sample	06/12/2016	214	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	06/12/2016	214	GC-MS
Soil organic matter	U	Air dried sample	07/12/2016	BS1377:P3	Titrimetry
Asbestos identification	U	As submitted sample	05/12/2016	PMAN	Microscopy

Tests marked N are not UKAS accredited

Report Information

Report No.: 16-09782

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis (dried at < 30°C)
Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
PCB congener results may include any coeluting PCBs
Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

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

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

Sample Retention and Disposal

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

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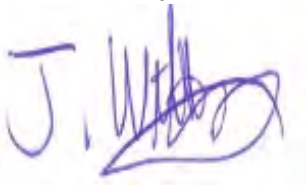
THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	17-10155
Issue:	1
Date of Issue:	13/01/2017
Contact:	Richard Embery
Customer Details:	Concept Engineering Consultants Ltd Unit 8, Warple Mews Warple Way London W3 0RF
Quotation No:	Q16-00626
Order No:	CL889
Customer Reference:	16/2900
Date Received:	06/01/2017
Date Approved:	13/01/2017
Details:	London City Airport
Approved by:	

John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683

Sample Summary

Report No.: 17-10155

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
84766	BH07 12.00	05/01/2017	09/01/2017	Silty loam	
84767	BH07 14.00	05/01/2017	09/01/2017	Sand + stones	

Results Summary

Report No.: 17-10155

			ELAB Reference	84766	84767
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH07	BH07
			Sample Depth (m)	12.00	14.00
			Sampling Date	05/01/2017	05/01/2017
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Arsenic	N	ug/l	5	26	< 5
Cadmium	N	ug/l	1	< 1	< 1
Chromium	N	ug/l	5	< 5	< 5
Copper	N	ug/l	5	< 5	< 5
Lead	N	ug/l	5	< 5	< 5
Mercury	N	ug/l	0.1	0.3	< 0.1
Nickel	N	ug/l	5	< 5	< 5
Selenium	N	ug/l	5	< 5	< 5
Zinc	N	ug/l	5	6	< 5
Inorganics					
Complex cyanide	N	ug/l	5	< 5	< 5
Hexavalent chromium	N	ug/l	100	< 100	< 100
Free Cyanide	N	ug/l	5	< 5	< 5
Total Cyanide	N	ug/l	5	< 5	< 5
Miscellaneous					
pH	N	pH units	0.1	8.3	8.2
Polyaromatic hydrocarbons					
Naphthalene Leachate GCMS	N	ug/l	0.01	0.07	0.11
Acenaphthylene Leachate GCMS	N	ug/l	0.01	0.01	0.02
Acenaphthene Leachate GCMS	N	ug/l	0.01	0.02	0.03
Fluorene Leachate GCMS	N	ug/l	0.01	0.03	0.03
Phenanthrene Leachate GCMS	N	ug/l	0.01	0.07	0.11
Anthracene Leachate GCMS	N	ug/l	0.01	0.03	0.04
Fluoranthene Leachate GCMS	N	ug/l	0.01	0.03	0.08
Pyrene Leachate GCMS	N	ug/l	0.01	0.02	0.05
Benzo (a) anthracene Leachate GCMS	N	ug/l	0.01	0.01	0.06
Chrysene Leachate GCMS	N	ug/l	0.01	< 0.01	0.05
Benzo (b) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	0.08
Benzo (k) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	0.06
Benzo (a) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	0.05
Indeno (1,2,3-cd) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	0.03
Dibenzo(a,h)anthracene Leachate GCMS	N	ug/l	0.01	< 0.01	0.01
Benzo(ghi)perylene Leachate GCMS	N	ug/l	0.01	< 0.01	0.04
Total PAH(16) Leachate GCMS	N	ug/l	0.01	0.35	0.85
BTEX					
Benzene	N	ug/l	1	< 1.00	< 1.00
Toluene	N	ug/l	1	< 1.00	< 1.00
Ethylbenzene	N	ug/l	1	< 1.00	< 1.00
Xylenes	N	ug/l	1	< 1.00	< 1.00
MTBE	N	ug/l	1	< 1.00	< 1.00

Method Summary

Report No.: 17-10155

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Cyanide (L) in solids in leachates	N		11/01/2017		Colorimetry
Metals by ICP in leachates	N		11/01/2017		ICPMS
pH of leachates	N		11/01/2017		Electromeric
PAHs and/or PCBs in leachates	N		11/01/2017	135	GC-MS
BTEX in leachates	N		13/01/2017	200A	GC-MS

Tests marked N are not UKAS accredited

Report Information

Report No.: 17-10155

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
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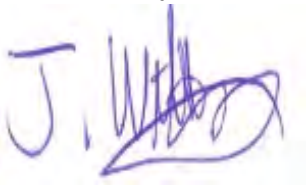
THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number:	17-10248
Issue:	1
Date of Issue:	20/01/2017
Contact:	Olia Savvidou
Customer Details:	Concept Engineering Consultants Ltd Unit 8, Warple Mews Warple Way London W3 0RF
Quotation No:	Q16-00626
Order No:	CL892
Customer Reference:	16/2900
Date Received:	11/01/2017
Date Approved:	20/01/2017
Details:	London City Airport
Approved by:	

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Sample Summary

Report No.: 17-10248

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
85464	BH12 14.10	09/01/2017	16/01/2017	Silty loam + stones	
85465	BH12 15.50	09/01/2017	16/01/2017	Sand	

Results Summary

Report No.: 17-10248

			ELAB Reference	85464	85465
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH12	BH12
			Sample Depth (m)	14.10	15.50
			Sampling Date	09/01/2017	09/01/2017
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Arsenic	N	ug/l	5	< 5	8
Cadmium	N	ug/l	1	< 1	< 1
Chromium	N	ug/l	5	< 5	< 5
Copper	N	ug/l	5	< 5	< 5
Lead	N	ug/l	5	< 5	< 5
Mercury	N	ug/l	0.1	< 0.1	< 0.1
Nickel	N	ug/l	5	< 5	< 5
Selenium	N	ug/l	5	< 5	< 5
Zinc	N	ug/l	5	< 5	< 5
Inorganics					
Complex cyanide	N	ug/l	5	< 5	< 5
Hexavalent chromium	N	ug/l	100	< 100	< 100
Free Cyanide	N	ug/l	5	< 5	< 5
Total Cyanide	N	ug/l	5	< 5	< 5
Miscellaneous					
pH	N	pH units	0.1	7.3	7.7
Polyaromatic hydrocarbons					
Naphthalene Leachate GCMS	N	ug/l	0.01	0.08	0.07
Acenaphthylene Leachate GCMS	N	ug/l	0.01	0.02	0.02
Acenaphthene Leachate GCMS	N	ug/l	0.01	0.12	0.04
Fluorene Leachate GCMS	N	ug/l	0.01	0.07	0.16
Phenanthrene Leachate GCMS	N	ug/l	0.01	0.31	0.62
Anthracene Leachate GCMS	N	ug/l	0.01	0.08	0.08
Fluoranthene Leachate GCMS	N	ug/l	0.01	0.03	0.06
Pyrene Leachate GCMS	N	ug/l	0.01	0.02	0.04
Benzo (a) anthracene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Chrysene Leachate GCMS	N	ug/l	0.01	< 0.01	0.02
Benzo (b) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo (k) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo (a) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Indeno (1,2,3-cd) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo(ghi)perylene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Total PAH(16) Leachate GCMS	N	ug/l	0.01	0.75	1.12
BTEX					
Benzene	N	ug/l	1	< 1.00	< 1.00
Toluene	N	ug/l	1	< 1.00	< 1.00
Ethylbenzene	N	ug/l	1	< 1.00	< 1.00
Xylenes	N	ug/l	1	< 1.00	< 1.00
MTBE	N	ug/l	1	< 1.00	< 1.00

Method Summary

Report No.: 17-10248

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Cyanide (L) in solids in leachates	N		19/01/2017		Colorimetry
Metals by ICP in leachates	N		18/01/2017		ICPMS
pH of leachates	N		19/01/2017		Electromeric
PAHs and/or PCBs in leachates	N		18/01/2017	135	GC-MS
BTEX in leachates	N		20/01/2017	200A	GC-MS

Tests marked N are not UKAS accredited

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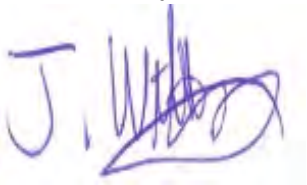
Approved by:	

John Wilson, Operations Manager

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Sample Summary

Report No.: 17-10249

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
85466	BH13 12.50	11/01/2017	16/01/2017	Silty loam	
85467	BH13 13.00	11/01/2017	16/01/2017	Sand + stones	

Results Summary

Report No.: 17-10249

			ELAB Reference	85466	85467
			Customer Reference		
			Sample ID		
			Sample Type	SOIL	SOIL
			Sample Location	BH13	BH13
			Sample Depth (m)	12.50	13.00
			Sampling Date	11/01/2017	11/01/2017
Determinand	**Codes**	**Units**	**LOD**		
Metals					
Arsenic	N	ug/l	5	11	< 5
Cadmium	N	ug/l	1	< 1	< 1
Chromium	N	ug/l	5	< 5	< 5
Copper	N	ug/l	5	< 5	< 5
Lead	N	ug/l	5	< 5	< 5
Mercury	N	ug/l	0.1	< 0.1	< 0.1
Nickel	N	ug/l	5	< 5	< 5
Selenium	N	ug/l	5	< 5	< 5
Zinc	N	ug/l	5	8	< 5
Inorganics					
Complex cyanide	N	ug/l	5	< 5	< 5
Hexavalent chromium	N	ug/l	100	< 100	< 100
Free Cyanide	N	ug/l	5	< 5	< 5
Total Cyanide	N	ug/l	5	< 5	< 5
Miscellaneous					
pH	N	pH units	0.1	7.8	8.1
Polyaromatic hydrocarbons					
Naphthalene Leachate GCMS	N	ug/l	0.01	0.11	0.07
Acenaphthylene Leachate GCMS	N	ug/l	0.01	0.02	< 0.01
Acenaphthene Leachate GCMS	N	ug/l	0.01	0.04	0.02
Fluorene Leachate GCMS	N	ug/l	0.01	0.05	0.03
Phenanthrene Leachate GCMS	N	ug/l	0.01	0.21	0.14
Anthracene Leachate GCMS	N	ug/l	0.01	0.05	0.03
Fluoranthene Leachate GCMS	N	ug/l	0.01	0.04	0.02
Pyrene Leachate GCMS	N	ug/l	0.01	0.02	0.01
Benzo (a) anthracene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Chrysene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo (b) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo (k) fluoranthene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo (a) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Indeno (1,2,3-cd) pyrene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Benzo(ghi)perylene Leachate GCMS	N	ug/l	0.01	< 0.01	< 0.01
Total PAH(16) Leachate GCMS	N	ug/l	0.01	0.58	0.33
BTEX					
Benzene	N	ug/l	1	< 1.00	< 1.00
Toluene	N	ug/l	1	< 1.00	< 1.00
Ethylbenzene	N	ug/l	1	< 1.00	< 1.00
Xylenes	N	ug/l	1	< 1.00	< 1.00
MTBE	N	ug/l	1	< 1.00	< 1.00

Method Summary

Report No.: 17-10249

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Cyanide (L) in solids in leachates	N		19/01/2017		Colorimetry
Metals by ICP in leachates	N		18/01/2017		ICPMS
pH of leachates	N		19/01/2017		Electromeric
PAHs and/or PCBs in leachates	N		18/01/2017	135	GC-MS
BTEX in leachates	N		20/01/2017	200A	GC-MS

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APPENDIX F

TPS Piling Risk Assessment Report 2018

TPS

Making tomorrow a better place

London City Airport Development

Piling Risk Assessment Report

January 2018

London City Airport Development

Prepared by

Daniel Freeland, Principal Geotechnical Engineer

Checked by

Michelle Brock, Senior Engineer

Authorised by

Russell Knapton, Associate Director

Prepared for

London City Airport

A400-TPS-S-01-XXX-DC-RP-247-003 rev 6

January 2018

TPS
Making tomorrow a better place

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Appendix A: Concept Site Investigations Factual Report
Appendix B: Concept Site Investigations Interpretative Report

1. Introduction

London City Airport (LCA) are proposing an extension to existing aircraft stands and a new taxiway link to the existing hold area over King George V (KGV) Dock. The proposed works comprise the City Airport Development Programme (CADP1) planning application (13/01228/FUL) which was granted planning permission in July 2016. The planning application included a Piling Risk Assessment Report (TPS, May 2013) for the proposed piling works in KGV Dock, which comprised Appendix 16.2 of the Updated Environmental Statement (UES) of September 2015.

This updated Piling Risk Assessment forms Appendix F to the report prepared by RPS for submission to the London Borough of Newham (LBN) in order to discharge Part a) and Part b) of Condition 39: Contamination, of the CADP1 planning permission (RPS ref: HLEI45199/001R, dated March 2017). It should therefore be read in conjunction with that document.

- This report comprises an update to the previous TPS Piling Risk Assessment Report contained in the UES, in order to incorporate the findings of a ground investigation of the KGV Dock undertaken between November 2016 and February 2017. It supplements the information presented in the main Condition 39 report and supports the 'further information' that the Environment Agency (EA) has requested in its letter of 7th April 2017 (referenced NE /2017 /126729/01-L01), namely:
    - *"An assessment of the potential risk presented to controlled waters by the presence of the identified contaminated sediment within the dock;*
    - *Risk assessments and method statements for the management and monitoring of the contaminated sediment during the proposed works. We are mindful that the proposed piling works (and potentially subsequent construction phases) could potentially result in the mobilisation of sediment towards other controlled water bodies down gradient of King George V Dock such as the River Thames; and,*
    - *A remediation or risk mitigation strategy for the identified contaminated sediment to be employed during the works".*

This report is a Piling Risk Assessment based on EA guidelines (EA, 2001 and 2002). This report does not cover geotechnical design, wider site contamination issues or waste management of materials arising from excavations. The latter two issues are addressed more fully in Section 8: Outline Remediation Strategy of the main Condition 39 report by RPS and in the report prepared by LCA in order to discharge Condition 70: Waste Management Strategy for CADP1 (February 2017).

2. Site Description

A complete Desk Study and information covering full site history, geology and previous use is provided in the following sources:

- City Airport Development Programme, London City Airport, Phase 1 Preliminary Risk Assessment, Dated May 2013 Ref HLEI 19695/001R (RPS, 2013a);
- Updated Environmental Statement Chapter 16: Ground Conditions and Contamination for CADP (RPS, 2015);
- City Airport Development Programme, Submission under condition 39 of planning permission 13/01228/FUL – Contaminated Land Assessment and Outline Remediation Strategy Ref HLEI 45199/001R (RPS, 2017).

2.1. Site Location

The site is located at London City Airport, located in the Docklands area of east London. The site is located at the approximate National Ordnance Survey Grid Reference TQ 425 804 (see Figure 1 – site location plan).

2.2. Proposed Development

The proposed development comprises 8 new aircraft stands (with one existing stand being taken out of service, thereby providing 25 operational stands in total), a parallel taxiway and extended terminal facilities. The extension to the aircraft stands and new taxiway requires piling in the KGV Dock. A layout of the proposed and existing site can be seen in Approved Drawing 'CAOL-004: Key Engineering Features' showing the proposed new stands and new taxilane link to existing Hold 28 and on 'CAOL-900: Proposed Deck Structure and Foundations – General Arrangement'.

The piling and deck works are similar to those previously undertaken successfully, and without environmental incident, during the construction of the platform to create Hold 27 at the eastern end runway (2003) and for the Eastern Apron Extension (2007/2008). These two previous construction projects entailed the installation of piles in the KGV Dock using vibrodriver casings and rotary bores, a similar piling methodology to that proposed for the CADP1 works.

3. Geology

3.1. General Geology

The BGS Geological Survey Sheet 257 Romford (Solid and Drift Edition), Scale 1:50,000 and BGS website (BGS, 2017), reveals that the site is underlain by Alluvium which overlays the Thanet Sand Formation on the west of the dock and the Upper Chalk Formation on the east of the dock. The geology of the site is described more fully in Section 3.1 of the Condition 39 report by RPS.

3.2. Hydrology

The nearest surface water feature is the KGV Dock located beneath the proposed development. To the north is the Royal Albert dock and both link to the River Thames via a lock at the eastern end of the docks. The hydrological setting of the site is described more fully in Chapter 12 of the UES: Water Resources and Flood Risk.

3.3. Hydrogeology

The Environment Agency website (EA, 2017) indicates that the superficial Alluvium is classified as a Secondary (undifferentiated) Aquifer. The geology maps do not identify the superficial River Terrace Deposits at the site location; however, these are known to be present above the Thanet Sand from site specific ground investigations. The EA classify the superficial River Terrace Deposits as a Secondary A Aquifer.

The solid geology comprising the Thanet Sand Formation and Upper Chalk Formation is classified as follows:

- Thanet Sand Formation underlying the western side of the dock is a Secondary A Aquifer;
- Upper Chalk formation underlying the west of the dock and present below the Thanet Sand Formation is a Principal Aquifer.

The Environment Agency website indicates that the groundwater vulnerability of the Thanet Sand Formation to be Minor Aquifer (High) and for the Upper Chalk Formation to be Major Aquifer (High).

The Environment Agency (EA) website indicates that the site does not lie within a groundwater Source Protection Zone (SPZ).

The sides of the dock are lined with concrete but it is unclear from historical reports regarding the dock construction (Binns, 1923) on whether a clay liner was used at the base of the dock in the original construction. Ground investigations demonstrate a layer of dock bed silt which varies in thickness between 0.2 and 2.2m with an average of 1.1m. It is considered likely that this silt layer reduces hydraulic continuity between the water in the dock and the underlying controlled water.

4. Ground Investigations

Several ground investigations have been undertaken in and around the KGV Dock between 2001 and 2017. These are summarised below and within the main Condition 39 report by RPS. In addition, all site investigation reports (prior to 2015) were contained in Appendix 16.1 of the UES.

4.1. 2001 Soil Mechanics

This ground investigation for KGV Dock was undertaken by Soil Mechanics Limited on behalf of London City Airport in October 2001. The findings from the ground investigation are contained in the Soil Mechanics Limited Factual Report on Ground Investigation, London City Airport – Phase 2 Airside Improvement Programme, October 2001, Report Ref: 141002. (SM, 2001) and included in Appendix D of the Condition 39 submission (RPS, 2017).

4.1.1. Fieldworks

The ground investigation comprised the following:

- 11 No. Cable percussion boreholes carried out on the eastern end of the dock for development of new aircraft stands to depths of between 20.10m and 25.80m from the bottom of KGV Dock;
- 6 No. Cable percussion boreholes carried out on the western end of the dock for the development of an aircraft taxiway and holding area to depths of between 20.00m and 20.80m from the bottom of the KGV Dock;
- Soil sampling and Insitu Standard Penetration Testing (SPT).

4.2. 2013 RPS Investigation

In March 2013 an intrusive environmental investigation was carried out immediately adjacent to KGV Dock. Although the works were not carried out in the Dock itself, the results indicate that the area showed no significant concentrations of volatile contaminants detected within groundwater. As such, the risk to site users from contamination present in soils and groundwater beneath the site was considered to be low (RPS, 2013b). This conclusion is further substantiated by the Environmental Risk Assessment presented in Section 6 of the main Condition 39 report.

4.3. 2016/2017 Concept Site Investigations

This further ground investigation for KGV Dock was undertaken by Concept Site Investigations Limited on behalf of London City Airport between November 2016 and February 2017. The findings from the ground investigation are contained in the Concept Site Investigations Ltd Factual Report, CADP Surveys – Ground Investigation (Dock) Phase 2, March 2017, Report Ref: 16/2900 – FR01 (Concept, 2017a). This report is included in Appendix A of this Piling Risk Assessment.

4.3.1. Fieldworks

The ground investigation works comprised the following:

- 19 No. Cable percussion boreholes carried out in the dock to a maximum depth of 37.5m;
- 14 No. Rotary boreholes carried out in the dock to a maximum depth of 45.5m;
- 1 No. Rotary borehole carried out behind the dock wall to a depth of 30.8m;
- Menard Pressuremeter Testing and insitu SPT's;
- Soil sampling.

5. Ground Conditions

5.1. General

The various ground investigations have demonstrated that there is a geological boundary trending approximately north - south which crosses the centre of the site. To the west of this boundary the site is underlain by Terrace Gravels which overlay the Thanet Sand Formation and the Upper Chalk. To the east of this boundary the Thanet Sands are absent. The ground conditions are further detailed in Tables 5.1 and 5.2.

5.2. Eastern End King George V Dock

The soil profile encountered during the ground investigations on the eastern end of the KGV Dock is summarised in Table 5.1 below:

Table 5.1: Summary of Ground Conditions – Eastern Side King George V Dock

Soil Layer	Description	Depth (mAOD)	Typical Thickness (m)	Maximum Thickness (m)
Dock Silt	Very soft dark grey black SILT (some hydrocarbon odours)	From -5.51 to -7.81	1.27	1.95
River Terrace Gravels	Medium dense brown sandy and very sandy GRAVEL. The gravel is comprised of fine to coarse flint with occasional cobbles.	From -5.95 to -7.85	2.01	2.41
Upper Chalk Formation	Recovered as: Off white silty GRAVEL of chalk.	From -8.5	n/a	Proven to 45.5m depth

This summary is based on boreholes BH28, BH31, BH32, BH33 and BH34 from the Concept 2016/2017 ground investigation.

