

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 28/11/16	Ground Level (mOD) 3.54	Co-Ordinates E 542909.9 N 180291.6	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
28/11/16					(11.50)	Water.					

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Job No 16/2900	Date Started 28/11/16	Ground Level (mOD) 3.54	Co-Ordinates E 542909.9 N 180291.6	Final Depth 33.00m
Date Completed 29/11/16		Method/ Plant Used Cable Percussion		Sheet 2 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
28/11/16	12.00	1.00	-7.96		11.50		11.50			... VOC 0.7ppm	
				x x x x x x x x x x x x x x x x	(1.30)	Very soft, dark grey SILT with strong hydrocarbon odour. (DOCK SEDIMENT) 12.00 ... becoming soft and slight gravelly. Gravel is angular to subangular fine to medium flint	11.50-12.00 12.00 12.00 12.00-12.50	ES01 B02 ES03 B04	N1	0, 0 / 0, 1, 0, 0 ... VOC 0.8ppm	
28/11/16	13.00	1.20	-9.26		12.80		12.80				
				o o o o o o o o o o o o o o o o	(0.95)	Dark grey angular to well rounded fine to coarse silty flint GRAVEL with strong hydrocarbon odour and rare wood fragments (<25mm). (RIVER TERRACE DEPOSITS) 13.00 ... becoming sandy with rare angular to well rounded flint cobbles. Sand is fine to coarse	13.00 13.00-13.50	D05 ES06 B07	N26	5, 7 / 7, 7, 7, 5 ... VOC 0.3ppm	
28/11/16	14.00	1.00	-10.21		13.75		13.75				
				o o o o o o o o o o o o o o o o	(2.45)	Dark brown angular to well rounded fine to coarse very sandy flint GRAVEL with rare angular to subangular flint cobbles. Sand is fine to coarse. (RIVER TERRACE DEPOSITS) 15.75 ... becoming sandy	14.00 14.00 14.00-14.50 14.75 15.00-15.50	D08 ES09 B10 D11 B12	N21 N32	3, 4 / 4, 6, 5, 6 ... VOC 0.4ppm 3, 5 / 7, 7, 8, 10	
28/11/16	16.00	1.60	-12.66		16.20		16.00-16.20 16.20-16.50				
				o o o o o o o o o o o o o o o o		Light grey fine slightly clayey SAND. (THANET SAND FORMATION: THANET SAND) 18.00 ... becoming clayey	16.00-16.20 16.20-16.50 17.00 17.50 17.50 18.00-18.50	B14 B15 D16 D17 B18	N50/ 210 mm	5, 7 / 12, 19, 19	
28/11/16	16.60	1.10					17.00 17.50				
				o o o o o o o o o o o o o o o o			17.50 18.00-18.50	D19 B20	N50/ 90 mm	11, 14 / 36, 14	
28/11/16	16.60	0.95					17.50 18.00-18.50				
				o o o o o o o o o o o o o o o o			19.00 19.00 19.50-20.00		N50/ 210 mm	5, 10 / 14, 17, 19	
29/11/16	16.60	1.10					19.00 19.00 19.50-20.00				
				o o o o o o o o o o o o o o o o							

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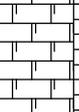
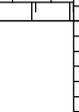
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Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 3 of 4

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
29/11/16	16.60	1.00					20.50		N50/ 230 mm	5, 11 / 14, 13, 16, 7	
							20.50 21.00-21.50	D21 B22			
29/11/16	16.60	1.30			(11.40)		22.00		N50/ 265 mm	6, 8 / 11, 13, 15, 11	
							22.00 22.50-23.00	D23 B24			
29/11/16	16.60	0.60					23.50		N50/ 230 mm	5, 9 / 12, 15, 18, 5	
						24.00 ... becoming very clayey	23.50 24.00-24.50	D25 B26			
29/11/16	25.00	0.30					25.00 25.00	D27	N47	6, 8 / 9, 11, 14, 13	
							25.50-26.00	B28			
29/11/16	25.00	0.90					26.50 26.50	D29	N45	4, 7 / 8, 11, 12, 14	
							27.00-27.50	B30			
			-24.06		27.60		27.60-28.00	B31			
29/11/16	25.00	0.50	-24.46		(0.40) 28.00	Black angular to subangular fine to coarse rinded flint GRAVEL with rare black rinded flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)	28.00 28.00	D32	N34	4, 5 / 7, 8, 9, 10	
						White CHALK recovered as: firm, slightly gravelly SILT. Gravel comprises angular to subangular fine to medium, extremely weak, low density chalk fragments. (SEAFORD CHALK FORMATION)	28.50-29.00	B33			
29/11/16	25.00	1.10				28.50 ... [NI] recovered as: angular to subangular fine to coarse very silty GRAVEL with occasional angular to subangular black rinded flint cobbles. Gravel is extremely weak, low density white chalk fragments	29.50 29.50	D34	N37	3, 5 / 7, 9, 9, 12	
						29.50 ... [NI] recovered as: firm, white SILT	30.00-30.50	B35			