5.3. Western End King George V Dock

The soil profile encountered during the ground investigation on the western end of the KGV Dock is summarised in Table 5.2 below:

Table 5.2: Summary of Ground Conditions – Western Side King George V Dock

Soil Layer	Description	Depth (mAOD)	Typical Thickness (m)	Maximum Thickness (m)
Dock Silt	Very soft dark grey black SILT (Some Hydrocarbon odours)	From -6.46 to -8.71	0.98	2.2
River Terrace Gravels	Medium dense brown sandy and very sandy GRAVEL. The gravel is comprised of fine to coarse flint with occasional cobbles. (occasional hydrocarbon odours)	From -6.96 to -9.26	2.41	4.44
Thanet Sand Formation including Bullhead Beds	Very dense dark green fine SAND.	From -8.91 to -13.57	12.23	17.40
Upper Chalk Formation	Recovered as: Off white silty GRAVEL of chalk.	From -13.79	n/a	Proven to 37.5m depth

This summary is based on Concept 2016/2017 boreholes BH03 – BH27, BH29 and BH30. Note BH29 and BH30 are geographically located in the west of the dock but have been included in this summary as they contain similar ground conditions as those in the east.

5.4. Contamination Findings of 2016/2017 Ground Investigation

From the 2016/2017 ground investigation the following contamination testing was undertaken on samples of soil comprising dock bed silt or the underlying River Terrace Deposits:

- 33 No. Asbestos Screens, Heavy Metals, Speciated polynuclear aromatic hydrocarbons (PAH), Speciated hydrocarbons (TPH), and pH;
- 17 No. Volatile and Semi - Volatile Organic Compounds (VOC and SVOC);
- 7 No. Polychlorinated Biphenyls (PCB).

Leachate samples were obtained from dock silt and subject to the following analysis:

- 9 No. Heavy Metals, Speciated polynuclear aromatic hydrocarbons, and pH;
- 3 No. Speciated hydrocarbons.

A full interpretation of the contamination results is provided in the Concept Interpretative Report (Concept, 2017b), presented at Appendix B.

An assessment of the contamination results and associated risks by TPS demonstrates that:

- Out of 33 samples tested elevated PAH's were detected in a single location (BH3). The results from BH3 demonstrated elevated levels of Benzo (a) Pyrene, Benzo (b) Fluoranthene and Dibenzo (a,h) Anthracene at 11.7m in dock bed silt. A further 5 No. dock bed silt and Terrace Gravel samples were tested from BH3 at 1m intervals down to a depth of 16.7m and these were not elevated in PAH's. These results indicate that elevated PAH's not widespread in the dock silt and in a single location where they are present they are not mobile;
- Out of 7 samples tested marginally elevated PCB's were detected in a single location BH31. These results indicate that elevated PCB's are localised to a single area and not indicative of a widespread problem;

- Given that the dock bed silt is underwater and the relatively short exposure times for construction workers undertaking piling it is considered that there is a low risk from localised areas of contamination in the dock bed silt and no remedial measures are required to protect human receptors;
- Out of 9 No. leachate tests from samples of dock silt all PAH and TPH results exceeded very conservative UK groundwater standards and one result was marginally elevated compared to EQS saltwater standards for arsenic. The site is not in a source protection zone and there is limited hydraulic continuity between the dock water and underlying groundwater and therefore the receptors considered to be most at risk from leachates in the dock silt are the dock water and the nearby River Thames;
- Given that only a single sample was marginally above the EQS saltwater value for arsenic and given that the closest contamination pathway to the River Thames is approximately 500m from the site it is considered that the risk to water in the Thames from dock bed silt is low and no remediation or mitigation is required in this respect;
- There is a potential risk that the dock bed silt could become disturbed from piling operations thus creating a contamination pathway to water in the dock, however the widespread dispersal of contaminants is unlikely due to the stratification of the water column and lack of significant currents in the Dock (as described in the UES). Additionally the risk of a pathway being generated will be further reduced by mitigation measures adopted during piling and as described in the CADP Construction Environmental Management Plan (CEMP).

6. Foundation Constructability

The following options have been assessed to determine if they are appropriate foundations for the proposed piling works in the KGV Dock. It should be noted that this assessment post-dates an earlier detailed assessment of the alternative piling methods which was presented in Chapter 6 and Appendix 6.4 of the UES. This assessment was based on the principle of Best Practical Means (BPM) and had the objective of minimising the amount of pile driving that was necessary and minimising the noise generated. This earlier assessment strongly supported the use of 'Vibrodriver Casing and Rotary Bore' piling which was judged to be the most practicable piling method when scored against 5 key criteria – Practicality, Programme, Financial, Safety and Noise performance of each piling method considered.

6.1. Shallow Spread (Pad) Foundations

This is not considered suitable due to the requirement for construction in the existing KGV Dock.

6.2. Raft Foundations

This is not considered suitable due to the requirement for construction in the existing KGV Dock.

6.3. Bored Piles (Continuous Flight Auger and Rotary)

This method was used previously on the site. The presence of Alluvium and dock silt will require the use of a permanent casing to construct rotary bored piles. This casing will prevent deterioration of the pile due to aggressive contaminants and prevent contaminated material falling into the borehole during construction.

6.4. Auger Displacement Pile

The pile auger supports the bore sides and displaces soil. Due to the dock silt a permanent casing is considered necessary, which is difficult to use with this method.

6.5. Driven Cast in Place Pile

Due to the expected depth of driving, the location of sensitive structures, airport infrastructure, noise and possibility of 'plugged' material causing cross contamination, the use of a closed driven pile is not considered further.

6.6. Driven Pre Cast Pile

Due to the expected depth of driving, the location of sensitive structures, airport infrastructure, noise and possibility of 'plugged' material causing cross contamination, the use of solid driven pre-cast piles is not considered further.

It is considered that there is scope to install hollow open ended steel tubular piles using vibration methods. The hollow steel piles are similar to the casing installed for rotary bored piles in 6.3; however, they would not require boring and infilling with reinforced concrete. As with option 6.3 the permanent casing around the piles would prevent contaminated pathways being created during construction.

6.7. Summary

Consistent with the previous assessment presented in the UES, and based on the practicalities of constructing piles under water, it is proposed to adopt rotary bored piles in permanent casing ('Vibrodriver Casing and Rotary Bore') as the piling method within the Dock. Vibrated hollow steel piles could be a suitable alternative. As described further in the following section, from the perspective of pollution risk, both methods are considered to provide the required protection to the underlying controlled waters and are therefore comparable.

7. Potential Environmental Hazards Due to Foundation Construction

For rotary boreholes, the use of permanent casing is required for constructability issues but is also recommended as it will remove piling induced contamination pathways and provide protection to underlying controlled waters. In a similar manner, the adoption of hollow steel piles would also protect controlled waters. The following summarises pollution scenarios that could exist and the mitigation provided by the chosen piling methods.

7.1. Creation of Preferential Pathways through an Aquitard to Allow Potential Aquifer Contamination

With rotary bored piles and driven hollow steel piles it is considered that there is a negligible risk of creating preferential pathways.

7.2. Creation of Preferential Pathway to Allow Migration of Land Gases to the Surface.

The piles will be constructed in water and therefore this is not considered to be a significant risk for any piling method.

7.3. Direct Contact with Contaminated Soil Arisings that have been brought to the Surface

Bored piles bring arisings to the surface which may be contaminated and their handling, transport and disposal will be addressed in the Specialist Contractors Method Statement. This is described more fully in the report to discharge Condition 70: Waste Management Strategy for CADP1 (February 2017).

There will be no arisings with driven hollow steel piles.

The use of permanent casing or driven hollow steel piles will prevent arisings coming into contact with the dock water.

7.4. Direct Contact of the Piles with Contaminated Soil or Leachate causing Degradation of Materials

The risk from contaminants in soil/ leachate is that they may be aggressive to pile materials causing degradation of piles, reducing or eliminating their load carrying capacity, and possibly creating further migration pathways.

For rotary bored piles this risk is highest during curing of the concrete and is mitigated by the proposed use of a permanent steel casing driven through the dock silt.

If hollow steel piles were to be used, these would be designed to resist aggressive conditions should they exist on site.

7.5. The Driving of Solid Contaminants down into the Aquifer during Pile Driving

Bored piles or driven hollow steel piles will not push down contaminants into the aquifer.

7.6. The Disturbance of Contaminants Present in the Dock Bed Silt during Piling Operations

The risk from this hazard is highest during construction and is a consequence of all piling methods. However, undertaking rotary boring in permanent casing or installing hollow steel piles are the least disruptive piling methods in respect of the dock bed silt.

Where sediment is mobilised laterally it is likely to quickly resettle on the dock bed due to stratification within the dock. This characteristic of the water column in the Dock has been recorded through a limnology study undertaken by RPS in 2012/2013 which is described in Chapter 12 of the UES.

It has been concluded that rotary bored piles and driven hollow steel piles are likely to cause minimal disturbance to the dock bed silt due to the proposed instalment of the tubular pile casings by vibratory methods. Notwithstanding, the appointed contractor must, as a minimum precautionary measure, carry out monitoring of the turbidity of the water at the surface and base of the Dock (at approximately 1m and 10m depth respectively) throughout the duration of the piling works. If the piling is found to be generating a notable increase the quantities of suspended silts in the water column, contractors will be required to adopt further preventative measures. Such measures must include 'silt curtains' or equivalent containment measures or working methods on the dock bed to prevent dispersal of dock bed silt and thereby contain any potential contamination – either in free phase or bound with the silt particles. The appointed contractor will be required to set out such preventative/ contingency measures within their method statement and to agree these with LCA and RoDMA prior to piling works.

Additionally, a formal water quality monitoring programme shall be developed in consultation with the EA and RoDMA. A three phase water quality-monitoring programme shall be carried out throughout the piling works, which will comprise: daily monitoring for pH, turbidity and dissolved oxygen; fortnightly monitoring of Total Petroleum Hydrocarbon (TPH), Polyaromatic Hydrocarbon (PAH), organotins and PCBs; and, monthly monitoring of arsenic, cadmium, lead, mercury, chromium, copper, nickel and zinc. Should elevated concentrations of these contaminants be identified in water samples then an appropriate plan for dealing with the contamination will be put in place. The nature and extent of the contamination shall be fully investigated, a risk assessment carried out to identify any potential ongoing risks to sensitive receptors and, if necessary, these risks will be mitigated to the satisfaction of LBN and the EA. Monitoring of these contaminants will also be undertaken once prior to the piling works commencing (to establish the baseline water quality conditions) and on 3 separate occasions in the 6 months period after cessation of the piling works in order to demonstrate no permanent changes to water quality caused by the activity.

7.7. Contamination of Groundwater by Concrete or Grout

For rotary bored piles, the casting of the concrete directly against the soil has the potential for leaching of wet concrete or grout. However, the use of permanent casing in the upper aquifer and the injection of polymer fluid during auguring (to maintain the integrity of the bore) will reduce this risk.

This is not a risk when using hollow steel piles as concrete or grout are not utilised in the construction of this type of pile.

8. Environmental Risk Assessment

The risk assessment methodology used to determine the nature and level of risk from contaminated land at the site is based on the risk management framework provided in the Contaminated Land Report (CLR) 11 "Model Procedures for the Management of Land Contamination" (EA, 2004).

The CLR11 definition of risk is:

> *Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.*

A risk is created where there is a linked combination of a contaminant to a potential receptor via an exposure pathway i.e. a pollutant linkage. CLR11 explains the elements of this pollutant linkage as follows:

- CONTAMINANT – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
- RECEPTOR – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and
- PATHWAY – a route by which a receptor can be exposed to, or affected by, a contaminant.

There is only a risk to potentially vulnerable receptors on the site from contaminants where there is a possible pathway linking the receptor and the contaminant (in soil or groundwater). The likelihood of any pollution linkages on the site must be assessed before any contaminants can be classed as a risk.

8.1. Conceptual Model

The conceptual model has been derived from the review of previous reports and recent ground investigation data.

8.2. Potential Sources of Contamination

The historic site uses indicate potential sources of contamination including the following:

- Dockyard boat mooring;
- Made Ground used to infill former structures and/or to modify ground level;
- Previous on-site industrial site uses, including the uses and storage of fuels and solvents;
- Dock water and silt in general is a potential source of pollutants and specifically:
    - Fuels and oils from docked ships;
    - Anti-fouling paints – metals, semi-metals, VOC's and SVOC's.

8.3. Sources of Contamination Identified

The ground investigations undertaken in the dock by Concept Site Investigations in 2016/2017 (see Appendix A) identified the following sources of contamination:

- The sediment at the base of the dock contains localised elevated PAHs and a very marginally elevated PCB level;
- A review of results demonstrated that the leachate from dock silt contained elevated hydrocarbons (PAH and TPH) and possibly phenols when compared against the UK Drinking Water Standards. When compared against the EQS levels for freshwater localised arsenic exceedances were present.

8.4. Potential Pathways for Contaminants

The following, potentially complete, exposure pathways have been identified resulting from the construction of piles:

- Direct contact with subsurface soil and dock water/silt by construction workers;
- Inhalation of vapours from soil and groundwater by construction workers;
- Transfer of pollutants from the dock silt into the natural ground;
- Transfer of pollutants from the dock silt into dock water or River Thames;
- Transfer of pollutants from the dock waters or dock silt to underlying aquifers;
- Percolation through soil of possible spilled hydrocarbons during the construction works.

8.5. Potential Vulnerable Receptors

The following potential site-specific receptors have been identified:

- Human health – construction workers, members of the public;
- Groundwater – underlying Secondary A Aquifer (Thanet Sand Formation) and Principle Aquifer (Upper Chalk Formation);
- Surface water – KGV Dock or River Thames (500m) away.

8.6. Risk Assessment Methodology

The risk assessment has been carried out following guidance in CIRIA 552 "Contaminated Land Risk Assessment – A Guide to Good Practice", (CIRIA, 2001).

The risk to a potential receptor from a contaminant source is only possible through the link of a complete exposure pathway. This assessment identifies where these pollutant linkages may exist. Risk is based on consideration of the likelihood of an event and the severity of the potential consequence.

The potential severity of a hazard on the identified receptor is estimated based on the following categorisation shown in Table 8.1 below:

Table 8.1: Categorisation of Potential Severity

Term	Description
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by EA Part IIA, 1990. Short term risk of pollution of sensitive water resource. Catastrophic damage to buildings/ property. A short term risk to a particular ecosystem, or organism forming an ecosystem.
Medium	Chronic damage to human health. Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming port of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings. Structures/ services or the environment
Minor	Harm, although not necessarily significant harm, which may result in financial loss, or expenditure to resolve. Non-permanent health effects to human health. Easily repairable effects of damage to buildings, structures and services.

The likelihood of an event on the identified receptor is estimated based on the following categorisation shown in Table 8.2.

Table 8.2: Categorisation of Likelihood

Term	Description
High Likelihood	There is a pollution linkage to an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such an event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Potential pollutant linkages are evaluated by considering where viable pathways between sources and receptors exist. Risk is based on a consideration of the following:

1. The likelihood of an event (probability) [takes into account both the presence of the hazard and receptor and the integrity of the pathway];
2. The severity of the potential consequence [takes into account both the potential severity of the hazard and the sensitivity of the receptor].

In accordance with the guidance, the following categorisation of risk is shown in Table 8.3.

Table 8.3: Categorisation of Risk

		Severity			
		Severe	**Medium**	**Mild**	**Minor**
Likelihood	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/ Low Risk
	Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/ Low Risk	Low Risk	Very Low Risk	Very Low Risk

8.7. Risk Assessment Output

The findings of the qualitative source – pathway – receptor assessment are presented in Table 8.4.

Table 8.4: Piling Risk Assessment

Source	Pollutant	Receptors	Pathways to Receptor	Associated Hazard [Potential severity]	Likelihood of Occurrence	Mitigation	Residual Risk
Potential contaminants in Dock Bed Silt	Hydrocarbons, PCB's in dock bed silt	Humans (Construction Workers)	Direct contact, inhalation or accidental ingestion especially during below ground works	Harm to health (Medium)	Unlikely.	Short exposure times for construction workers. Protection provided by standard personal protective equipment. No arisings for driven hollow steel pile	**Low Risk** **(Rotary Bored Pile)** **No Risk** **(Driven Hollow Steel Pile)**
		Groundwater Superficial geology is classed as Secondary A aquifer Bedrock geology is classed as Secondary A or Principal Aquifer	Piling operations causing pathway between dock bed silt and controlled water	Localised Pollution of a Principal aquifer (outside a Source Protection Zone) (Medium)	Unlikely	Proposed piling methods of rotary bored piles in permanent casing or driven hollow steel piles will mitigate risk.	**Low Risk** **(Rotary Bored Pile or Driven Hollow Steel Pile)**
		Other Controlled Water Dock water or River Thames 500m away	Piling operations causing dispersal of contaminants in dock bed silt	Pollution of controlled water (Mild)	Unlikely	Chosen piling methods will limit disturbance of dock bed silt. Additionally measures such as silt blankets on dock bed or similar to prevent disturbance will be adopted. During pile construction period dock water will be routinely monitored to determine the effectiveness of the measures implemented.	**Very Low Risk** **(Rotary Bored Pile or Driven Hollow Steel Pile)**

9. Conclusions

The site is located at London City Airport, located in the Docklands area of east London. The proposed development is to provide new aircraft stands, taxiway and terminal facilities. The extension to the aircraft stands and new taxiway link will be constructed on a concrete deck over the KGV Dock and requires piling works.

The site is underlain by dock bed silt and Terrace Gravels which overlay the Thanet Sand Formation on the west of the dock and the Upper Chalk Formation on the east of the Dock.

Based on constructability, and informed by a detailed assessment of alternative piling techniques reported in the UES, it is proposed to use a bored pile with a permanent steel casing ('Vibrodriver Casing and Rotary Bore'). Driven hollow steel piles could be used, however rotary bored piles in permanent steel casing were carried out successfully at the airport during previous developments and have been assessed to be the most practicable piling method.

Both proposed methods provide a permanent steel casing which will protect the underlying aquifers by preventing pollutants from the dock silt and/or dock water entering the natural ground or underlying aquifers.

There is a risk that piling activities will disturb the dock bed silt and disperse contaminants therein. However, measures will be implemented during construction to prevent this from occurring, including those set out in the CADP Construction Environmental Management Plan (CEMP) submitted in accordance with condition 88 and the Site Waste Management Strategy, submitted in accordance with condition 70. Moreover, as described in the UES, the stratification of the water column and lack of significant currents in the Dock will act to contain the dispersal of any disturbed silt at the base of the Dock.

Overall, with the proposed methods of piling and the mitigation measures as summarised in Table 8.4, the risk to controlled waters and other vulnerable receptors from the contamination identified in the dock sediment is considered to be low and no further remedial measures are considered necessary.

10. References

(BGS, 2017) British Geological Survey Online Geology Viewer. http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html Accessed in April 2017.

(Binns, 1923) The King George V Dock, London. Paper No 4410. Proceedings of the Institution of Civil Engineers 1923.

(CIRIA, 2001) - CIRIA 552 "Contaminated Land Risk Assessment – A Guide to Good Practice."

(Concept, 2017a) Concept Site Investigations Ltd Factual Report, CADP Surveys – Ground Investigation (Dock) Phase 2, 6/4/17, Report Ref: 16/2900 – FR02.

(Concept, 2017b) Concept Site Investigations Ltd Geotechnical Interpretative Report, CADP Surveys – Ground Investigation (Dock) Phase 2, March 2017, Report Ref: 16/2900 – IR02.

(EA, 2001) Piling and penetrative ground improvement methods on land affected by contamination. Guidance on Pollution Prevention. National Groundwater and Contaminated Land Centre, Westcott et al, 2001.

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(EA, 2017) Environment Agency Website – Whats in Your Backyard - Groundwater. http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683&y=355134&scale=1&layerGroups=default&ep=map&textonly=off&lang=_e&topic=groundwater. Accessed April 2017.

(RPS, 2013a) City Airport Development Programme, London City Airport, Phase 1 Preliminary Risk Assessment, Dated May 2013 Ref HLEI 19695/001R.

(RPS, 2013b) RPS, City Airport Development Programme, London City Airport Phase 2, Environmental Site Investigation for London City Airport, March 2013.

(RPS, 2015) RPS, Updated Environmental Statement Chapter 16: Ground Conditions and Contamination for CADP, September 2015.

(RPS, 2017) RPS, City Airport Development Programme, Submission under condition 39 of planning permission 13/01228/FUL – Contaminated Land Assessment and Outline Remediation Strategy Ref HLEI 45199/001R, 2017.

(SM, 2001) Soil Mechanics Limited Factual Report on Ground Investigation, London City Airport – Phase 2 Airside Improvement Programme, October 2001, Report Ref: 141002.

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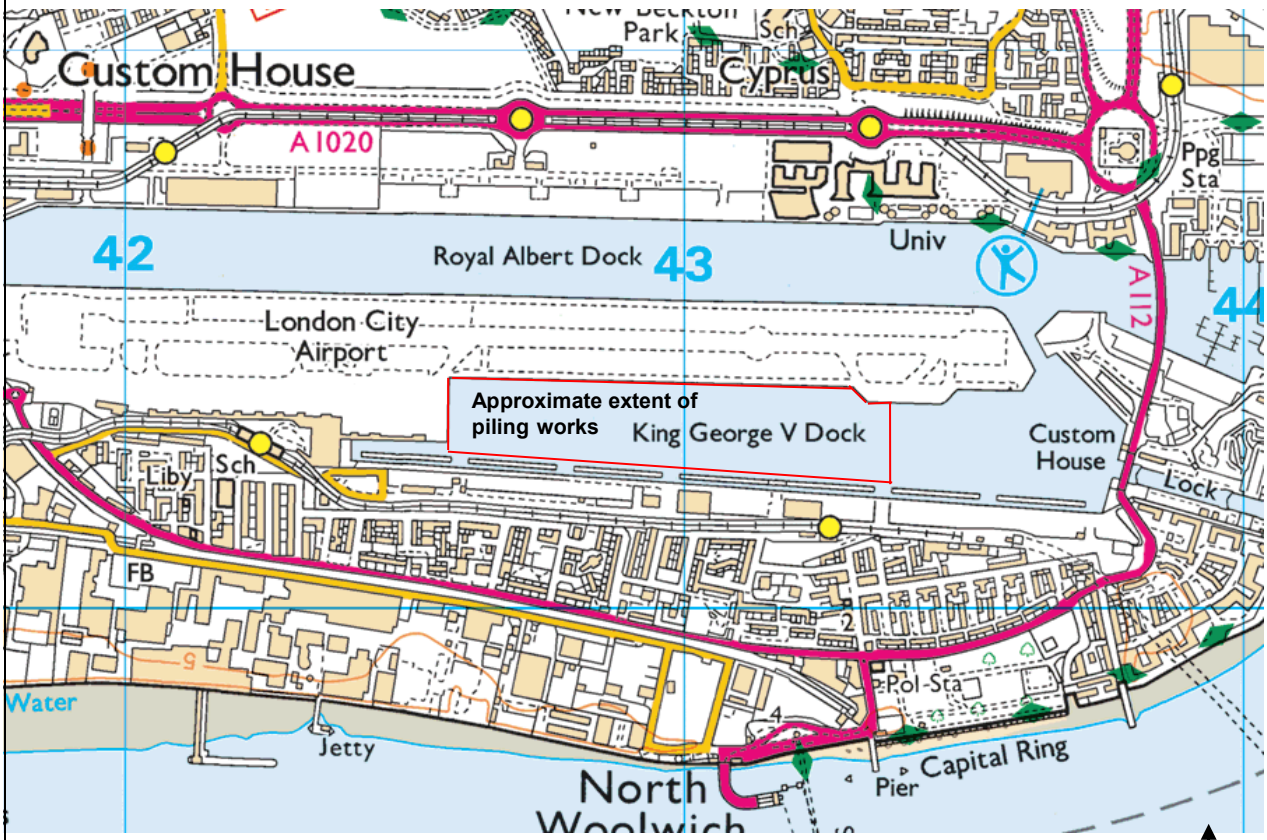
Figures

Figure 1 - Site Location Plan



Project:	City Airport	**Drawn**	**Checked**	**Revision**	
Job No:	112406	DF	MB		
Site:	City Airport, London	**Date**	**Date**	**Date**	
OS licence no	100055611	Apr 2017	Apr 2017		

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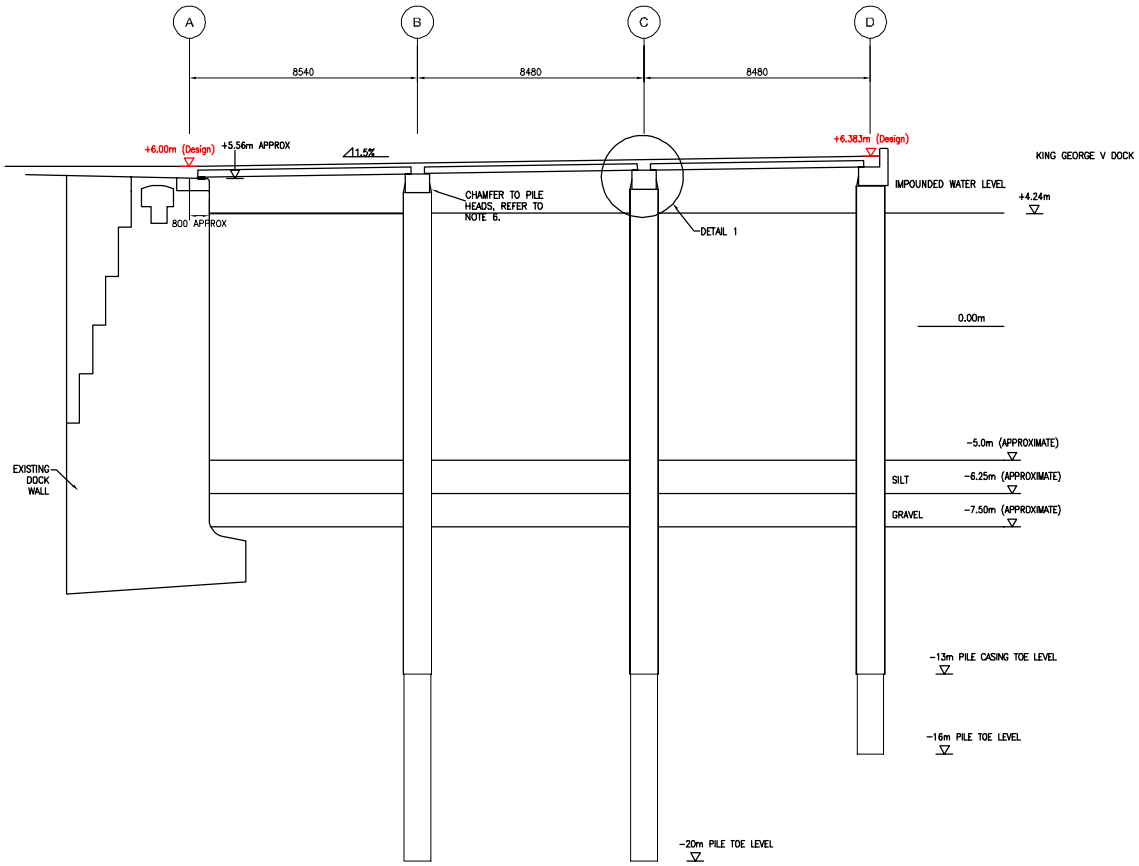
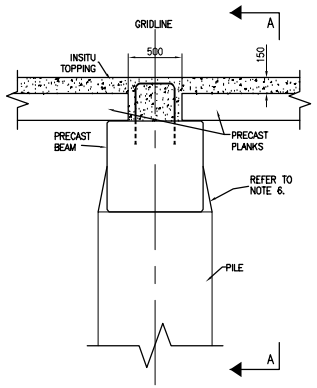
Drawings

NOTES

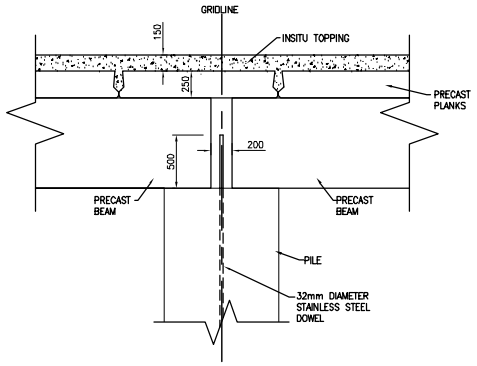
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. ALL LEVELS IN METRES ABOVE ORDNANCE DATUM (OD).
3. DOCK WALL POSITION AS SHOWN APPROXIMATE ONLY, GRIDLINES SET OUT AS SHOWN ON DRAWING J22241B/1002.
4. DOCK WALL SECTION AS SHOWN TAKEN FROM HISTORICAL DRAWINGS ACTUAL CROSS-SECTION MAY VARY.
5. FOR DOCK WALL CONNECTION DETAIL REFER TO DRAWING J22241B/1011.
6. CHAMFER TO BE PROVIDED AROUND BEAMS TO PILE HEADS TO PREVENT BIRDS NESTING. CHAMFER TO BE FORMED OF 3:1 SAND:CEMENT.



TYPICAL CROSS SECTION THROUGH STRUCTURE
(GRIDLINES 4 TO 17)
SCALE 1:100



DETAIL 1
SCALE 1:25



SECTION A-A
SCALE 1:25

Rev	Date	Status	Description of Revision	Drawn	Checked	Authorised
7	19.08.03	AS-BUILT	FINAL ISSUE	AT	NSB	SJH
6	28.03.03	CONSTRUCTION	NOTE 6. ADDED AS PER CLIENT REQUEST.	AT	NJH	SJH
5	10.03.03	CONSTRUCTION	NOTE REMOVED	AT	NJH	SJH
4	07.02.03	CONSTRUCTION	LEVELS REVISED	AT	CDF	NJH
3	04.02.03	CONSTRUCTION	STAINLESS STEEL DOWEL DIA CHANGED	AT	CDF	NJH
2	24.01.03	PRELIMINARY	MINOR AMENDMENTS	AT	CDF	NJH
1	16.12.02	PRELIMINARY	DETAIL 1 ADDED	AT	CDF	NJH
0	03.12.02	PRELIMINARY	ORIGINAL ISSUE	AT	CDF	NJH

LONDON CITY AIRPORT

MOWLEM JACOBS

OPERATIONAL IMPROVEMENTS PROJECT

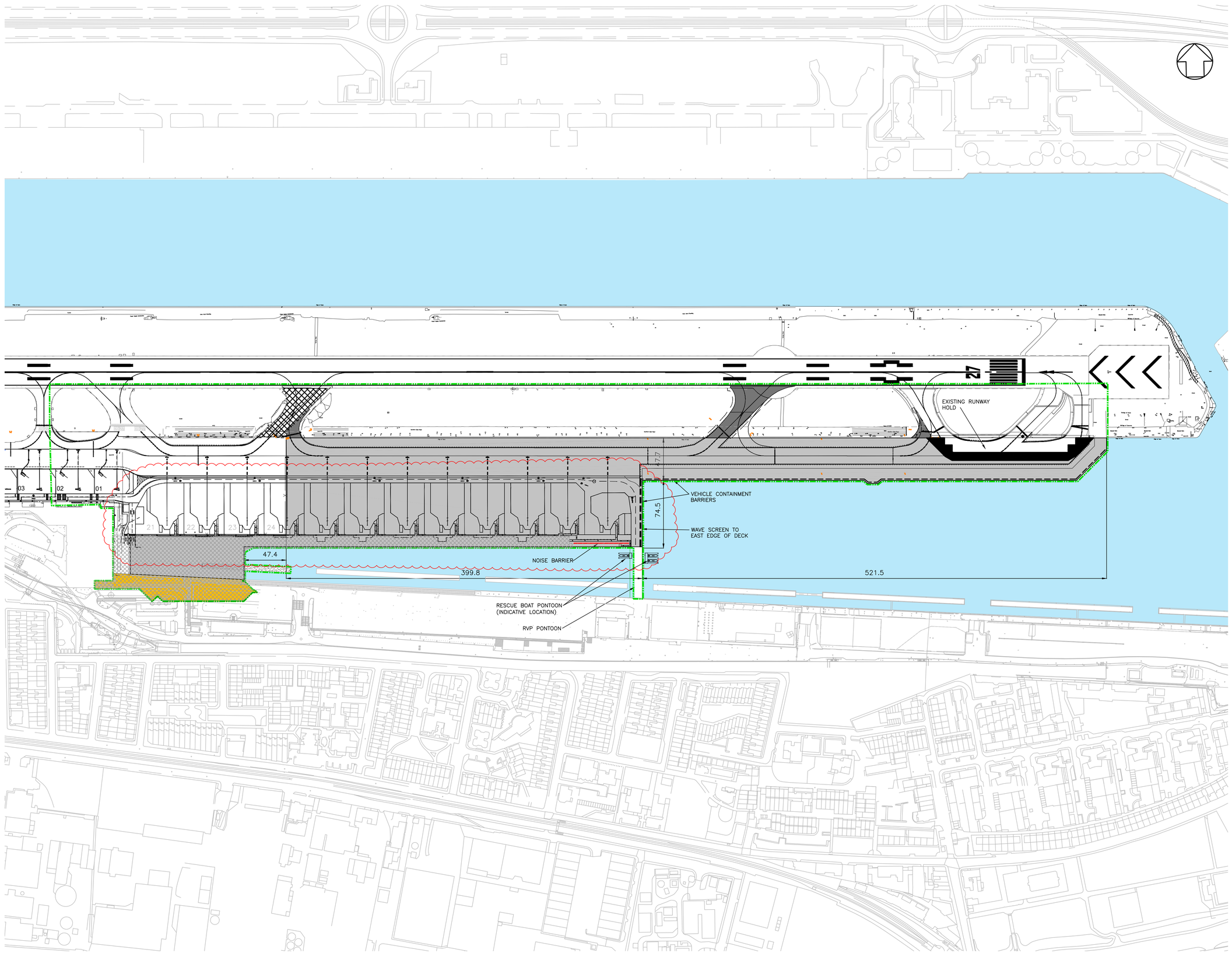
Drawing Title

RUNWAY 28 HOLD STRUCTURE
CROSS SECTIONS THROUGH DECK

AS-BUILT

Drawing Number J22241B/1001 Rev 07

Scale AS SHOWN Original Size A1 CAD File CS293_01_1001



DO NOT SCALE FROM THIS DRAWING

1. ALL DIMENSIONS IN MILLIMETRES UNLESS STATED OTHERWISE.
2. APRON TO HAVE FLOOD LIGHTING IN ACCORDANCE WITH CAP 168. SEE DRAWING CAOL–521 AND 522.
3. TAXIWAYS TO HAVE AIRFIELD GROUND LIGHTING IN ACCORDANCE WITH CAP 168. TYPICAL DETAILS ON DRAWING CAOD–500.
4. NEW AIRCRAFT STANDS TO BE PROVIDED WITH FIXED ELECTRICAL GROUND POWER. PURSUANT TO CONDITION 44.
5. REFER TO 'PROPOSED SURFACE WATER DRAINAGE STRATEGY' FOR AIRFIELD SURFACE WATER CONCEPT. PURSUANT TO CONDITION 69.
6. STAND MARKINGS ARE SHOWN FOR ILLUSTRATION PURPOSES ONLY

KEY

- HOLD AREA STRENGTHENING (1864m²)
- NEW RUNWAY LINKS CONSTRUCTED USING TRADITIONAL GROUND BEARING PAVEMENT (3234m²)
- SUSPENDED DECK (75628m²)
- PILED FOUNDATION
- EXPOSED DOCK WATER
- DOLPHINS CUT OFF BELOW WATER LEVEL TO ENABLE DECK CONSTRUCTION
- NEW NOISE BARRIER (DETAILS PERSUANT TO CONDITION 53)
- HIGH CONTAINMENT VEHICLE BARRIER
- GROUND FLOOR BUILDING OUTLINE. REFER TO Dwg. Nos. A400–PAW–A–14–L00–DR–GA–200–005 C & A400–PAW–A–14–L00–DR–GA–200–006 B FOR FURTHER DETAILS
- REVISION CLOUD
- PROPOSAL BOUNDARY – ALL INFORMATION OUTSIDE OF THE PROPOSAL BOUNDARY IS FOR ILLUSTRATION PURPOSES ONLY.

REVISION NOTES:

REVISED EAST PIER

Rev	Revised By	Date	Checked By	Date
G	G. ROUGH	17/07/2017	P. MISTRY	17/07/2017
	REVISED EAST PIER			
F	G. ROUGH	30/06/2017	P. MISTRY	30/06/2017
	SECTION 73 PLANNING UPDATE			
E	R.WOOD	01/07/2013	W.HELLYER	01/07/2013
	ISSUED FOR PLANNING. REVISED TO LCY COMMENTS			
D	R.WOOD	13/06/2013	W.HELLYER	13/06/2013
	ISSUED FOR PLANNING. REVISED TO LCY COMMENTS			
C	R.WOOD	04/04/2013	W.HELLYER	04/04/2013
	ISSUED FOR PLANNING. REVISED TO LCY COMMENTS			
B	R.WOOD	22/03/2013	W.HELLYER	22/03/2013
	ISSUED FOR PLANNING			
A	R.WOOD	11/03/2013	W.HELLYER	11/03/2013
	PRELIMINARY PLANNING SET			

FOR APPROVAL

London City Airport
Get closer.

Project
CITY AIRPORT
DEVELOPMENT PROGRAMME

Drawing Title
5.4 KEY ENGINEERING FEATURES

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TPS Job Manager	P. MISTRY	
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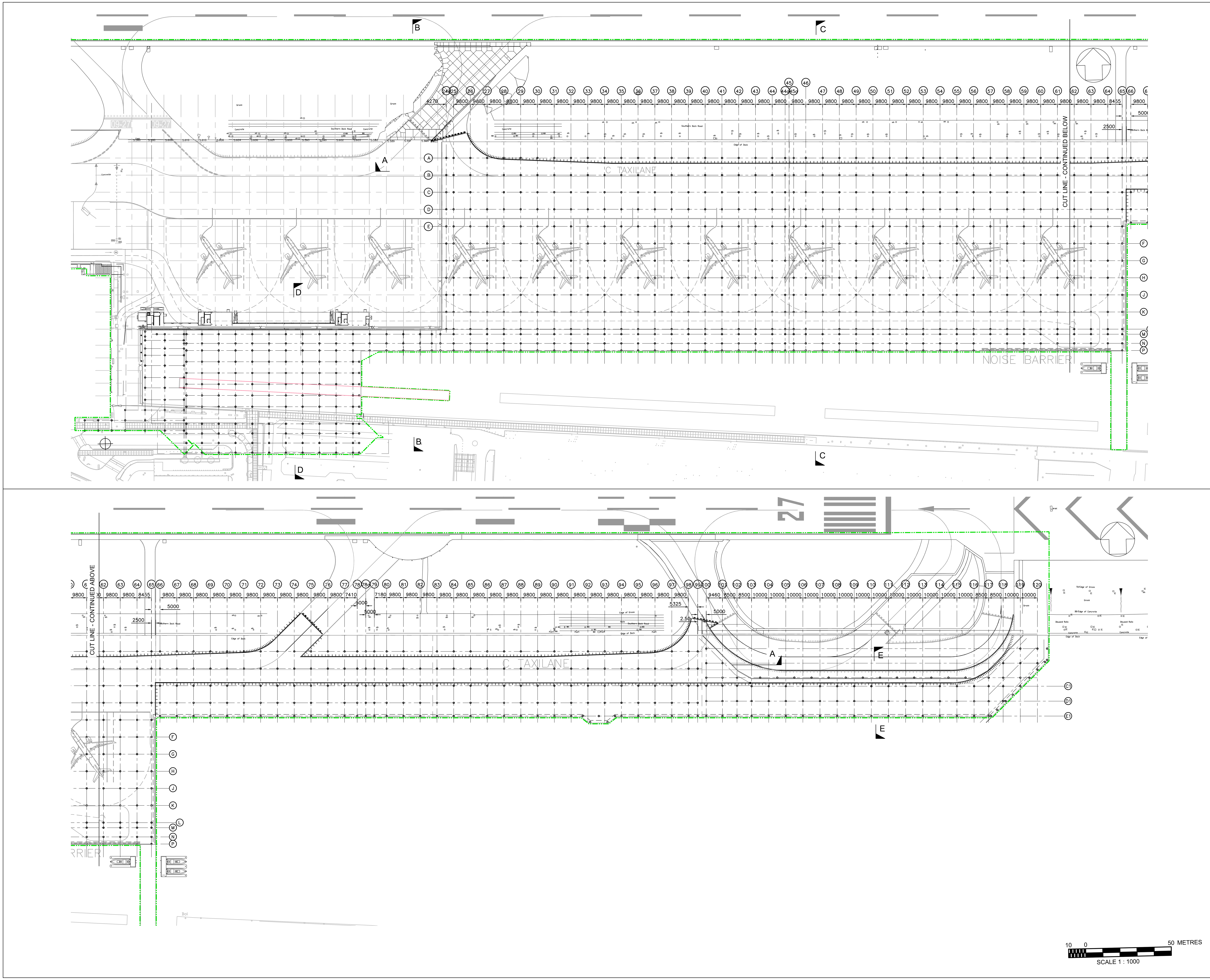
Drawn By:	R.WOOD	12/12/2012
Checked:	W.HELLYER	20/12/2012
Authorised:	R.MOORE	20/12/2012

TPS Project No.	Drawing Status	Scale (at A1) (at A3)
112931	APPROVAL	1:2000

Project No.	Orig.	Disc.	Zone	Level	Type	Sub Type	Series	Sht. No.	Rev.
CAOL-004									G

DWG NO.
USERNAME
PLOT SCALE 1 = 1
ACAD 2010
DATE TIME
02



NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
2. ALL LEVELS ARE IN METRES ABOVE ORDNANCE SURVEY DATUM.
3. FOR SECTIONS REFER TO Dwg.Nos. CA0L-910, CA0L-911 AND CA0D-921.
4. PILE POSITIONS MAY BE SUBJECT TO ADJUSTMENT AT DETAIL DESIGN STAGE

KEY

PROPOSAL BOUNDARY – ALL INFORMATION OUTSIDE OF THE PROPOSAL BOUNDARY IS FOR ILLUSTRATION PURPOSES ONLY.

Rev	Revised By	Date	Checked By	Date
E	R.WOOD	02/07/2013	W.HELLYER	02/07/2013
ISSUED FOR PLANNING. REVISED TO LCY COMMENTS				
D	R.WOOD	13/06/2013	W.HELLYER	13/06/2013
ISSUED FOR PLANNING. REVISED TO LCY COMMENTS				
C	R.WOOD	04/04/2013	W.HELLYER	04/04/2013
ISSUED FOR PLANNING. REVISED TO LCY COMMENTS				
B	R.WOOD	22/03/2013	W.HELLYER	22/03/2013
ISSUED FOR PLANNING				
A	R.WOOD	11/03/2013	W.HELLYER	11/03/2013
PRELIMINARY PLANNING SET				

For Approval

LondonCityAirport
Royal Docks London E16 2PB

Project
CITY AIRPORT DEVELOPMENT PROGRAMME

Drawing Title
5.14 PROPOSED DECK STRUCTURE AND FOUNDATIONS GENERAL ARRANGEMENT

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Birmingham : Croydon : Edinburgh : Sheffield : Wolverhampton

TPS Job Manager: R.MOORE

QA System - Checks		Signature	Date
Drawn By:	R.WOOD		19/02/2013
Checked:	W.HELLYER		11/03/2013
Authorised:	R.MOORE		11/03/2013

TPS Project No.	Drawing Status	Scale (at A1)	(at A3)
112931	APPROVAL	1:1000	

Drawing No. (Displ / Bldg / Level / Type / CiSfb Element Code / Seq. No.)	Revision
CA0L-900	E

TPS

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Appendices

TPS

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Appendix A Concept Factual Report

SITE INVESTIGATION REPORT

CADP Surveys Ground Investigation (Dock) - Phase 2

ISSUE 02

SITE INVESTIGATION REPORT

CADP Surveys Ground Investigation (Dock) - Phase 2

Prepared for: London City Airport Limited

Concept: 16/2900 - FR 02 06/04/2017

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DOCUMENT ISSUE REGISTER			
Project Name:	CADP Surveys Ground Investigation (Dock) - Phase 2		
Project Number:	16/2900		
Document Reference:	16/2900 - FR 02	**Current Issue**	Issue 02
Document Type:	Site Investigation Report		

Development	Name	Signature	Date
Prepared by:	O Savvidou		06/04/2017
Checked by:	I Penchev		06/04/2017
Approved by:	A Savidu		06/04/2017

Issued to:	LCA / TPS

Date	Issue	Amendment Details/ Reason for issue	Issued to
16/12/16	Issue 00	INTERIM	LCA / TPS
06/03/17	Issue 01	DRAFT	LCA / TPS
06/04/17	Issue 02	FINAL / Updated with comments and resistivity testing results	LCA / TPS

Notes:

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4.2.1 Sampling and Testing during Dynamic Sampling / Rotary Drilling

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1. PROJECT PARTICULARS

Site Location:	London City Airport, Hartmann Road, London, E16 2PX
Client:	London City Airport
Investigation Supervisor:	TPS
Fieldwork:	02/11/2016 – 10/02/2017 & 17/03/2017
Laboratory Work:	17/11/2016 – 30/03/2017

2. PURPOSE AND SCOPE OF WORKS

The site is located at London City Airport. The proposed development is the expansion of the airport terminal, apron and taxiways.

All boreholes apart from borehole BH06 were drilled in the King George V dock, to the south of the airport runway. BH06 was drilled on land to the south of the dock.

The scope of the works comprised the following:

- 19 No. Cable Percussion Boreholes to a maximum depth of 37.50m;
- 15 No. Rotary Boreholes to a maximum depth of 45.50m;
- 1 No. Machine Excavated Trial Pit to a depth of 2.00m;
- Menard Pressuremeter Testing;
- Resistivity Survey & Testing;
- Geotechnical & Chemical Testing.

Table 1 – Exploratory Hole List

Hole ID	Hole Type	Depth (m)	Easting	Northing	Level (mOD)
BH03	DS/RC	34.60	542413.370	180267.864	4.769
BH04	CP	37.50	542417.701	180296.248	4.893
BH05	CP	33.95	542452.302	180279.078	4.681
BH06	DS/RC	30.80	542560.265	180240.465	5.685
BH07	DS/RC	33.50	542513.764	180296.367	4.945
BH09	CP	32.00	542594.059	180293.687	5.021
BH10	CP	32.50	542647.531	180376.794	4.340
BH10R	DS/RC	32.80	542651.709	180376.698	4.461
BH11	CP	31.50	542650.530	180345.576	4.919
BH12	RC	32.00	542653.372	180305.55	5.291

Hole ID	Hole Type	Depth (m)	Easting	Northing	Level (mOD)
BH13	CP	34.50	542716.471	180368.238	4.879
BH14	CP	31.50	542716.885	180326.605	4.670
BH15	CP	30.45	542718.780	180279.033	4.099
BH16	RC	39.00	542785.280	180379.679	5.007
BH17	DS/RC	35.90	542780.798	180342.426	5.242
BH18	CP	33.50	542783.211	180300.561	4.178
BH19	CP	36.60	542846.429	180360.759	4.343
BH20	CP	35.50	542853.055	180316.149	4.917
BH21	CP	33.00	542847.089	180282.337	4.249
BH21R	DS/RC	33.50	542842.977	180278.205	4.541
BH22	DS/RC	37.50	542914.013	180377.073	4.443
BH23	CP	36.50	542909.727	180338.933	4.553
BH24	CP	33.00	542909.850	180291.631	3.536
BH25	CP	32.00	542968.451	180348.390	4.314
BH25R	DS/RC	32.00	542970.559	180356.359	4.311
BH26	CP	32.00	542965.953	180322.196	4.412
BH27	RC	33.00	542971.440	180248.897	4.884
BH28	CP	32.00	543034.613	180352.202	4.792
BH29	RC	45.50	543114.058	180367.976	4.928
BH30	DS/RC	33.00	543181.635	180343.204	4.231
BH31	CP	32.00	543245.511	180364.438	4.686
BH32	DS/RC	31.40	543300.740	180351.599	4.612
BH33	DS/RC	32.00	543390.972	180334.126	4.186
BH34	CP	31.50	543459.990	180338.911	4.955
TP01	TP	2.00	543374.640	180188.760	5.440

Key
CP – Cable Percussion Borehole
RC – Rotary Borehole
DS/RC – Dynamic Sampler / Rotary Borehole
TP – Machine Excavated Trial Pit

3. DESCRIPTION OF WORKS

The works were carried out in accordance with the London City Airport "CADP Surveys – Ground Investigation (Dock) – Phase 2" document with reference A400/surv/004/D.1.13, revision 00, dated July 2016, and with Concept's Method Statement.

The approximate centre of the site is located at National Grid Reference: 543015E, 180335N.

The locations of all exploratory holes are shown in the Exploratory Hole Location Plan presented in Section 7 of this report.

4. INVESTIGATION METHODS

The boreholes were carried out from a pontoon platform within the dock. Trial pits were excavated using a backhoe excavator. Dynamic probing was conducted using a Terrier drilling rig.

4.1 Cable Percussion Drilling

19 No. Cable Percussion Boreholes (BH04-05, BH09-10, BH11, BH13-15, BH18-21, BH23-26, BH28, BH31 & BH34) were drilled to a maximum depth of 37.50m depth using a standard cable percussion rig (Dando 175) with 200mm and 150mm diameter casing as appropriate.

Aquifer protection measures were taken during drilling at all borehole locations. To prevent the contamination of the aquifer a bentonite plug of at least 1.0m was inserted at the interface between the River Terrace Deposits and underlying Thanet Sand and Chalk. The boreholes were then re-drilled through the plug and continued with Ø150mm casing.

Upon completion of drilling of borehole BH20 it was discovered that the casing had got stuck into the Thanet Sand. In the attempt to retract it, one of the joints sheared off leaving 13.5m of 150mm casing at the bottom of the borehole between the depths of 12.00m and 25.50m below ground level. Attempts to recover the casing involved the use of a fishing tool and hydraulic jacks with maximum pull capacity of 100 ton. Attempts to recover this casing were unsuccessful and were eventually abandoned. The casing was left in-situ and the borehole was backfilled with cement/bentonite grout.

4.1.1 Sampling and Testing during Cable Percussion Drilling

Environmental samples (tubs, jars and vials) were taken for chemical analysis in the dock silt, terrace gravels and Made Ground or at each change of strata and where visual or olfactory evidence of contamination was noted or as instructed by the Investigation Supervisor. All samples taken for chemical analysis were screened for volatiles using a Phocheck Tiger photoionization detector.

Bulk samples were taken at regular intervals throughout the boreholes.

Standard Penetration Tests (SPT) were carried out at specified intervals or as otherwise instructed by the Investigation Supervisor. The resulting SPT “N” blow count values are presented in the relevant borehole records. Where an SPT using a split spoon sampler was not possible, due to the granular nature of the material, a solid cone was used.

Small, disturbed samples were retrieved from the SPT split spoon sampler.

Undisturbed Thin Walled samples (UT) were taken in accordance with EC7 using a down-hole sliding hammer in cohesive material at regular intervals or as instructed by the Engineer.

The borehole logs are presented in Section 8 of this report.

4.2 Dynamic Sampling / Rotary Drilling

15 No. Dynamic Sampling / Rotary Boreholes (BH03, BH06-07, BH10R, BH12, BH16, BH17, BH21R, BH22, BH25R, B27, BH29-30, BH32-33) were drilled to a maximum depth of 45.50m using Geotec 350 and Comacchio 405 rigs, with dynamic sampling or rotary

core methods being used as appropriate. Dynamic sampling techniques were used in soft ground or gravels where rotary coring would not have been suitable.

4.2.1 Sampling and Testing during Dynamic Sampling / Rotary Drilling

Environmental samples (tubs, jars and vials) were taken for chemical analysis in the dock silt and terrace graves. All samples taken for chemical analysis were screened for volatiles using a Phocheck Tiger photoionization detector.

Near-continuous samples were recovered in core runs nominally 1.50m long within semi- rigid plastic liners, sealed at each end after recovery and stored in wooden core boxes.

The semi-rigid plastic liners were split in Concept's logging cabin on site and the material was geologically logged and photographed following recovery. Selected sub-samples of core were taken at various intervals where possible. The sub-cores were sealed in wax and aluminium foil.

SPTs were carried out at regular intervals. The resulting SPT 'N' values are presented in the borehole records. SPTs were taken using a split spoon sampler in predominantly cohesive or very fine grained deposits as instructed by the Investigation Supervisor. Where an SPT using the split spoon sampler was not possible, due to the granular nature of the material, a solid cone was used.

Bulk and small disturbed samples were also taken instructed by the Investigation Supervisor.

The borehole logs are presented in Section 8 of this report.

4.3 Machine Excavated Trial Pit

1 No machine excavated Trial Pit (TP01) was carried out to a depth of 2.00m in order to determine the structure of the dock wall and shallow ground conditions in the long stay car park.

The pit was excavated at the back of the dock wall to a depth of 2.00m. Further excavation was not possible due to ground water causing the pit to collapse. Shoring of the pit was not possible due to the presence of railway tracks that were not able to be removed. The pit was backfilled with arisings on the day of the excavation.

During excavation, a step at the back of the wall was observed. A super heavy dynamic probe was mobilised to investigate the structure of the back of the dock wall below 2.00m. Using as-built drawings as a guide, the probe was used to find steps in the back of the wall. Probing was carried out at 4No locations. The results of the probing are presented in the TP01 sketch, with the depths at which the probe refused.

The pit was made good with concrete on completion of the dynamic probing.

The pits was logged and photographed. The log and sketch are presented in Section 9 of this report and the photographs in Section 14.

4.4 Standpipe Installations

A monitoring well with flush stopcock cover was installed in the onshore borehole BH06 as follows:

Table 2 – Monitoring Installation Details

Hole ID	Base of Borehole (m bgl)	Diameter of Installation (mm)	Type of Installation	Base (m bgl)	Top RZ (m bgl)	Bottom RZ (m bgl)
BH06	30.80	50	SPGW	10.00	2.00	10.00
		50	SPGW	12.70	23.70	12.70

KEY

SPGW – Groundwater Standpipe
RZ – Response Zone

The borehole was backfilled with bentonite pellets with the groundwater response zone backfilled with a 10mm pea shingle filter. The installation was finished with concrete and a lockable stopcock cover flush with the ground.

No monitoring was requested at this stage of the investigation.

4.5 Menard Pressuremeter Testing

Menard Pressuremeter tests were carried out in BH03, BH06 BH10R, BH17, BH21R and BH25R by the specialist subcontractor Igeotest In-situ.

The pressuremeter testing report is presented in Section 10.

4.6 Resistivity Survey and Testing

Resistivity survey to determine the water resistivity and its corrosive nature was carried out in the Dock. The survey comprised water conductivity measurements taken using YSI Pro Multi Probe, at approximately 20m intervals along all dock walls and airfield side edges and recorded. Starting point of the grid for Eastern terminal extension was 1m from the existing MTB and 1m from the dock side. The water resistivity was derived from the conductivity measurements.

Soil samples from selected boreholes from specified depths were tested in the laboratory. Depths were chosen to be similar to the depths of toes of the nearest proposed piles.

The survey and the testing results are presented in Section 11 of this report.

4.7 Logging / Laboratory Testing

Logging of all soil samples was carried out in accordance with BS 5930:2015.

Geotechnical testing is performed at Concept Site Investigations laboratory in accordance with BS1377:1990 unless otherwise stated in the report. Concept is accredited by UKAS for tests where the UKAS logo is appended to the individual test report or summary. Approved signatories for laboratory testing are as follows:

- LG – Lynn Griffin (Quality Manager)
- KM – Kasia Mazerant (Laboratory Manager)

Where subcontracted analysis has been carried out, the details of the laboratory (and accreditation where applicable) are shown in the individual test report or summary.

The results are presented in tabular format in Section 12 of this report.

All chemical testing was specified and scheduled by TPS and carried out by ELABS in accordance with the requirements of UKAS ISO17025 and MCERTS. The results are presented in tabular format in Section 13 of this report.

4.8 Setting Out

The locations of all exploratory holes were agreed with the Investigation Supervisor and set out prior to commencement of the site works.

The locations were established using GPS equipment with an accuracy of +/- 0.03m. Fluctuations in the dock water level may have an impact on the accuracy of the levels recorded in the boreholes.

The co-ordinates and levels of the as-built locations of the boreholes are shown in the Exploratory Hole Location Plan presented in Section 7 of this report.

5. GEOLOGICAL GROUND PROFILE

The BGS Geological Survey Sheet 257 Romford (Solid and Drift Edition), Scale 1:50,000 reveals that the site is underlain by Alluvium which overlays the Thanet Sand Formation to the west of the dock and the Upper Chalk Formation to the east of the dock. The investigation generally confirms the anticipated geology. The geological strata encountered during the investigation are summarised in the tables below:

Table 3.1 – Summary of ground conditions at the western end of the dock (BH03, BH05, BH07, BH09, BH10, BH10R, BH11, BH12, BH13, BH14, BH15, BH16, BH17, BH18, BH19, BH21, BH21R, BH22, BH23, BH24, BH25, BH25R, BH26, BH27)

Formation	Average Thickness (m)	Min and Max Reduced Level to top of the unit (mOD)	Remarks
Dock Silt	0.98	-6.46 to -8.71	Hydrocarbon odour noted
River Terrace Deposits	2.41	-6.96 to -9.26	Hydrocarbon odour noted
Thanet Sand Formation	12.23	-8.91 to -13.57	
Thanet Sand Formation: Bullhead Bed	0.42	-17.79 to -29.99	
Chalk Formation	Depth of strata not proven	-13.79 to -27.16	

#

Table 3.2 – Summary of ground conditions at the eastern end of the dock (BH28, BH29, BH30, BH31, BH32, BH33, BH34)

Formation	Average Thickness (m)	Min and Max Reduced Level to top of the unit (mOD)	Remarks
Dock Silt	1.27	-5.51 to -7.81	Hydrocarbon odour noted
River Terrace Deposits	2.01	-6.01 to -9.31	Hydrocarbon odour noted
Chalk Formation	Depth of strata not proven	-8.5 to -13.57	

Table 3.3 – Summary of land side ground conditions (BH06)

Formation	Average Thickness (m)	Min and Max Reduced Level to top of the unit (mOD)	Remarks
Made Ground	7.10	+5.69	Hydrocarbon / Organic odour noted
Alluvium	3.90	-1.42	
River Terrace Deposits	3.50	-5.32	Hydrocarbon odour noted
Thanet Sand Formation	11.70	-8.82	
Thanet Sand Formation: Bullhead Bed	0.10	-20.52	
Chalk Formation	Depth of strata not proven	-20.62	

REFERENCES

British Standards Institution, (2015) Code of practice for ground investigations, British Standard BS5930: 2015, BSI, London

British Standards Institution, (2011) Investigation of potentially contaminated sites, British Standard BS10175: 2011, BSI, London.

UK Specification for Ground Investigation, (2011) Site Investigation Steering Group, Thomas Telford, London

British Geological Survey (1996) London and the Thames Valley 4th Edition, London HMSO.

British Standards Institution BS EN ISO 22475-1, (2006) Geotechnical Investigation and Testing – Sampling Methods and Groundwater Measurements – Part 1: Technical Principles for Execution

British Standards Institution BS EN 1997:1 (2004) EuroCode 7 - Geotechnical Design. Part 1 – General Rules.

British Standards Institution BS EN 1997:2 (2007) EuroCode 7 - Geotechnical Design. Part 2 - Ground Investigation and Testing.

Entwisle N D C, Hobbs, P R N, Northmore, K J, Skipper, J, Raines, M R, Self, S J, Ellison, R A & Jones L D (2013) Engineering Geology of British Rocks and Soils - Lambeth Group. British Geological Survey Open Report, OR/13/006. 316pp.

Lord JA, Clayton CRI, Mortimore RN, 2002 Engineering in Chalk. Construction Industry Research and Information Association (CIRIA), C574. 350pp

6. SITE LOCATION PLAN

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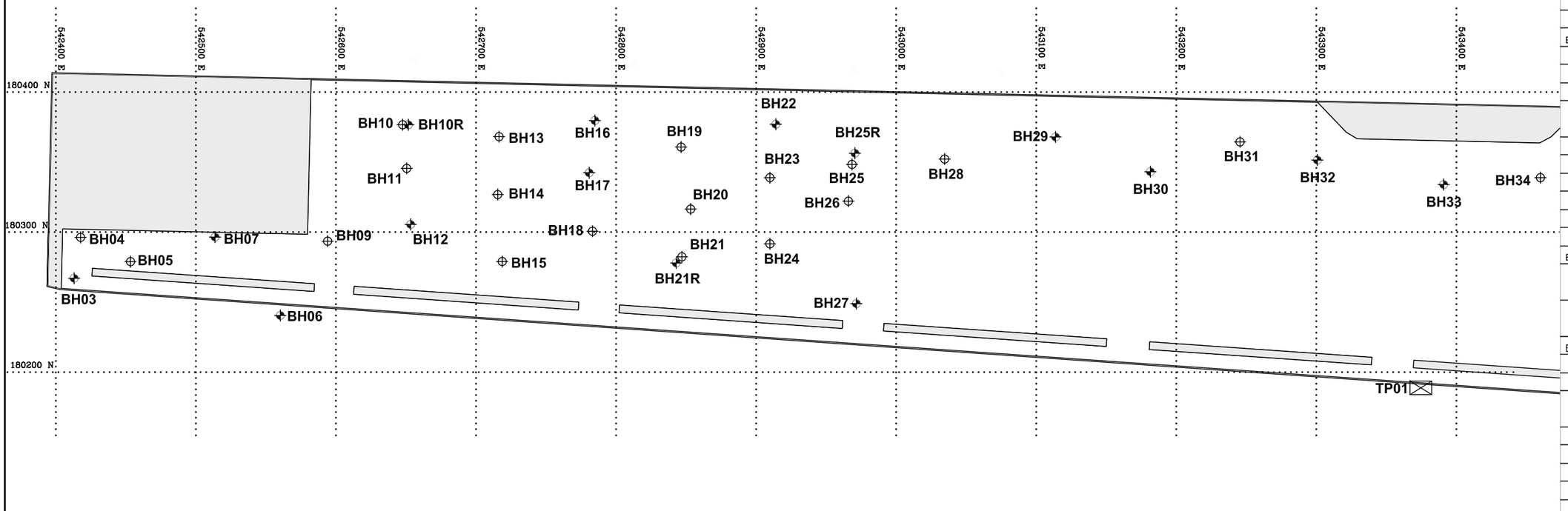
7. EXPLORATORY HOLE LOCATION PLAN



NOTES

1. This drawing should not be scaled, only use annotated dimensions.

PointID	HoleDepth	Easting	Northing	Elevation (mOD)	TYPE
BH03	34.60	542413.37	180267.86	4.77	DS/RC
BH04	37.50	542417.70	180296.25	4.89	CP
BH05	33.95	542452.30	180279.08	4.68	CP
BH06	30.80	542560.27	180240.47	5.69	DS/RC
BH07	33.50	542513.76	180296.37	4.95	DS/RC
BH09	32.00	542594.06	180293.69	5.02	CP
BH10	32.50	542647.53	180376.79	4.34	CP
BH10R	32.80	542651.71	180376.70	4.46	DS/RC
BH11	31.50	542650.53	180345.58	4.92	CP
BH12	32.00	542653.37	180305.55	5.29	RC
BH13	34.50	542716.47	180368.24	4.88	CP
BH14	31.50	542716.89	180326.61	4.67	CP
BH15	30.45	542718.78	180279.03	4.10	CP
BH16	39.00	542785.28	180379.68	5.01	RC
BH17	35.90	542780.80	180342.43	5.24	DS/RC
BH18	33.50	542783.21	180300.56	4.18	CP
BH19	36.60	542846.43	180360.76	4.34	CP
BH20	35.50	542853.06	180316.15	4.92	CP
BH21	33.00	542847.09	180282.34	4.25	CP
BH21R	33.50	542842.98	180278.21	4.54	DS/RC
BH22	37.50	542914.01	180377.07	4.44	DS/RC
BH23	36.50	542909.73	180338.93	4.55	CP
BH24	33.00	542909.85	180291.63	3.54	CP
BH25	32.00	542968.45	180348.39	4.31	CP
BH25R	32.00	542970.56	180356.36	4.31	DS/RC
BH26	32.00	542965.95	180322.20	4.41	CP
BH27	33.00	542971.44	180248.90	4.88	RC
BH28	32.00	543034.61	180352.20	4.79	CP
BH29	45.50	543114.06	180367.98	4.93	RC
BH30	33.00	543181.64	180343.20	4.23	DS/RC
BH31	32.00	543245.51	180364.44	4.69	CP
BH32	31.40	543300.74	180351.60	4.61	DS/RC
BH33	32.00	543390.97	180334.13	4.19	DS/RC
BH34	31.50	543459.99	180338.91	4.96	CP
TP01	2.00	543374.64	180188.76	5.44	TP

KEY

⊕	DS/R - Dynamic Sampling / Rotary
⊕	CP - Cable Percussion
⊠	TP - Trial Pit

No	Revision	Drawn	Checked	Passed	Date

CONCEPT SITE INVESTIGATIONS

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Client:	London City Airport
Project:	CADP Surveys - Ground Investigation (Dock) - Phase 2
Title:	Figure 1 Exploratory Hole Location Plan
Dwg. No:	162900/00
Status:	Issue
Scale:	NTS

Drawn	Checked	Passed	Date
RD/EV	OS	MD	February 17

8. CABLE PERCUSSION - DYNAMIC SAMPLING / ROTARY BOREHOLE LOGS

CONCEPT
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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	34.60	RC	10/11/2016	17/11/2016	TC	CB	112	PDC	Geotec 350	AR779

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	146
34.60	146

CASING

Depth (m)	Diameter (mm)
0.00	150
24.30	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)
11.50	12.50		100
12.50	13.50		30
13.50	14.30		100
14.30	15.30		100
15.30	16.30		100
16.30	16.80		100
16.80	21.00		0
21.00	21.50		100
21.50	22.00		100
22.00	24.50		0
24.50	26.00		87
26.00	27.50		0
27.50	28.80		87
28.80	29.50		0
29.50	30.50		100
30.50	32.00		100
32.00	33.50		100
33.50	34.60		90

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
11.50	34.60	Cement / Bentonite Grout	17/11/2016

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

CONCEPT
Unit 8 Warple Mews, Warple Way
London, W3 0RF
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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
15/11/16	0.00			... see Remark 3 & 4
15/11/16	21.50	17.20	3.80	
16/11/16	21.50	17.20	4.60	
16/11/16	27.50	16.80	5.10	
17/11/16	27.50	17.20	3.90	
17/11/16	34.60	24.30	8.60	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	12.50	N37	0, 0 / 1, 7, 11, 18		
C	13.50	N50	5, 10 / 11, 13, 12, 14		
C	14.50	N50/0.135	8, 16 / 24, 26		
C	15.50	N50/0.16	4, 11 / 21, 26, 3		
C	17.00	N50/0.105	2, 8 / 25, 25		
C	18.50	N50/0.115	9, 16 / 26, 24		
C	20.00	N50/0.125	8, 12 / 26, 24		
S	21.50	N50/0.18	4, 14 / 15, 23, 12		
S	24.50	N50/0.115	12, 19 / 24, 26		
S	32.00	N48	21, 4 / 9, 10, 11, 18		
S	33.50	N50/0.085	21, 4 / 36, 14		

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Poor flush return throughout.
5. Pressuremeter tests carried out at 22.30m, 23.80m, 26.65m. Test at 29.50m depth stopped as chalk was encountered.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

CONCEPT
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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	1 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
15/11/16									Water					
								(11.50)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	2 of 4

PROGRESS			STRATA								SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description		Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
						-6.73		11.50							
			100					(2.00)	Very soft, dark grey SILT with strong hydrocarbon odour. (DOCK SEDIMENT) 12.20 ... becoming slightly gravelly with frequent wood fragments (<200mm). Gravel is angular to subangular fine to coarse flint.		11.70 11.70	ES01		... VOC 19.0ppm	
			30			-8.73		13.50			12.50 12.70 12.70 13.50	N37 ES02 N50		0, 0 / 1, 7, 11, 18 ... VOC 0.5ppm 5, 10 / 11, 13, 12, 14	
			100					(3.30)	Dark brown, sandy angular to rounded fine to coarse flint GRAVEL with rare flint cobbles. Sand is fine to coarse. (RIVER TERRACE DEPOSITS) 14.20 ... with rare wood fragments (<120mm)		13.50-14.00 13.70 13.70 14.30-15.30 14.50	B03 ES04 B05	N50/ 135 mm	... VOC 0.0ppm 8, 16 / 24, 26	
			100								14.70 14.70 15.30-16.00 15.50	ES06 B07	N50/ 160 mm	... VOC 0.1ppm 4, 11 / 21, 26, 3	
			100						15.60 ... becoming very sandy		15.70 15.70	ES08		... VOC 0.1ppm	
			100			-12.03		16.80			16.70 16.70	ES09		... VOC 0.1ppm	
			0					(4.20)	No recovery		17.00 18.50		N50/ 105 mm N50/ 115 mm	2, 8 / 25, 25 9, 16 / 26, 24	
											20.00		N50/ 125 mm	8, 12 / 26, 24	

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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	3 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			0			-16.23		21.00		21.00-21.50	B10			
			100						Light grey silty fine SAND. (THANET SAND FORMATION: THANET SAND)					
15/11/16	17.20	3.80								21.50		N50/ 180 mm	4, 14 / 15, 23, 12	
16/11/16	17.20	4.60	100						21.50 ... becoming slightly clayey 21.50 - 21.80 ... with coarse gravel and cobble size flint	21.50	D11			
										22.30			... Pressuremeter Test at 22.30m	
			0											
										23.80			... Pressuremeter Test at 23.80m	
										24.50		N50/ 115 mm	12, 19 / 24, 26	
										24.50	D12			
										25.10	B13			
			87					(8.50)	25.20 ... with no clay					
			0							26.65			... Pressuremeter Test at 26.65m	
16/11/16	16.80	5.10												
17/11/16	17.20	3.90	87						28.20 ... with occasional pockets of dark green fine glauconitic sand					
										28.70	B14			
			0											
						-24.73		29.50		29.50			... Pressuremeter pocket aborted see Remarks	
			100	0		-25.03		29.80	Dark grey angular to subangular medium to coarse rinded flint GRAVEL. (THANET SAND FORMATION: BULLHEAD BED)					

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CONCEPT
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Borehole No

BH03

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	10/11/16	4.77	E 542413.4 N 180267.9	34.60m
	Date Completed 17/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	4 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			100	0					White CHALK recovered as: extremely weak, medium density silty subangular to angular white chalk COBBLES with occasional light grey marling. (SEAFORD CHALK FORMATION)					
			100	43					30.60 - 30.75 ... with occasional medium to coarse gravel size and rare cobble size angular to subangular black rinded flint 30.80 ... becoming strong and medium density 30.90 ... with a fracture 31.20 - 31.25 ... with a band of angular to subangular coarse black rinded flint gravel	31.40-31.65	C15			
									31.70 ... with a fracture infilled with coarse black rinded flint gravel	32.00		N48	21, 4 / 9, 10, 11, 18	
			100	67	57			(4.80)	31.75 ... [NI] recovered as: moderately weak, medium density off-white angular to subangular silty chalk COBBLES 32.00 - 32.20 ... [NI] recovered as: off-white soft, very gravelly SILT. Gravel is angular to subangular medium to coarse black rinded flint 32.35 - 32.40 ... with a fracture infilled with angular to subangular fine to coarse moderately weak, medium density white chalk fragments 32.45 ... with a fracture	32.70-33.00	C16			
									33.20 ... [NI] recovered as: off-white angular to subangular fine to coarse silty GRAVEL. Gravel comprises extremely weak, medium density chalk fragments and black rinded flint	33.50		N50/ 85 mm	21, 4 / 36, 14	
			90	63	63				33.30 - 33.50 ... with horizontal, planar, smooth fracture	33.80-34.10	C17			
17/11/16	24.30	8.60				-29.83		34.60						
									End of Borehole					

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CONCEPT
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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	37.50	CP	22/12/2016	05/01/2017	ST	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)
12.30	16.50
18.00	24.00
24.00	31.50

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks
21.50	24.00	2:00	Sand
29.50	31.50	2:10	Sand
31.50	32.50	0:30	Sand

HOLE

Depth (m)	Diameter (mm)
0.00	200
24.00	200
37.50	150

CASING

Depth (m)	Diameter (mm)
0.00	200
20.50	200
27.30	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
11.50	37.50	Cement / Bentonite Grout	05/01/2017

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

CONCEPT
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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
22/12/16	0.00			
22/12/16	11.50	11.50	1.00	... see Remark 3
22/12/16	13.50	13.00	1.20	
22/12/16	14.50	14.20	2.00	
22/12/16	15.50	15.30	1.90	
22/12/16	16.50	16.40	2.00	
22/12/16	17.00	17.00	2.00	
03/01/17	17.00	16.50	1.50	
03/01/17	18.00	17.00	2.00	
03/01/17	19.50	17.00	2.10	
03/01/17	21.00	17.00	3.00	
03/01/17	22.50	17.00	1.50	
03/01/17	24.00	20.50	1.60	
03/01/17	24.00	24.00	2.00	
04/01/17	24.00	20.50	1.10	
04/01/17	25.50	25.40	1.60	
04/01/17	27.00	25.50	1.20	
04/01/17	28.50	25.50	3.00	
04/01/17	30.00	27.30	2.10	
04/01/17	31.50	27.30	1.60	
04/01/17	31.50	27.30	2.00	
05/01/17	31.50	27.30	2.00	
05/01/17	33.00	27.30	1.20	
05/01/17	34.50	27.30	1.50	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	13.50	N40	5, 9 / 12, 8, 8, 12	13.00	1.20
C	14.50	N30	1, 2 / 3, 7, 8, 12	14.20	2.00
C	15.50	N16	1, 1 / 2, 4, 4, 6	15.30	1.90
C	16.50	N50/0.115	1, 7 / 22, 28	16.40	2.00
S	18.00	N50/0.085	17, 8 / 40, 10	17.00	2.00
S	19.50	N50/0.03	25 / 50	17.00	2.10
S	21.00	N50/0.135	10, 15 / 22, 28	17.00	3.00
S	22.50	N50/0.17	5, 10 / 17, 24, 9	17.00	1.50
S	24.00	N36/0.115	14, 14 / 26, 10	20.50	1.60
S	25.50	N50/0.22	4, 9 / 13, 17, 20	25.40	1.60
S	27.00	N50/0.155	8, 14 / 20, 23, 7	25.50	1.20
S	28.50	N60/0.22	8, 12 / 19, 21, 20	25.50	3.00
S	30.00	N50/0.16	5, 9 / 15, 23, 12	27.30	2.10
S	31.50	N50/0.015	20, 5 / 50	27.30	1.60
S	33.00	N37	6, 5 / 6, 8, 6, 17	27.30	1.20
S	34.50	N50/0.17	9, 7 / 13, 22, 15	27.30	1.50

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Ø200mm casing used from pontoon level to 17.00m depth. Bentonite seal inserted between 24.00m and 26.00m and borehole re-drilled with Ø150mm casing to 27.30m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

CONCEPT
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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
22/12/16						Water					
					(11.50)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

CONCEPT
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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS				
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
22/12/16	11.50	1.00	-6.61		11.50		11.50-11.80	B01			
					(0.80)	Dark grey slightly gravelly clayey SILT with strong hydrocarbon odour. Gravel is angular to subangular fine to coarse flint. (DOCK SEDIMENT)	11.80-12.25	UT02	11 blows	89% Recovery	
			-7.41		12.30		12.30	D03			
					(1.20)	Dark grey slightly sandy silty clayey, angular to subangular fine to coarse flint GRAVEL with strong hydrocarbon odour. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	12.50-13.00	B04			
22/12/16	13.00	1.20	-8.61		13.50		13.50		N40	5, 9 / 12, 8, 8, 12	
					(3.00)	Yellowish brown very sandy angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	13.50-14.00	B05			
22/12/16	14.20	2.00					14.50		N30	1, 2 / 3, 7, 8, 12	
							14.50-15.00	B06			
22/12/16	15.30	1.90					15.50		N16	1, 1 / 2, 4, 4, 6	
							15.50-16.00	B07			
22/12/16	16.40	2.00	-11.61		16.50		16.50		N50/ 115 mm	1, 7 / 22, 28	
						Light grey fine silty SAND. (THANET SAND FORMATION: THANET SAND)	16.50-17.00	B08			
22/12/16	17.00	2.00									
03/01/17	16.50	1.50					17.50-18.00	B09			
03/01/17	17.00	2.00					18.00		N50/ 85 mm	17, 8 / 40, 10	
							18.00	D10			
							18.50-19.00	B11			
03/01/17	17.00	2.10					19.50		N50/ 30 mm	25 / 50	
							19.50	D12			

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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	3 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
							20.50-21.00	B13			
03/01/17	17.00	3.00					21.00		N50/ 135 mm	10, 15 / 22, 28	
						21.00 ... becoming slightly clayey					
							21.00	D14			
							21.50-22.00	B15			
						21.50 ... becoming clayey					
03/01/17	17.00	1.50					22.50		N50/ 170 mm	5, 10 / 17, 24, 9	
							22.50	D16			
					(13.50)						
							23.50-24.00	B17			
03/01/17	20.50	1.60					24.00		N36/ 115 mm	14, 14 / 26, 10	
04/01/17	20.50	1.10									
							24.00	D18			
							24.50-25.00	B19			
						24.50 ... becoming very clayey					
04/01/17	25.40	1.60					25.50		N50/ 220 mm	4, 9 / 13, 17, 20	
							25.50	D20			
							26.50-27.00	B21			
04/01/17	25.50	1.20					27.00		N50/ 155 mm	8, 14 / 20, 23, 7	
							27.00	D22			
							27.50-28.00	B23			
04/01/17	25.50	3.00					28.50		N60/ 220 mm	8, 12 / 19, 21, 20	
							28.50	D24			
							29.50-30.00	B25			
04/01/17	27.30	2.10	-25.11		30.00		30.00		N50/ 160 mm	5, 9 / 15, 23, 12	

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH04

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	22/12/16	4.89	E 542417.7 N 180296.2	37.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	4 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
			-25.21		30.10	Black angular to subangular fine to coarse rinded flint GRAVEL. (THANET SAND FORMATION: BULLHEAD BED)	30.00	D26			
							30.00-30.50	B27			
						White CHALK recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak medium density white chalk fragments and black rinded flint. (SEAFORD CHALK FORMATION)	31.00-31.50	B28			
04/01/17	27.30	1.60					31.50		N50/ 15 mm	20, 5 / 50	
05/01/17	27.30	2.00					31.50	D29			
							32.50-33.00	B30			
05/01/17	27.30	1.20					33.00		N37	6, 5 / 6, 8, 6, 17	
						33.00 ... [NI] recovered as: white slightly gravelly SILT. Gravel comprises fine to medium weak medium density chalk fragments and black rinded flint	33.00	D31			
					(7.40)		34.00-34.50	B32			
						34.00 ... with rare cobble size black rinded flint					
05/01/17	27.30	1.50					34.50		N50/ 170 mm	9, 7 / 13, 22, 15	
						34.50 ... [NI] recovered as: slightly gravelly SILT. Gravel comprises angular to subangular fine to medium weak medium density chalk fragments	34.50	D33			
			-32.61		37.50						
						37.49 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel comprises weak medium density angular to subangular fine to coarse chalk fragments and black rinded flint					
						End of Borehole					

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	33.95	CP	19/12/2016	21/12/2016	ST	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)
17.00	26.00

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	200
24.50	200
33.95	150

CASING

Depth (m)	Diameter (mm)
0.00	200
17.00	200
25.00	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
11.90	33.95	Cement / Bentonite Grout	

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
19/12/16	0.00			
19/12/16	12.10	11.90	1.20	... see Remark 3
19/12/16	13.00	12.50	2.00	
19/12/16	14.00	13.50	2.50	
19/12/16	15.00	14.60	2.70	
19/12/16	15.50	15.50	2.70	
20/12/16	15.50	15.50	2.00	
20/12/16	16.00	15.50	2.00	
20/12/16	17.00	16.50	1.90	
20/12/16	18.50	17.00	1.60	
20/12/16	20.00	17.00	1.00	
20/12/16	21.50	17.00	1.30	
20/12/16	23.00	17.00	1.00	
20/12/16	24.50	17.00	1.50	
20/12/16	26.00	25.00	2.00	
21/12/16	26.00	25.00	1.00	
21/12/16	27.50	25.00	1.00	
21/12/16	29.00	25.00	1.60	
21/12/16	30.50	25.00	1.80	
21/12/16	32.00	25.00	3.00	
21/12/16	33.50	25.00	2.00	
21/12/16	33.95	25.00	2.00	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	13.00	N12	3, 2 / 3, 4, 2, 3	12.50	2.00
C	14.00	N44	5, 14 / 13, 8, 12, 11	13.50	2.50
C	15.00	N53/0.23	1, 3 / 3, 15, 25, 10	14.60	2.70
S	16.00	N50/0.135	1, 2 / 17, 33	15.50	2.00
S	17.00	N50/0.07	12, 13 / 50	16.50	1.90
S	18.50	N50/0.07	13, 12 / 50	17.00	1.60
S	20.00	N50/0.22	6, 8 / 15, 17, 18	17.00	1.00
S	21.50	N50/0.17	8, 14 / 19, 20, 11	17.00	1.30
S	23.00	N50/0.2	6, 14 / 17, 23, 10	17.00	1.00
S	24.50	N50/0.275	4, 7 / 13, 13, 14, 10	17.00	1.50
S	26.00	N50/0.19	6, 12 / 14, 22, 14	25.00	2.00
S	27.50	N50/0.18	7, 12 / 16, 25, 9	25.00	1.00
S	29.00	N50	7, 8 / 10, 12, 10, 18	25.00	1.60
S	30.50	N50	4, 5 / 4, 19, 12, 15	25.00	1.80
S	32.00	N36	4, 5 / 7, 8, 8, 13	25.00	3.00
S	33.50	N50	5, 5 / 10, 15, 12, 13	25.00	2.00

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Ø200mm casing used from pontoon level to 17.00m depth. Bentonite seal inserted between 22.50m and 24.50m and borehole re-drilled with Ø150mm casing to 25.00m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

CONCEPT
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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
19/12/16						Water					
					(11.90)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 18:02

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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS				
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			-7.22		11.90						
19/12/16	11.90	1.20			(0.60)	Soft, dark grey clayey SILT. (DOCK SEDIMENT)	12.10-12.55	UT01	10 blows	100% Recovery	
			-7.82		12.50		12.50-13.00	B02			
			-7.87		12.55		12.50	D03			
19/12/16	12.50	2.00				Yellowish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint. (RIVER TERRACE DEPOSITS)	13.00		N12	3, 2 / 3, 4, 2, 3	
						Dark grey sandy GRAVEL with strong hydrocarbon odour. Gravel is angular to rounded fine to coarse flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	13.00-13.50	B04			
19/12/16	13.50	2.50			(3.45)	13.00 ... becoming clayey with rare angular to subangular flint cobbles and rare pieces of plastic	14.00		N44	5, 14 / 13, 8, 12, 11	
						14.00 ... becoming very sandy with no clay and no hydrocarbon odour	14.00-14.50	B05			
19/12/16	14.60	2.70					15.00		N53/ 230 mm	1, 3 / 3, 15, 25, 10	
						15.00 ... with a pocket of soft brown clay (<40mm)	15.00-15.50	B06			
19/12/16	15.50	2.70									
20/12/16	15.50	2.00									
20/12/16	15.50	2.00	-11.32		16.00		16.00		N50/ 135 mm	1, 2 / 17, 33	
						Light grey silty fine SAND. (THANET SAND FORMATION: THANET SAND)	16.00	D07			
							16.00-16.50	B08			
20/12/16	16.50	1.90					17.00		N50/ 70 mm	12, 13 / 50	
							17.00	D09			
							17.50-18.00	B10			
20/12/16	17.00	1.60					18.50		N50/ 70 mm	13, 12 / 50	
							18.50	D11			
						19.00 ... becoming slightly clayey	19.00-20.00	B12			
20/12/16	17.00	1.00					20.00		N50/ 220 mm	6, 8 / 15, 17, 18	

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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	3 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
							20.00	D13			
							20.50-21.00	B14			
20/12/16	17.00	1.30					21.50		N50/ 170 mm	8, 14 / 19, 20, 11	
							21.50	D15			
							22.00-22.50	B16			
						22.00 ... becoming clayey					
					(12.80)						
20/12/16	17.00	1.00					23.00		N50/ 200 mm	6, 14 / 17, 23, 10	
							23.00	D17			
							23.50-24.00	B18			
20/12/16	17.00	1.50					24.50		N50/ 275 mm	4, 7 / 13, 13, 14, 10	
							24.50	D19			
							25.00-25.50	B20			
						25.00 ... becoming very clayey					
20/12/16	25.00	2.00					26.00		N50/ 190 mm	6, 12 / 14, 22, 14	
21/12/16	25.00	1.00									
							26.00	D21			
							26.50-27.00	B22			
21/12/16	25.00	1.00					27.50		N50/ 180 mm	7, 12 / 16, 25, 9	
							27.50-27.90	D23			
							28.00-28.50	B24			
			-24.12		28.80		28.80-29.00	D25			
21/12/16	25.00	1.60	-24.32		29.00	Black angular to subangular fine to coarse rinded flint GRAVEL. (THANET SAND FORMATION: BULLHEAD BED)	29.00		N50	7, 8 / 10, 12, 10, 18	
							29.00-29.50	D26			
						White CHALK recovered as: firm, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint. (SEAFORD CHALK FORMATION)	29.50-30.00	B27			

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Borehole No

BH05

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	19/12/16	4.68	E 542452.3 N 180279.1	33.95m
	Date Completed 21/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	4 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
21/12/16	25.00	1.80			(4.95)	29.50 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL with rare black rinded flint cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint 30.50 ... [NI] recovered as: soft, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint	30.50 30.50-30.95 31.00-31.50	 D28 B29	N50	4, 5 / 4, 19, 12, 15	
21/12/16	25.00	3.00				32.00 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to coarse weak, medium density chalk fragments 32.50 ... with no black rinded flint cobbles	32.00 32.00-32.50 32.50-33.00	 D30 B31	N36	4, 5 / 7, 8, 8, 13	
21/12/16	25.00	2.00				33.50 ... [NI] recovered as: white slightly gravelly SILT. Gravel is angular to subangular fine to coarse weak, medium density chalk fragments	33.50 33.50-33.95	 D32	N50	5, 5 / 10, 15, 12, 13	
21/12/16	25.00	2.00	-29.27		33.95	End of Borehole					

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 18:02

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Borehole No

BH06

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	1.20	IP	24/11/2016	24/11/2016	JB	CB			Hand Excavated	
1.20	15.20	DS	24/11/2016	29/11/2016	JB	CB			Comacchio 405	C1
15.20	30.80	RC	29/11/2016	01/12/2016	JB	CB	112	PDC	Comacchio 405	C1

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	200
5.20	200
14.50	150
30.80	146

CASING

Depth (m)	Diameter (mm)
0.00	200
5.20	200
14.50	150

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
15.20	20.30	Water	98	
20.30	30.80	Water	95	

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation
SPGW	50	10.00	2.00	10.00	01/12/2016
SPGW	50	23.70	12.70	23.70	01/12/2016

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
0.00	0.30	Concrete / Flush cover	01/12/2016
0.30	2.00	Bentonite pellets	
2.00	10.00	Pea shingle	
10.00	12.00	Bentonite pellets	
12.00	23.70	Pea shingle	
23.70	30.80	Bentonite pellets	

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)
1.20	2.20		100
2.20	3.20		100
3.20	4.20		0
4.20	5.20		100
5.20	6.20		80
6.20	7.20		100
7.20	8.20		50
8.20	9.20		80
9.20	10.20		100
10.20	11.20		60
11.20	12.20		100
12.20	13.20		80
13.20	14.20		100
14.20	15.20		100
15.20	17.30		24
17.30	18.80		100
18.80	20.30		100
20.30	21.80		100
21.80	23.30		100
23.30	24.80		100
24.80	26.30		67
26.30	27.80		100
27.80	29.30		90
29.30	30.80		100

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

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Borehole No

BH06

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
24/11/16	0.00			
24/11/16	4.20	4.20		
25/11/16	4.20	4.20		
25/11/16	7.20	7.20		
28/11/16	7.20	7.20		
28/11/16	14.20	14.50		
29/11/16	14.20	14.50		
29/11/16	20.30	14.50		
30/11/16	20.30	14.50		
30/11/16	30.80	14.50		

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
S	1.20	N5	1, 2 / 1, 1, 2, 1	0.00	
S	2.20	N4	1, 1 / 1, 1, 1, 1	0.00	
S	3.20	N4	1, 2 / 2, 0, 1, 1	0.00	
S	4.20	N8	2, 2 / 2, 1, 3, 2	4.20	
S	5.20	N7	1, 2 / 1, 2, 2, 2	5.20	
S	6.20	N2	0, 0 / 1, 0, 0, 1	5.20	
S	7.20	N0	0, 0 / 0, 0, 0, 0	7.20	
S	8.20	N0	0, 0 / 0, 0, 0, 0	8.20	
S	9.20	N0	0, 0 / 0, 0, 0, 0	9.20	
S	10.20	N0	0, 0 / 0, 0, 0, 0	10.20	
C	11.20	N54	4, 8 / 13, 13, 14, 14	11.20	
C	12.20	N47	3, 7 / 9, 12, 13, 13	12.20	
C	13.20	N12	1, 2 / 2, 2, 4, 4	13.20	
C	14.20	N52	3, 4 / 6, 14, 16, 16	14.50	
C	15.20	N50/0.18	9, 11 / 14, 18, 18	14.50	
C	17.30	N50/0.115	10, 10 / 25, 25	14.50	
C	18.80	N50/0.105	11, 9 / 27, 23	14.50	
C	20.30	N50/0.245	5, 11 / 12, 13, 17, 8	14.50	
S	21.80	N37	3, 4 / 7, 9, 10, 11	14.50	
S	23.30	N39	4, 5 / 6, 10, 11, 12	14.50	
S	24.80	N38	4, 6 / 7, 8, 10, 13	14.50	
S	27.80	N50/0.105	3, 15 / 20, 30	14.50	
S	29.30	N28	5, 6 / 6, 6, 6, 10	14.50	
S	30.80	N35	5, 6 / 7, 8, 9, 11	14.50	

GENERAL REMARKS

1. Inspection pit hand excavated prior to boring.
2. Clearance by UXO Magnetometer probe.
3. Dynamic sampling techniques used from 1.20m to 15.20m. Rotary boring carried out thereafter.
4. Pressuremeter tests carried out at 15.80m and 25.40m depths.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

CONCEPT
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Borehole No

BH06

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	1 of 6

PROGRESS			STRATA								SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description		Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
24/11/16								(0.40)	CONCRETE (0.30m) over concrete rubble.						
						5.29		0.40							
								(0.35)	Dark brown, clayey silty gravelly fine to coarse SAND with rare flint cobbles and a metal nail (85mm). Gravel is angular to rounded fine to coarse flint. (MADE GROUND)		0.60			... VOC 0.4ppm	
						4.94		0.75			0.60	ES01			
									Orangish brown gravelly fine to medium SAND with rare pockets of soft, brown clay (<40mm). Gravel is angular to rounded fine to coarse flint gravel. (MADE GROUND)		1.00			... VOC 0.6ppm	
											1.00	ES02			
											1.20		N5	1, 2 / 1, 1, 2, 1	
											1.20	D03			
											1.50			... VOC 2.1ppm	
								(1.65)			1.50	ES04			
			100								1.70-2.00	B05			
									1.70 ... becoming fine to coarse						
									1.80 ... becoming very gravelly						
											2.20		N4	1, 1 / 1, 1, 1, 1	
											2.20	D06			
						3.29		2.40							
						3.09		2.60	Orangish brown very sandy angular to subrounded fine to coarse GRAVEL. Sand is fine to coarse. (MADE GROUND)		2.50			... VOC 2.8ppm	
											2.50	ES07			
			100						2.40 - 2.60 ... becoming very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint						
								(0.60)	Orangish brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint. (MADE GROUND)		3.00-3.10	B08			
									2.90 ... becoming fine to medium		3.10	B09			
						2.49		3.20			3.20		N4	1, 2 / 2, 0, 1, 1	
						2.39		3.30	Soft, orangish brown slightly sandy slightly gravelly silty CLAY with occasional dark grey staining. Gravel is subangular to rounded fine to medium flint. (MADE GROUND)		3.20	D10			
						2.19		3.50							
						1.99		3.70	Brown, slightly clayey very sandy GRAVEL. Gravel is angular to well rounded fine to coarse flint. Sand is fine to coarse. (MADE GROUND)		3.70	D11			
			0						Orangish brown silty very clayey fine to medium SAND. (MADE GROUND)						
						1.79		3.90	Soft, orangish brown slightly sandy silty CLAY with occasional dark grey staining. (MADE GROUND)						
								(0.30)			4.10			... VOC 0.5ppm	
24/11/16	4.20					1.49		4.20	Dark brown gravelly fine to coarse SAND. Gravel is angular to well rounded fine to coarse flint. (MADE GROUND)		4.10	ES12			
25/11/16	4.20										4.20		N8	2, 2 / 2, 1, 3, 2	
									Brown, very sandy angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse. (MADE GROUND)		4.20	D13			
								(0.50)							
			100			0.98		4.70							
						0.89		4.80	Soft, yellowish brown silty CLAY with occasional to frequent dark grey staining. (MADE GROUND)						
						0.73		4.95	4.75 ... with occasional reddish brown fine to coarse gravel size brick fragments						
									Brown very sandy angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse. (MADE GROUND)		5.20		N7	1, 2 / 1, 2, 2, 2	
											5.20	D14			
								(0.70)	Brown angular to well rounded fine to coarse flint GRAVEL. (MADE GROUND)						
									5.05 ... with rare pockets of very soft gravelly clay. Gravel is angular to subrounded fine to medium flint						
			80			0.03		5.65	5.50 ... with occasional wood fragments (<85mm)						
									5.60 ... with rare tile fragments (<20mm)		5.70			... VOC 0.2ppm	
											5.70	ES15			
									Light brown gravelly fine to medium SAND. Gravel is angular to rounded fine to coarse flint. (MADE GROUND)						
									5.80 - 5.85 ... with a band of soft orangish brown silty clay						

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Borehole No

BH06

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	2 of 6

PROGRESS			STRATA								SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description		Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			80					(0.85)	6.10 ... becoming dark grey with hydrocarbon odour and rare wood fragments (<45mm) 6.20 - 6.30 ... with a band of angular to well-rounded fine to coarse flint gravel with rare tile fragments (<55mm)		6.20		N2	0, 0 / 1, 0, 0, 1	
						-0.82		6.50			6.50			... VOC 0.2ppm	
									Very soft to soft, dark grey SILT with strong hydrocarbon odour. (MADE GROUND)		6.50	ES16			
			100			-1.02		6.70			6.80	B17			
								(0.40)	Orangish brown gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. (MADE GROUND)						
						-1.42		7.10							
25/11/16	7.20								Very soft to soft, dark grey clayey SILT with hydrocarbon odour. (ALLUVIUM)		7.20		N0	0, 0 / 0, 0, 0, 0	
28/11/16	7.20										7.20	D18			
											7.50			... VOC 0.2ppm	
			50								7.50	ES19			
											8.00	D20			
								(2.10)			8.20		N0	0, 0 / 0, 0, 0, 0	
											8.20	D21			
											8.50			... VOC 0.3ppm	
			80								8.50	ES22			
									8.90 ... becoming soft		9.00	D23			
						-3.52		9.20							
									Soft, brownish grey silty CLAY with organic odour. (ALLUVIUM)		9.20		N0	0, 0 / 0, 0, 0, 0	
											9.20	D24			
											9.50			... VOC 0.3ppm	
			100								9.50	ES25			
											10.00	D26			
								(1.80)			10.20		N0	0, 0 / 0, 0, 0, 0	
											10.20	D27			
											10.50	D28			
			60						10.70 ... becoming firm with occasional dark grey staining						
						-5.32		11.00							
									Dark brown sandy GRAVEL. Gravel is angular to well rounded fine to coarse flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)		11.20		N54	4, 8 / 13, 13, 14, 14	
			100					(1.50)							

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Borehole No

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	3 of 6

PROGRESS			STRATA							SAMPLES & TESTS			
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records
			100							12.20		N47	3, 7 / 9, 12, 13, 13
									12.20 ... becoming slightly sandy				
						-6.82		12.50		12.50-13.10	B29		
			80						Yellowish brown gravelly fine to coarse SAND with occasional flint cobbles. Gravel is angular to well rounded fine to coarse flint. (RIVER TERRACE DEPOSITS)				
								(0.70)					
						-7.52		13.20	13.10 ... becoming very gravelly with flint cobbles	13.20		N12	1, 2 / 2, 2, 4, 4
									Dark brown sandy GRAVEL with rare flint cobbles. Gravel is angular to well rounded fine to coarse flint. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	13.20-13.50	B30		
			100										
								(1.20)	13.70 ... with no sand				
28/11/16	14.50									14.20		N52	3, 4 / 6, 14, 16, 16
29/11/16	14.50					-8.72		14.40					
						-8.82		14.50	Yellowish brown gravelly fine to coarse SAND. Gravel is angular to well rounded fine to coarse flint. (RIVER TERRACE DEPOSITS)				
			100						Light grey silty fine SAND. (THANET SAND FORMATION: THANET SAND)				
										15.00-15.20	B31		
										15.20		N50/ 180 mm	9, 11 / 14, 18, 18
										15.80			... Pressuremeter test at 15.80m depth
			24										
										16.80-17.30	B32		
									16.80 ... becoming clayey				
										17.30		N50/ 115 mm	10, 10 / 25, 25
									17.30 ... becoming slightly clayey				
										17.50-17.90	B33		
			100										

Instrument/ Backfill

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	4 of 6

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			100							18.80		N50/ 105 mm	11, 9 / 27, 23	
			100						19.50 ... becoming clayey	19.80-20.10	B34			
29/11/16	14.50									20.30		N50/ 245 mm	5, 11 / 12, 13, 17, 8	
30/11/16	14.50							(11.70)						
			100							21.00-21.50	B35			
			100							21.80		N37	3, 4 / 7, 9, 10, 11	
										21.80	D36			
			100							22.90-23.20	B37			
			100						23.30 ... becoming locally very clayey	23.30		N39	4, 5 / 6, 10, 11, 12	
										23.30	D38			
										24.00-24.70	B39			

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	5 of 6

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			100							24.80		N38	4, 6 / 7, 8, 10, 13	
										24.80	D40			
										25.30-25.70	B41			
			67						25.30 ... becoming very clayey	25.40			... Pressuremeter test at 25.40m depth	
						-20.52		26.20						
						-20.62		26.30	Black angular to subangular medium to coarse rinded flint GRAVEL with rare angular to subangular rinded flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)					
									Strong, medium density white CHALK with occasional light grey marling. (SEAFORD CHALK FORMATION) 26.60 - 26.80 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel comprises weak, medium density white chalk fragments and rare black rinded flint					
			100	63	53				27.10 - 27.25 ... [NI] recovered as: soft to firm, white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint					
										27.50-27.75	C42			
									27.50 ... with a horizontal fracture and at 27.75m					
										27.80		N50/ 105 mm	3, 15 / 20, 30	
									27.80 - 27.90 ... [NI] recovered as: soft, white gravelly SILT. Gravel is weak, medium density angular to subangular fine to coarse chalk fragments					
										27.80	D43			
									28.00 - 28.10 ... with a band of angular to subangular fine to coarse black rinded flint gravel, occasional medium to coarse gravel size extremely weak, low density chalk fragments and rare rinded flint cobbles					
									28.30 ... with occasional subhorizontal fractures and 1No horizontal fracture					
			90	66	57			(4.50)	28.55 - 28.65 ... [NI] recovered as: moderately strong, medium density white chalk COBBLES					
									28.85 ... with a subvertical fracture					
									29.00 - 29.10 ... with occasional subhorizontal fractures					
										29.30		N28	5, 6 / 6, 6, 6, 10	
									29.25 - 29.30 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel comprises weak, medium density white chalk fragments	29.30	D44			
									29.50 - 29.70 ... with 1No wide open fracture					
			100	63	27				29.70 - 29.80 ... with occasional subvertical fractures					

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Borehole No

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	28/11/16	5.69	E 542560.3 N 180240.5	30.80m
	Date Completed 01/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	6 of 6

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
									30.00 - 30.10 ... [NI] recovered as: white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	30.10-30.40	C45			
			100	63	27				30.45 ... with 1No open horizontal fracture 30.50 ... with occasional subvertical off-white open fractures					
30/11/16	14.50					-25.12		30.80	30.70 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with rare moderately weak, medium density white chalk cobbles. Gravel is moderately weak, medium density chalk fragments	30.80 30.80	D46	N35	5, 6 / 7, 8, 9, 11	
									End of Borehole					

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Borehole No

BH07

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	15.80	DS	14/12/2016	15/12/2016	TC	CB			Geotec 350	AR779
15.80	33.50	RC	15/12/2016	16/12/2016	TC	CB	112	PDC	Geotec 350	AR779

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	150
15.80	150
33.50	146

CASING

Depth (m)	Diameter (mm)
0.00	150
13.50	150

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
15.80	16.90	Water	20	
16.90	18.20	Water	10	
18.20	22.70	Water	0	
22.70	33.50	Water	25	

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
11.80	33.50	Cement / Bentonite Grout	05/01/2017

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)
11.80	12.80		100
12.80	13.80		100
13.80	14.80		80
14.80	15.80		100
15.80	16.90		73
16.90	18.20		91
18.20	19.70		93
19.70	21.20		93
21.20	22.70		93
22.70	23.00		100
23.00	24.50		100
24.50	26.00		93
26.00	27.50		100
27.50	29.00		60
29.00	30.50		100
30.50	32.00		100
32.00	33.50		100

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

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Borehole No

BH07

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
03/01/17	0.00			
03/01/17	12.50	12.50		... see Remark 4
03/01/17	14.80	12.50	1.80	
04/01/17	14.80	12.50	4.80	
04/01/17	15.80	13.50		... Rotary flush
04/01/17	22.70	13.50	2.10	
05/01/17	22.70	13.50	3.20	
05/01/17	33.50	13.50	2.10	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
S	16.90	N50/0.075	25 / 50	13.50	
S	18.20	N50/0.095	18, 7 / 39, 11	13.50	
S	19.70	N50/0.15	8, 15 / 24, 26	13.50	
S	21.20	N50/0.16	11, 14 / 22, 26, 2	13.50	
S	23.00	N50/0.22	6, 11 / 15, 18, 17	13.50	
S	24.50	N50/0.245	3, 9 / 12, 13, 18, 7	13.50	
S	26.00	N50/0.255	6, 9 / 12, 13, 15, 10	13.50	
S	27.50	N50/0.23	7, 9 / 14, 16, 18, 2	13.50	
S	29.00	N50/0.02	25 / 50	13.50	

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Dynamic sampling techniques used from 11.80m to 15.80m. Rotary boring carried out thereafter.
4. Water present in the borehole from casing installation through the dock.
5. Poor flush return throughout.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

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Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	1 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
03/01/17									Water					
								(11.80)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
Unit 8 Warple Mews, Warple Way
London, W3 0RF
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Borehole No

BH07

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	2 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
						-6.86		11.80						
									Very soft, dark grey SILT with strong hydrocarbon odour.	12.00			... VOC 2.5ppm	
									(DOCK SEDIMENT)	12.00	ES01			
			100					(1.00)						
03/01/17	12.50								12.30 ... becoming clayey	12.50	D02			
									12.50 ... becoming firm very clayey with strong hydrocarbon odour					
						-7.86		12.80						
									Dark grey, silty very sandy angular to well rounded fine to coarse flint GRAVEL with strong hydrocarbon odour. Sand is fine to coarse					
								(0.50)						
			100			-8.36		13.30	(RIVER TERRACE DEPOSITS)					
									Dark brown, gravelly fine to coarse SAND with hydrocarbon odour. Gravel is angular to rounded fine to coarse flint.	13.50	D03			
									(RIVER TERRACE DEPOSITS)	14.00			... VOC 2.0ppm	
								(1.30)		14.00	ES04			
			80											
						-9.66		14.60						
03/01/17	12.50	1.80							Brown very sandy angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse.					
04/01/17	12.50	4.80							(RIVER TERRACE DEPOSITS)					
								(0.75)	14.80 ... with no sand	15.20	B05			
			100			-10.41		15.35						
									Light grey silty fine SAND.					
04/01/17	13.50								(THANET SAND FORMATION: THANET SAND)					
										16.00	B06			
			73											
										16.90		N50/ 75 mm	25 / 50	
										16.90	D07			
										17.00	B08			
			91											
										18.20		N50/ 95 mm	18, 7 / 39, 11	
										18.20	D09			
										18.50	B10			
			93						19.00 ... becoming clayey					
										19.70		N50/ 150 mm	8, 15 / 24, 26	
			93											

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Borehole No

BH07

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	3 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
										19.70	D11			
										20.50	B12			
			93											
										21.20		N50/ 160 mm	11, 14 / 22, 26, 2	
			93					(12.95)		22.00	B13			
04/01/17	13.50	2.10												
05/01/17	13.50	3.20	100						22.70 ... becoming very clayey	23.00		N50/ 220 mm	6, 11 / 15, 18, 17	
										23.00	D14			
			100							24.00	B15			
										24.50		N50/ 245 mm	3, 9 / 12, 13, 18, 7	
			93							25.00	B16			
										26.00		N50/ 255 mm	6, 9 / 12, 13, 15, 10	
										26.00	D17			
			100							27.00	B18			
										27.50		N50/ 230 mm	7, 9 / 14, 16, 18, 2	
										28.00	B19			
			60			-23.36		28.30						
								(0.90)	Black angular to subangular fine to coarse rinded flint GRAVEL with rare cobbles. Cobbles are angular to subangular rinded flint. (THANET SAND FORMATION: BULLHEAD BED)	29.00		N50/ 20 mm	25 / 50	
						-24.26		29.20						
			100	77	60				Strong, white CHALK. (SEAFORD CHALK FORMATION) 29.30 ... with 1No horizontal fracture and at 29.40m 29.60 ... with occasional angular to subangular fine to coarse black rinded flint 29.70 ... with occasional subhorizontal and	29.50	B20			

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Borehole No

BH07

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	03/01/17	4.95	E 542513.8 N 180296.4	33.50m
	Date Completed 05/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	4 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			100	77	60				subvertical fractures 29.90 ... with 1No horizontal fracture 30.00 - 30.20 ... with occasional subvertical fractures and subhorizontal fractures 30.20 - 30.40 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint 30.45 ... with 1No subhorizontal fracture 30.50 - 30.90 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint 30.90 ... with 1No horizontal fracture and at 30.95m 31.10 ... with 1No wide open fracture 31.30 ... with 1No wide open fracture infilled with weak, medium density gravel size chalk fragments and angular to subangular fine to coarse black rinded flint 31.40 ... with 1No subhorizontal fracture 31.50 ... with 1No subvertical fracture 31.55 ... with 1No wide open fracture and at 31.90m 32.00 - 32.50 ... [NI] recovered as: very silty GRAVEL. Gravel comprises weak, medium density chalk fragments and angular to subangular fine to coarse black rinded flint 32.40 - 32.50 ... with angular to subangular fine to coarse black rinded flint 32.60 ... with 1No horizontal fracture infilled with angular to subangular fine to coarse gravel. Gravel comprises weak, medium density chalk fragments and rare black rinded flint cobbles 33.40 ... with 1No open fracture and at 33.45m					
			100	73	57			(4.30)		31.60-31.90	C21			
										32.00	D22			
			100	73	63					32.60-32.90	C23			
										33.00-33.40	C24			
05/01/17	13.50	2.10				-28.56		33.50	End of Borehole					

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	17/01/17	5.02	E 542594.1 N 180293.7	32.00m
	Date Completed 19/01/17			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	32.00	CP	17/01/2017	19/01/2017	ST	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)
14.00	18.00
25.00	27.00
28.00	31.50

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks
25.50	26.40	0:40	Sand
26.70	27.00	0:30	Flinty Chalk
28.50	30.00	1:15	Flinty Chalk
31.00	32.00	1:00	Flinty Chalk

HOLE

Depth (m)	Diameter (mm)
0.00	200
24.00	200
32.00	150

CASING

Depth (m)	Diameter (mm)
0.00	200
15.00	200
26.70	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
12.80	32.00	Cement / Bentonite Grout	19/01/2017

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	17/01/17	5.02	E 542594.1 N 180293.7	32.00m
	Date Completed 19/01/17			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
17/01/17	0.00			
17/01/17	12.80	12.80	1.00	... see Remark 3
17/01/17	13.00	12.90	1.00	
17/01/17	14.00	13.60	2.00	
17/01/17	15.00	13.60	2.40	
17/01/17	16.00	14.50	3.00	
17/01/17	17.00	15.00	3.10	
17/01/17	18.00	15.00	3.60	
17/01/17	19.50	15.00	3.10	
17/01/17	21.00	15.00	2.90	
18/01/17	21.00	15.00	1.00	
18/01/17	24.00	15.00	1.50	
18/01/17	25.50	25.00	1.70	
18/01/17	27.00	26.70	1.80	
18/01/17	27.00	26.70	2.10	
19/01/17	27.00	26.70	1.00	
19/01/17	28.50	26.70	1.00	
19/01/17	30.00	26.70	1.30	
19/01/17	31.50	26.70	1.50	
19/01/17	32.00	26.70	1.50	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	13.00	N50/0.275	4, 7 / 7, 9, 17, 17	12.90	1.00
C	14.00	N50/0.07	25 / 50	13.60	2.00
S	15.00	N50/0.07	15, 10 / 50	13.60	2.40
S	16.00	N50/0.105	11, 14 / 35, 15	14.50	3.00
S	17.00	N50/0.16	7, 12 / 22, 20, 8	15.00	3.10
S	18.00	N50/0.21	8, 12 / 17, 20, 13	15.00	3.60
S	19.50	N50/0.2	7, 15 / 15, 23, 12	15.00	3.10
S	21.00	N50/0.25	5, 7 / 11, 16, 18, 5	15.00	2.90
S	22.50	N50/0.19	8, 12 / 18, 20, 12	15.00	1.00
S	24.00	N50/0.28	7, 10 / 12, 13, 15, 10	15.00	1.50
S	25.50	N38	5, 8 / 8, 9, 10, 11	25.00	1.70
S	27.00	N50/0.255	6, 7 / 8, 15, 15, 12	26.70	1.80
S	28.50	N50	8, 13 / 10, 20, 7, 13	26.70	1.00
S	30.00	N50/0.265	5, 7 / 8, 10, 20, 12	26.70	1.20
S	31.50	N43	8, 8 / 6, 7, 11, 19	26.70	1.50

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Ø200mm casing used from pontoon level to 15.00m depth. Bentonite seal inserted between 14.00m and 15.00m and borehole re-drilled with Ø150mm casing to 26.70m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	17/01/17	5.02	E 542594.1 N 180293.7	32.00m
	Date Completed 19/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
17/01/17						Water					
					(12.80)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	Date Completed 17/01/17 19/01/17	5.02	E 542594.1 N 180293.7	32.00m

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
17/01/17	12.80	1.00	-7.78		12.80		12.80-13.00	B01			
17/01/17	12.90	1.00	-7.98		13.00	Dark grey, very clayey SILT. (DOCK SEDIMENT)	13.00		N50/ 275 mm	4, 7 / 7, 9, 17, 17	
					(1.00)	Dark grey, clayey sandy angular to well rounded fine to coarse flint GRAVEL with occasional flint cobbles (<70mm). (RIVER TERRACE DEPOSITS)	13.00-13.50	B02			
17/01/17	13.60	2.00	-8.98		14.00		14.00		N50/ 70 mm	25 / 50	
						Light grey, silty fine SAND. (THANET SAND FORMATION: THANET SAND)	14.00-14.50	B03			
						14.00 ... becoming slightly sandy					
17/01/17	13.60	2.40					15.00		N50/ 70 mm	15, 10 / 50	
							15.00-15.20	D04			
							15.50-16.00	B05			
17/01/17	14.50	3.00					16.00		N50/ 105 mm	11, 14 / 35, 15	
							16.00-16.40	D06			
							16.50-17.00	B07			
17/01/17	15.00	3.10					17.00		N50/ 160 mm	7, 12 / 22, 20, 8	
							17.00-17.45	D08			
							17.50-18.00	B09			
17/01/17	15.00	3.60					18.00		N50/ 210 mm	8, 12 / 17, 20, 13	
						18.00 ... becoming clayey					
							18.00-18.35	D10			
							19.00-19.50	B11			
17/01/17	15.00	3.10					19.50		N50/ 200 mm	7, 15 / 15, 23, 12	
							19.50-19.85	D12			
							20.00-20.50	B13			

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	17/01/17	5.02	E 542594.1 N 180293.7	32.00m
	Date Completed 19/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	3 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
					(12.70)	20.00 ... becoming very clayey					
17/01/17	15.00	2.90					21.00		N50/ 250 mm	5, 7 / 11, 16, 18, 5	
18/01/17	15.00	1.00					21.00-21.45	D14			
							22.00-22.50	B15			
							22.50		N50/ 190 mm	8, 12 / 18, 20, 12	
							22.50-23.00	D16			
							23.50-24.00	B17			
18/01/17	15.00	1.50					24.00		N50/ 280 mm	7, 10 / 12, 13, 15, 10	
							24.00-24.50	D18			
							25.00-25.50	B19			
18/01/17	25.00	1.70					25.50		N38	5, 8 / 8, 9, 10, 11	
							25.50-25.90	D20			
							26.40-26.80	B21			
			-21.68		26.70		26.70-27.00	B22			
18/01/17	26.70	1.80	-21.98		27.00	Black, silty angular to subangular fine to coarse rinded flint GRAVEL with rare angular to subangular black rinded flint cobbles. (THANET SAND FORMATION: BULLHEAD BEDS)	27.00		N50/ 255 mm	6, 7 / 8, 15, 15, 12	
19/01/17	26.70	1.00					27.00-27.50	D23			
						[NI] White CHALK recovered as: soft, white gravelly SILT. Gravel is weak, medium to low density angular to subangular fine to coarse chalk fragments. (SEAFORD CHALK FORMATION)	28.00-28.50	B24			
19/01/17	26.70	1.00				28.00 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density white chalk fragments and black rinded flint with rare black angular to subangular rinded flint cobbles	28.50		N50	8, 13 / 10, 20, 7, 13	
							28.50-28.90	D25			
						28.50 ... [NI] recovered as: soft, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint with rare black rinded flint cobbles					
					(5.00)		29.50-30.00	B26			
						29.50 ... with occasional cobble size medium density, angular to subangular chalk fragments					
19/01/17	26.70	1.30					30.00		N50/ 265 mm	5, 7 / 8, 10, 20, 12	

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Borehole No

BH09

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	Date Completed 17/01/17 – 19/01/17	5.02	E 542594.1 N 180293.7	32.00m

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	4 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
						30.00 ... [NI] recovered as: soft, white gravelly SILT. Gravel is weak, medium density angular to subangular fine to coarse chalk fragments	30.00-30.45	D27			
							31.00-31.50	B28			
19/01/17	26.70	1.50					31.50		N43	8, 8 / 6, 7, 11, 19	
						31.50 ... becoming silty with rare cobble size chalk fragments	31.50-31.90	D29			
							31.50-32.00	B30			
19/01/17	26.70	1.50	-26.98		32.00	31.51 ... [NI] recovered as: soft, white gravelly SILT. Gravel is weak, medium density angular to subangular fine to coarse chalk fragments					
						End of Borehole					

Issue No:	Checked By:	Approved By:	Log Print Date & Time:
01	AN	OS	03/03/2017 17:45

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Borehole No

BH10

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	32.50	CP	23/11/2016	24/11/2016	SW	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)
23.50	27.50

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	200
17.50	200
32.50	150

CASING

Depth (m)	Diameter (mm)
0.00	200
17.50	200
24.00	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
11.80	32.50	Cement / Bentonite Grout	24/11/2016

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

CONCEPT
Unit 8 Warple Mews, Warple Way
London, W3 0RF
Telephone: 0208812880_
E-mail: si@conceptconsultants.co.uk

Borehole No

BH10

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
23/11/16	0.00			
23/11/16	12.50	12.50	1.20	... see Remark 3
23/11/16	13.50	13.50	1.50	
23/11/16	14.50	14.50	1.60	
23/11/16	15.50	15.50	1.30	
23/11/16	16.50	16.50	1.80	
23/11/16	17.50	16.60	1.65	
24/11/16	17.50	16.60	1.10	
24/11/16	18.00	18.00	1.10	
24/11/16	19.50	19.00	1.40	
24/11/16	21.00	19.00	2.10	
24/11/16	22.50	19.00	2.70	
24/11/16	24.00	24.00	GL	
24/11/16	25.50	24.00	GL	
24/11/16	27.00	24.00	GL	
24/11/16	28.50	24.00	1.10	
24/11/16	30.00	24.00	1.90	
24/11/16	31.50	24.00	2.70	
24/11/16	32.50	24.00	2.70	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	12.50	N18	3, 4 / 5, 5, 4, 4	12.50	1.20
C	13.50	N12	2, 3 / 3, 4, 3, 2	13.50	1.50
C	14.50	N16	2, 2 / 3, 4, 4, 5	14.50	1.60
C	15.50	N28	3, 4 / 5, 7, 7, 9	15.50	1.30
S	16.50	N50/0.085	4, 10 / 39, 11	16.50	1.80
S	18.00	N50/0.153	5, 14 / 21, 24, 5	18.00	1.10
S	19.50	N50/0.13	7, 15 / 25, 25	19.00	1.40
S	21.00	N50/0.17	6, 15 / 17, 21, 12	19.00	2.10
S	22.50	N50/0.165	4, 10 / 16, 23, 11	19.00	2.70
S	24.00	N50/0.155	7, 15 / 21, 21, 8	24.00	GL
S	25.50	N50/0.155	6, 12 / 19, 24, 7	24.00	GL
S	27.00	N55/0.25	4, 13 / 20, 15, 12, 8	24.00	GL
S	28.50	N31	3, 5 / 7, 7, 8, 9	24.00	1.10
S	30.00	N36	4, 6 / 8, 8, 10, 10	24.00	1.90
S	31.50	N42	5, 7 / 8, 10, 12, 12	24.00	2.70

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Ø200mm casing used from pontoon level to 17.50m depth. Bentonite seal inserted between 16.00m and 17.50m and borehole re-drilled with Ø150mm casing to 24.00m depth.
5. Borehole collapsing at 23.50m up to 19.00m depth. Casing advanced and borehole re-drilled.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

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CONCEPT
Unit 8 Warple Mews, Warple Way
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Borehole No

BH10

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
23/11/16						Water					
					(11.80)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH10

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS				
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			-7.46		11.80		11.80			... VOC 0.4ppm	
							11.80	ES01			
						Dark grey slightly sandy gravelly SILT with strong hydrocarbon odour. Gravel is angular to subrounded fine to coarse flint. Sand is fine to coarse.	11.80-12.20	B02			
					(0.70)						
23/11/16	12.50	1.20	-8.16		12.50	(DOCK SEDIMENT)	12.50		N18	3, 4 / 5, 5, 4, 4	
						Dark grey sandy angular to well rounded fine to coarse flint GRAVEL with rare well rounded flint cobbles and strong hydrocarbon odour. Sand is fine to coarse.	12.50			... VOC 0.2ppm	
							12.50	ES03			
					(0.75)		12.50-13.00	B04			
			-8.91		13.25	(RIVER TERRACE DEPOSITS)	13.25	D05			
23/11/16	13.50	1.50				Dark brown very sandy angular to well rounded fine to coarse flint GRAVEL with rare subangular flint cobbles. Sand is fine to coarse.	13.50		N12	2, 3 / 3, 4, 3, 2	
							13.50			... VOC 0.5ppm	
							13.50	ES06			
						(RIVER TERRACE DEPOSITS)	13.50-14.00	B07			
							14.25	D08			
23/11/16	14.50	1.60			(2.25)	14.25 ... becoming slightly sandy	14.50		N16	2, 2 / 3, 4, 4, 5	
							14.50-15.00	B09			
							15.25	D10			
23/11/16	15.50	1.30	-11.16		15.50		15.50		N28	3, 4 / 5, 7, 7, 9	
							15.50-15.80	B11			
			-11.46		15.80	Dark brown very gravelly fine to coarse SAND. Gravel is angular to well rounded fine to coarse flint.	15.80-16.00	B12			
						(RIVER TERRACE DEPOSITS)					
						Light grey silty fine SAND.	16.25	D13			
						(THANET SAND FORMATION: THANET SAND)					
23/11/16	16.50	1.80					16.50		N50/ 85 mm	4, 10 / 39, 11	
							16.50	D14			
							17.00-17.50	B15			
						17.00 ... becoming clayey					
23/11/16	16.60	1.65									
24/11/16	16.60	1.10									
24/11/16	18.00	1.10					18.00		N50/ 153 mm	5, 14 / 21, 24, 5	
							18.00	D16			
							18.50-19.00	B17			
24/11/16	19.00	1.40					19.50		N50/ 130 mm	7, 15 / 25, 25	
							19.50	D18			
							20.00-20.50	B19			

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Borehole No

BH10

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	3 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
24/11/16	19.00	2.10			(11.20)	21.50 ... becoming slightly clayey	21.00		N50/ 170 mm	6, 15 / 17, 21, 12	
							21.00 21.50-22.00	D20 B21			
24/11/16	19.00	2.70					22.50		N50/ 165 mm	4, 10 / 16, 23, 11	
							22.50 23.00-23.50	D22 B23			
24/11/16	24.00	GL					24.00		N50/ 155 mm	7, 15 / 21, 21, 8	
							24.00 24.50-25.00	D24 B25			
24/11/16	24.00	GL					25.50		N50/ 155 mm	6, 12 / 19, 24, 7	
							25.50 26.00-26.50	D26 B27			
24/11/16	24.00	GL	-22.66		27.00		27.00		N55/ 250 mm	4, 13 / 20, 15, 12, 8	
					(0.50)	White CHALK recovered as: soft, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint with occasional pockets of dark green glauconitic fine sand (<10mm). (SEAFORD CHALK FORMATION)	27.00 27.50-28.00	D28 B29			
			-23.16		27.50						
24/11/16	24.00	1.10				White CHALK recovered as: very silty angular to subangular fine to coarse GRAVEL with rare moderately weak, medium density white chalk cobbles. Gravel comprises weak, medium density white chalk fragments and black rinded flint. (SEAFORD CHALK FORMATION) 28.50 ... [NI] recovered as: soft to firm, white gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint 29.00 ... with rare cobble size black rinded flint	28.50 28.50	D30	N31	3, 5 / 7, 7, 8, 9	
							29.00-29.50	B31			
24/11/16	24.00	1.90					30.00		N36	4, 6 / 8, 8, 10, 10	

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Borehole No

BH10

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.34	E 542647.5 N 180376.8	32.50m
	Date Completed 24/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	4 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
					(5.00)	30.00 ... [NI] recovered as: soft to firm, white slightly gravelly SILT. Gravel is angular to subangular fine to medium extremely weak, low density chalk fragments	30.00	D32			
							31.00	D33			
						31.00 ... [NI] recovered as: very soft, white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	31.50		N42	5, 7 / 8, 10, 12, 12	
24/11/16	24.00	2.70				31.50 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel comprises angular to subangular fine to medium weak, medium density chalk fragments and black rinded flint	31.50	D34			
						32.00 ... with rare angular to subangular fine to coarse black rinded flint gravel	32.00-32.50	B35			
24/11/16	24.00	2.70	-28.16		32.50	End of Borehole					

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Borehole No

BH10R

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	16.00	DS	29/11/2016	29/11/2016	TC	CB			Geotec 350	AR779
16.00	32.80	RC	29/11/2016	01/12/2016	TC	CB	112	PDC	Geotec 350	AR779

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	150
17.00	150
32.00	146

CASING

Depth (m)	Diameter (mm)
0.00	150
17.00	150

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
16.00	16.50	Water	20	
16.50	17.80	Water	30	
17.80	20.00	Water	90	
20.00	24.50	Water	30	
24.50	26.00	Water	90	
26.00	32.80	Water	30	

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
12.00	32.80	Cement / Bentonite Grout	01/12/2016

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)
12.00	12.70		100
12.70	13.70		100
13.70	14.40		100
14.40	15.40		100
15.40	16.00		100
16.00	16.50		100
16.50	17.80		100
17.80	20.00		0
20.00	21.00		100
21.00	21.90		100
21.90	23.00		100
23.00	24.50		100
24.50	26.00		0
26.00	27.50		90
27.50	29.00		100
29.00	29.80		100
29.80	31.30		100
31.30	32.80		100

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Borehole No

BH10R

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
29/11/16	0.00			
29/11/16	16.50	15.50	0.90	... see Remark 4
30/11/16	16.50	15.50	1.60	
30/11/16	17.80	15.50	1.40	
01/12/16	17.80	15.50	2.10	
01/12/16	21.90	17.00	GL	
01/12/16	32.80	17.00	1.20	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Dynamic sampling techniques used from 12.00m to 16.00m. Rotary boring carried out thereafter.
4. Water present in the borehole from casing installation through the dock.
5. Pressuremeter tests carried out at 19.00m and 25.10m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

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Borehole No

BH10R

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	1 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
29/11/16									Water					
								(12.00)						

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Borehole No

BH10R

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	2 of 4

PROGRESS			STRATA								SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description		Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
						-7.54		12.00							
			100			-8.14		(0.60) 12.60	Very soft, brown silty CLAY with occasional dark grey staining. (DOCK SEDIMENT) 12.20 ... becoming dark grey with strong hydrocarbon odour.		12.50			... VOC 0.1ppm	
											12.50	ES01			
						-8.44		12.90	12.40 ... with 1No wood fragment		12.50	D02			
			100					(0.90)	Dark grey angular to well rounded fine to coarse flint GRAVEL with strong hydrocarbon odour. (RIVER TERRACE DEPOSITS) 12.70 ... with no hydrocarbon odour		13.50			... VOC 0.0ppm	
						-9.34		13.80	Dark brown very gravelly fine to coarse SAND. Gravel is angular to well rounded fine to coarse flint. (RIVER TERRACE DEPOSITS)		13.50	ES03			
											13.50	B04			
			100			-9.94		(0.60) 14.40	Dark brown angular to well rounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS) 14.00 ... with rare flint cobbles		14.10	B05			
						-10.34		(0.40) 14.80	Light brown fine to coarse SAND. (RIVER TERRACE DEPOSITS)						
			100					(0.90)	Dark brown very sandy angular to well rounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)		15.10	B06			
									15.30 ... becoming sandy. Sand is fine to coarse		15.50	B07			
			100			-11.24		15.70	15.40 ... with occasional wood fragments (<50mm) and no sand 15.60 ... becoming sandy. Sand is fine to coarse						
									Light grey fine silty SAND. (THANET SAND FORMATION: THANET SAND) 16.00 ... with occasional angular to well rounded fine to coarse flint gravel		16.00	B08			
			100												
29/11/16	15.50	0.90													
30/11/16	15.50	1.60													
											17.00	B09			
			100												
30/11/16	15.50	1.40													
01/12/16	15.50	2.10													
			0								19.00			... Pressuremeter test at 19.00m depth	

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Borehole No

BH10R

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

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16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	3 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
									20.00 ... becoming clayey					
			100							20.50	B10			
									20.50 ... becoming slightly clayey					
									21.00 ... becoming locally clayey					
			100					(11.60)		21.50	B11			
01/12/16	17.00	GL							21.90 ... becoming clayey					
			100							22.50	B12			
										23.50	B13			
			100											
										25.10			... Pressuremeter test at 25.10m depth	
			0											
									26.00 ... becoming very clayey					
			90							27.00	B14			
						-22.84		27.30						
						-23.04		27.50	Black angular to subangular medium to coarse rinded flint GRAVEL with rare flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)					
									Strong, medium density white CHALK with rare coarse flint cobbles. (SEAFORD CHALK FORMATION)					
			100	80	73				27.75 ... with 1No horizontal fracture 27.90 ... with 1No wide open horizontal fracture 28.10 ... with 1No wide open horizontal fracture infilled with gravel size angular to subangular fine to coarse weak, medium density chalk fragments and at 28.25m 28.40 ... with 1No horizontal fracture and at 28.50m	28.10-28.30	C15			
			100	84	81				28.50 - 28.90 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density off-white chalk fragments and black rinded flint 28.90 - 29.00 ... with a vertical fracture 29.10 ... with rinded flint gravel	29.20-29.50 29.70-29.95	C16 C17			
			100	73	53				29.30 ... with 1No horizontal fracture					

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
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Borehole No

BH10R

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	23/11/16	4.46	E 542651.7 N 180376.7	32.80m
	Date Completed 28/11/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Dynamic Sampling / Rotary	4 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
								(5.30)	29.50 ... with rinded flint gravel 29.55 - 29.70 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with rare weak, medium density white chalk cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint					
			100	73	53				29.85 ... with 1No horizontal fracture and at 29.90m 30.10 ... with 1No wide open fracture infilled with gravel size angular to subangular fine to coarse weak, medium density chalk fragments 30.40 - 30.70 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with occasional weak, medium density white chalk cobbles and rare black rinded flint cobbles. Gravel comprises weak, medium density white chalk fragments and medium to coarse black rinded flint					
			100	93	87				31.30 - 31.40 ... with 1No vertical fracture 31.40 - 31.50 ... with 1No wide open horizontal fracture infilled with gravel size angular to subangular fine to coarse weak, medium density chalk fragments	32.00-32.20	C18			
01/12/16	17.00	1.20				-28.34		32.80	31.60 ... with 1No horizontal fracture and at 31.65m 31.70 ... with 1No wide open horizontal fracture infilled with gravel size angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint with 1No black rinded flint cobble 32.00 ... with 1No horizontal fracture and at 32.30m and 32.35m 32.60 ... with 1No wide open fracture 32.75 ... with 1No wide open fracture infilled with angular to subangular medium to coarse black rinded flint gravel 32.80 ... with occasional angular to subangular medium to coarse black rinded flint gravel End of Borehole					

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	31.50	CP	15/12/2016	19/12/2016	ST	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks
21.00	24.00	2:00	

HOLE

Depth (m)	Diameter (mm)
0.00	200
24.00	200
31.50	150

CASING

Depth (m)	Diameter (mm)
0.00	200
17.40	200
25.00	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
13.50	31.50	Cement / Bentonite Grout	19/12/2016

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

CONCEPT
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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
15/12/16	0.00			
15/12/16	14.00	13.90	3.00	... see Remark 3
15/12/16	15.00	14.80	0.80	
15/12/16	16.00	15.70	2.00	
15/12/16	17.00	16.90	1.30	
15/12/16	18.00	17.10	2.00	
16/12/16	18.00	17.10	1.50	
16/12/16	19.50	17.40	1.60	
16/12/16	21.00	17.40	1.20	
16/12/16	22.50	17.40	2.00	
16/12/16	24.00	17.40	1.50	
16/12/16	25.50	25.00	1.70	
16/12/16	27.00	25.00	2.30	
16/12/16	28.50	25.00	3.10	
19/12/16	28.50	25.00		
19/12/16	30.00	25.00	4.00	
19/12/16	31.50	25.00	5.00	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
	14.00	N50/0.08	25 / 42, 8	13.90	3.00
	15.00	N50/0.075	10, 15 / 50	14.80	0.80
	16.00	N50/0.115	14, 11 / 30, 20	15.70	2.00
	17.00	N50/0.18	8, 8 / 18, 26, 6	16.90	1.30
	18.00	N50/0.155	6, 10 / 15, 23, 12	17.10	2.00
	19.50	N50/0.155	8, 16 / 20, 24, 6	17.40	1.60
	21.00	N50/0.17	10, 14 / 18, 22, 10	17.40	1.20
	22.50	N50/0.275	10, 10 / 12, 14, 8, 16	17.40	2.00
	24.00	N50/0.225	4, 8 / 14, 15, 21	17.40	1.50
	25.50	N50/0.225	6, 9 / 12, 18, 20	25.00	1.70
	27.00	N26	4, 5 / 5, 7, 7, 7	25.00	2.30
	28.50	N50/0.23	12, 12 / 12, 14, 20, 4	25.00	3.10
	30.00	N41	6, 7 / 8, 7, 9, 17	25.00	4.00
	31.50	N33	5, 7 / 6, 8, 8, 11	25.00	5.00

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Ø200mm casing used from pontoon level to 17.40m depth. Bentonite seal inserted between 22.00m and 24.00m and borehole re-drilled with Ø150mm casing to 25.00m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:43

CONCEPT
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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
15/12/16						Water					
					(13.50)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

CONCEPT
Unit 8 Warple Mews, Warple Way
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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS				
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			-8.58		13.50		13.50-13.80	B01			
			-8.88		13.80	Soft, dark grey very gravelly silty CLAY with strong hydrocarbon odour. Gravel is angular to rounded fine to coarse flint. (DOCK SEDIMENT)	13.80-14.00	B02			
15/12/16	13.90	3.00	-9.08		14.00		14.00		N50/ 80 mm	25 / 42, 8	
						Dark grey very clayey silty sandy angular to well rounded fine to coarse flint GRAVEL with strong hydrocarbon odour. (RIVER TERRACE DEPOSITS)	14.00-14.50	B03			
15/12/16	14.80	0.80				Light grey silty fine SAND. Sand is fine to coarse. (THANET SAND FORMATION: THANET SAND)	15.00		N50/ 75 mm	10, 15 / 50	
							15.00	D04			
							15.50-16.00	B05			
15/12/16	15.70	2.00					16.00		N50/ 115 mm	14, 11 / 30, 20	
						16.00 ... becoming clayey					
							16.00	D06			
							16.50-17.00	B07			
15/12/16	16.90	1.30					17.00		N50/ 180 mm	8, 8 / 18, 26, 6	
							17.00	D08			
							17.50-18.00	B09			
15/12/16	17.10	2.00					18.00		N50/ 155 mm	6, 10 / 15, 23, 12	
16/12/16	17.10	1.50									
							18.00	D10			
							18.50-19.00	B11			
16/12/16	17.40	1.60					19.50		N50/ 155 mm	8, 16 / 20, 24, 6	
							19.50	D12			

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	3 of 4

PROGRESS			STRATA				SAMPLES & TESTS				
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
					(12.50)		20.50-21.00	B13			
16/12/16	17.40	1.20					21.00		N50/ 170 mm	10, 14 / 18, 22, 10	
							21.00	D14			
							21.50-22.00	B15			
16/12/16	17.40	2.00					22.50		N50/ 275 mm	10, 10 / 12, 14, 8, 16	
							22.50	D16			
							23.00-23.50	B17			
						23.00 ... becoming very clayey					
16/12/16	17.40	1.50					24.00		N50/ 225 mm	4, 8 / 14, 15, 21	
							24.00	D18			
							24.50-25.00	B19			
16/12/16	25.00	1.70					25.50		N50/ 225 mm	6, 9 / 12, 18, 20	
							25.50	D20			
			-21.58		26.50		26.50-27.00	B21			
					(0.50)	Black angular to subangular fine to coarse rinded flint GRAVEL with rare flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)					
16/12/16	25.00	2.30	-22.08		27.00		27.00		N26	4, 5 / 5, 7, 7, 7	
							27.00	D22			
						White CHALK recovered as: firm, white SILT. (SEAFORD CHALK FORMATION)	27.50-28.00	B23			
						27.50 ... becoming very gravelly. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint					
16/12/16	25.00	3.10					28.50		N50/ 230 mm	12, 12 / 12, 14, 20, 4	
19/12/16	25.00										
							28.50	D24			
							29.00-29.50	B25			
					(4.50)	29.00 - 29.50 ... with rare angular to subangular black rinded flint cobbles					
19/12/16	25.00	4.00					30.00		N41	6, 7 / 8, 7, 9, 17	

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

CONCEPT
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Borehole No

BH11

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	15/12/16	4.92	E 542650.5 N 180345.6	31.50m
	Date Completed 19/12/16			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	4 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
							30.00	D26			
							30.50-31.00	B27			
19/12/16	25.00	5.00	-26.58		31.50		31.50		N33	5, 7 / 6, 8, 8, 11	
						End of Borehole	31.50	D28			

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

CONCEPT
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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	32.00	RC	06/01/2017	09/01/2017	TC	CB	112	PDC	Geotec 350	AR779

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)

WATER ADDED

From (m)	To (m)

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks

HOLE

Depth (m)	Diameter (mm)
0.00	150
14.00	150
32.00	146

CASING

Depth (m)	Diameter (mm)
0.00	150
14.00	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)
14.00	15.50		73
15.50	17.00		100
17.00	18.50		93
18.50	20.00		93
20.00	21.50		93
21.50	23.00		100
23.00	24.50		93
24.50	26.00		87
26.00	27.50		73
27.50	29.00		93
29.00	30.50		100
30.50	32.00		100

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
14.00	32.50	Water	100	

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
14.00	32.00	Cement / Bentonite Grout	09/01/2017

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:42

CONCEPT
Unit 8 Warple Mews, Warple Way
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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
06/01/17	0.00			
06/01/17	14.00	14.00		... Rotary flush
06/01/17	23.00	14.00	2.10	
09/01/17	23.00	14.00		
09/01/17	32.00	14.00		

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
S	17.00	N50/0.225	4, 8 / 10, 17, 23	14.00	
S	18.50	N50/0.25	6, 9 / 12, 13, 18, 7	14.00	
S	20.00	N50/0.17	7, 10 / 15, 20, 15	14.00	
S	21.50	N50/0.21	8, 8 / 15, 18, 17	14.00	
S	23.00	N50/0.225	8, 10 / 13, 17, 20	14.00	
S	24.50	N50/0.225	7, 11 / 14, 16, 19, 1	14.00	
S	26.00	N34	5, 4 / 6, 8, 9, 11	14.00	
S	27.50	N50/0.26	5, 7 / 9, 13, 16, 12	14.00	
S	29.00	N48	4, 7 / 8, 10, 11, 19	14.00	
S	30.50	N37	3, 6 / 8, 8, 9, 12	14.00	
S	32.00	N41	4, 7 / 9, 9, 10, 13	14.00	

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:44

CONCEPT
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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Rotary	1 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
06/01/17									Water					
								(14.00)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Rotary	2 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
06/01/17	14.00					-8.71		14.00		14.10			... VOC 0.1ppm	
						-8.91		14.20	Dark grey clayey silty angular to well rounded fine to coarse flint GRAVEL with strong hydrocarbon odour. (DOCK SEDIMENT / RIVER TERRACE DEPOSITS)	14.10	ES01			
										14.50	B02			
			73						Light grey silty fine SAND. (THANET SAND FORMATION: THANET SAND)					
										15.50			... VOC 0.0ppm	
										15.50	ES03			
										16.00	B04			
			100						16.20 ... becoming slightly clayey					
										17.00		N50/ 225 mm	4, 8 / 10, 17, 23	
										17.00	D05			
										17.50	B06			
			93											
										18.50		N50/ 250 mm	6, 9 / 12, 13, 18, 7	
										18.50	D07			
			93											
										19.50	B08			
								(11.50)		20.00		N50/ 170 mm	7, 10 / 15, 20, 15	

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:48

CONCEPT
Unit 8 Warple Mews, Warple Way
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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Rotary	3 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
									20.00 ... becoming clayey					
										20.00	D09			
										20.00	D10			
										20.50	B11			
			93											
										21.50		N50/ 210 mm	8, 8 / 15, 18, 17	
			100							22.50	B12			
06/01/17	14.00	2.10								23.00		N50/ 225 mm	8, 10 / 13, 17, 20	
09/01/17	14.00								23.00 ... becoming very clayey					
										23.00	D13			
			93							23.50	B14			
										24.50		N50/ 225 mm	7, 11 / 14, 16, 19, 1	
			87							25.50	B15			
						-20.41		25.70						
								(0.60)	Black angular to subangular medium to coarse rinded flint GRAVEL with rare flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)	26.00		N34	5, 4 / 6, 8, 9, 11	
						-21.01		26.30						
			73	38	33				White CHALK recovered as: firm, white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint. (SEAFORD CHALK FORMATION)	27.00-27.25	C16			
									26.90 ... with a black rinded flint cobble					
									26.95 ... becoming strong, medium density white chalk					
									27.00 ... with 1No horizontal fracture	27.50		N50/ 260 mm	5, 7 / 9, 13, 16, 12	
									27.40 ... with a wide open subvertical fracture					
									27.50 - 27.80 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel comprises weak, medium density chalk fragments and rare black rinded flint	27.50	D17			
			93	60	57				27.80 ... with 1No horizontal fracture	28.25-28.55	C18			
									27.80 - 27.90 ... with occasional subhorizontal and subvertical fractures					
									28.10 ... with 1No wide open horizontal fracture					
									28.20 ... with 1No horizontal fracture					
									28.50 ... with 1No horizontal fracture infilled with angular to subangular fine to coarse gravel size weak, medium density chalk fragments and coarse gravel size black rinded flint	29.00		N48	4, 7 / 8, 10, 11, 19	
								(5.70)						
			100	47	40				28.60 ... with 1No horizontal fracture	29.55-29.75	C19			
									28.70 ... with 1No subhorizontal fracture					
									29.00 - 29.50 ... [NI] recovered as: angular to subangular fine to coarse very silty GRAVEL. Gravel comprises weak, medium density chalk fragments and					

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Borehole No

BH12

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	06/01/17	5.29	E 542653.4 N 180305.6	32.00m
	Date Completed 09/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Rotary	4 of 4

PROGRESS			STRATA							SAMPLES & TESTS				
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			100	47	40				black rinded flint 29.60 ... with 1No horizontal fracture 29.80 ... with 1No wide open horizontal fracture infilled with weak, medium density chalk fragments	30.50 30.50	D20	N37	3, 6 / 8, 8, 9, 12	
			100	67	57				29.90 ... with subhorizontal and subvertical fractures 30.00 - 30.10 ... with occasional subhorizontal and subvertical fractures 30.20 ... with 1No subhorizontal fracture 30.35 - 30.45 ... with angular to subangular fine to coarse gravel size and cobble size black rinded flint 30.50 - 30.80 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel is weak, medium density chalk fragments 30.90 ... with 1No subvertical fracture and at 31.10m and 31.40m 31.60 ... with 1No horizontal fracture	31.20-31.45	C21			
09/01/17	14.00					-26.71		32.00	End of Borehole	32.00		N41	4, 7 / 9, 9, 10, 13	

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Borehole No

BH13

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	05/01/17	4.88	E 542716.5 N 180368.2	34.50m
	Date Completed 10/01/17			

Client

London City Airport Limited

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Core Barrel (mm)	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	34.50	CP	05/01/2017	10/01/2017	ST	CB			Dando 175	AR909

WATER STRIKES

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)
19.50	18.53	20	17.50	

WATER ADDED

From (m)	To (m)
16.00	23.50

CHISELLING / SLOW DRILLING

From (m)	To (m)	Duration (hr)	Remarks
29.50	34.50	4:00	Flinty chalk

HOLE

Depth (m)	Diameter (mm)
0.00	200
24.00	200
34.50	150

CASING

Depth (m)	Diameter (mm)
0.00	200
17.50	200
25.50	150

ROTARY RECOVERY

From (m)	To (m)	Blows	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date
12.50	34.50	Cement / Bentonite Grout	10/01/2017

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Borehole No

BH13

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	05/01/17	4.88	E 542716.5 N 180368.2	34.50m
	Date Completed 10/01/17			

Client

London City Airport Limited

PROGRESS

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
05/01/17	0.00			
05/01/17	13.00	12.90	1.80	... see Remark 3
05/01/17	14.00	13.50	1.30	
05/01/17	15.00	14.40	1.50	
09/01/17	15.00	14.40	1.00	
09/01/17	16.00	15.50	1.00	
09/01/17	17.00	16.50	1.30	
09/01/17	18.00	17.50	2.00	
09/01/17	19.50	17.50	1.10	... Water Strike
09/01/17	21.00	17.50	0.90	
09/01/17	22.50	17.50	1.00	
09/01/17	24.00	17.50	1.20	
09/01/17	24.00	24.00	1.20	
10/01/17	24.00	24.00	1.20	
10/01/17	25.50	25.00	1.20	
10/01/17	27.00	25.50	1.10	
10/01/17	28.50	25.50	1.50	
10/01/17	30.00	25.50	1.60	
10/01/17	31.50	25.50	2.00	
10/01/17	33.00	25.50	1.60	
10/01/17	34.50	25.50	1.15	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	13.00	N34	5, 6 / 8, 8, 10, 8	12.90	1.80
C	14.00	N50/0.115	1, 8 / 25, 25	13.50	1.30
S	15.00	N50/0.04	10, 15 / 50	14.40	1.50
S	16.00	N50/0.06	25 / 50	15.50	1.00
S	17.00	N50/0.07	11, 14 / 50	16.50	1.30
S	18.00	N50/0.07	15, 10 / 50	17.50	2.00
S	19.50	N40/0.2	11, 10 / 7, 23, 10	17.50	1.10
S	21.00	N63	14, 7 / 13, 14, 22, 14	17.50	0.90
S	22.50	N50/0.18	8, 12 / 16, 22, 12	17.50	1.00
S	24.00	N50/0.22	7, 11 / 13, 20, 17	17.50	1.20
S	25.50	N50/0.155	10, 15 / 20, 27, 3	25.00	1.20
S	27.00	N50/0.2	6, 10 / 17, 20, 13	25.50	1.10
S	28.50	N39	5, 5 / 8, 8, 10, 13	25.50	1.50
S	30.00	N27	5, 5 / 3, 6, 10, 8	25.50	1.60
S	31.50	N38	4, 4 / 6, 7, 10, 15	25.50	2.00
S	33.00	N50	7, 8 / 8, 12, 15, 15	25.50	1.60
S	34.50	N50/0.07	6, 19 / 50	25.50	1.15

GENERAL REMARKS

1. Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
2. Clearance by UXO Magnetometer probe.
3. Water present in the borehole from casing installation through the dock.
4. Water seepage encountered at 19.50m depth, rising to 18.40m (5 mins), 18.45m (10 mins), 18.60m (15 mins) and 18.53m (20 mins).
5. Ø200mm casing used from pontoon level to 17.50m depth. Bentonite seal inserted between 24.00m and 26.00m and borehole re-drilled with Ø150mm casing to 25.50m depth.

KEY

SAMPLES

ES - Environmental Sample (Tub, Vial, Jar)
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

SPIE - Standpipe Piezometer
SPGW - Groundwater Monitor Standpipe
SPG/GW - Gas / Groundwater Monitor Standpipe
VWP - Vibrating Wire Piezometer
ICM - Inclinometer

HOLE TYPES

IP -Inspection Pit, TP-Trial Pit TT - Trial Trench
CP -Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS -Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC -Diamond Coring, CP/R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

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Borehole No

BH13

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	05/01/17	4.88	E 542716.5 N 180368.2	34.50m
	Date Completed 10/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	1 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
05/01/17						Water					
					(12.50)						

Issue No: 01	Checked By: AN	Approved By: OS	Log Print Date & Time: 03/03/2017 17:45

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Borehole No

BH13

Project

CADP Surveys Ground Investigation (Dock) - Phase 2

Job No	Date Started	Ground Level (mOD)	Co-Ordinates	Final Depth
16/2900	05/01/17	4.88	E 542716.5 N 180368.2	34.50m
	Date Completed 10/01/17			

Client	Method/ Plant Used	Sheet
London City Airport Limited	Cable Percussion	2 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
			-7.62		12.50		12.50			... VOC 0.2ppm	
						Dark grey clayey silty angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse.	12.50	ES01			
					(0.50)		12.50-13.00	B02			
05/01/17	12.90	1.80	-8.12		13.00	(DOCK SEDIMENT / RIVER TERRACE DEPOSITS)	13.00		N34	5, 6 / 8, 8, 10, 8	
							13.00			... VOC 0.1ppm	
						Light brown sandy angular to well rounded fine to coarse flint GRAVEL with low cobble content. Sand is fine to coarse. Cobbles are angular to well rounded flint. (RIVER TERRACE DEPOSITS)	13.00	ES03			
							13.00-13.50	B04			
05/01/17	13.50	1.30			(2.00)	14.00 ... with angular to subangular flint gravel	14.00		N50/ 115 mm	1, 8 / 25, 25	
							14.00-14.50	B05			
05/01/17	14.40	1.50	-10.12		15.00		15.00		N50/ 40 mm	10, 15 / 50	
09/01/17	14.40	1.00				Light grey fine SAND. (THANET SAND FORMATION: THANET SAND)	15.00	D06			
							15.50-16.00	B07			
09/01/17	15.50	1.00					16.00		N50/ 60 mm	25 / 50	
							16.00	D08			
							16.50-17.00	B09			
09/01/17	16.50	1.30					17.00		N50/ 70 mm	11, 14 / 50	
							17.00	D10			
							17.50-18.00	B11			
09/01/17	17.50	2.00				18.00 ... becoming slightly clayey	18.00		N50/ 70 mm	15, 10 / 50	
		1					18.00	D12			
							19.00-19.50	B13			
09/01/17	17.50	1.10					19.50		N40/ 200 mm	11, 10 / 7, 23, 10	
		1				19.50 ... becoming clayey	19.50	D14			

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