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Job No 16/2900	Date Started 28/11/16	Ground Level (mOD) 3.54	Co-Ordinates E 542909.9 N 180291.6	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
29/11/16	25.00	1.30			5.00	30.00 ... recovered as: GRAVEL comprising weak, medium density chalk fragments with rare cobble size moderately weak, medium density chalk fragments	31.00		N50/ 295 mm	4, 9 / 11, 13, 11, 15	
						31.00 ... [NI] recovered as: firm, white SILT	31.00 31.50-32.00	D36 B37			
29/11/16	25.00	1.10				32.00 ... with no chalk cobbles					
29/11/16	25.00	1.10	-29.46		33.00	32.50 ... [NI] recovered as: firm, white SILT	32.50 32.50	D38	N48	5, 8 / 10, 12, 13, 13	
						End of Borehole					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 22/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542968.5 N 180348.4	Final Depth 32.00m
	Date Completed 23/11/16			

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	32.00	CP	22/11/2016	23/11/2016	SW	CB			Dando 175	AR909

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
							22.10 28.55	22.40 28.90	0:30 0:45	Gravel Gravel

HOLE		CASING	
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)
0.00	200	0.00	200
16.50	200	15.10	200
32.00	150	18.00	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	32.00	Cement / Bentonite Grout	23/11/2016

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 22/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542968.5 N 180348.4	Final Depth 32.00m
	Date Completed 23/11/16			

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
22/11/16	0.00				C	12.50	N12	2, 2 / 3, 3, 3, 3	12.50	1.00
22/11/16	12.50	12.50	1.00	... see Remark 3	C	13.50	N14	3, 4 / 4, 3, 4, 3	13.50	1.10
22/11/16	13.50	13.50	1.10		C	14.50	N19	5, 6 / 5, 5, 4, 5	14.50	1.30
22/11/16	14.50	14.50	1.30		S	15.50	N34	4, 5 / 6, 8, 10, 10	15.10	1.00
22/11/16	15.50	15.10	1.00		S	16.50	N50/0.295	4, 5 / 9, 10, 14, 17	15.10	1.20
22/11/16	16.50	15.10	1.20		S	18.00	N44	4, 6 / 8, 10, 12, 14	18.00	0.90
22/11/16	18.00	18.00	0.90		S	19.50	N45	3, 5 / 9, 9, 13, 14	18.00	1.10
22/11/16	19.50	18.00	1.10		S	21.00	N33	4, 5 / 7, 8, 8, 10	18.00	1.00
22/11/16	21.00	18.00	1.00		S	22.50	N23	3, 4 / 5, 7, 6, 5	18.00	1.40
22/11/16	22.50	18.00	1.40		S	24.00	N25	2, 3 / 5, 6, 6, 8	18.00	1.00
22/11/16	24.00	18.00	1.00		S	25.50	N36	3, 4 / 4, 11, 10, 11	18.00	1.10
22/11/16	25.50	18.00	1.10		S	27.00	N36	5, 7 / 9, 10, 8, 9	18.00	0.90
22/11/16	27.00	18.00	0.90		S	28.50	N50/0.18	9, 14 / 20, 19, 11	18.00	1.00
22/11/16	27.50	18.00	0.90		S	30.00	N39	4, 6 / 8, 9, 11, 11	18.00	1.10
23/11/16	27.50	18.00	0.95		S	31.50	N37	4, 6 / 7, 9, 10, 11	18.00	1.40
23/11/16	28.50	18.00	1.00							
23/11/16	30.00	18.00	1.10							
23/11/16	31.50	18.00	1.40							
23/11/16	32.00	18.00	1.40							

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe
- Water present in the borehole from casing installation through the dock.
- Ø200mm casing used from pontoon level to 15.10m depth. Bentonite seal inserted between 15.00m and 16.50m and borehole re-drilled with Ø150mm casing to 18.00m 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 - Inclinator

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, C/P-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

Project
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Date Completed 23/11/16		Method/ Plant Used Cable Percussion		Sheet 1 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
22/11/16					(11.90)	Water.					

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Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
22/11/16	12.50	1.00	-7.59		11.90	Soft, dark grey very gravelly SILT with strong hydrocarbon odour and viscous texture. Gravel is angular to well rounded fine to coarse flint. (DOCK SEDIMENT)	11.90	ES01 B02	N12	... VOC 0.0ppm	
			-7.99		(0.40) 12.30		11.90-12.40			12.50 12.50	2, 2 / 3, 3, 3, 3 ... VOC 0.3ppm
22/11/16	13.50	1.10	-10.39		(2.40)	Brown, very sandy angular to well rounded fine to coarse flint GRAVEL with occasional flint cobbles. Sand is fine to coarse. (RIVER TERRACE DEPOSIT)	12.50	ES03 B04	N14	3, 4 / 4, 3, 4, 3 ... VOC 0.9ppm	
							13.25 ... becoming sandy with no cobbles				12.50-13.00
22/11/16	14.50	1.30	-10.39			14.25 ... with rare flint cobbles	13.25	D05	N19	5, 6 / 5, 5, 4, 5	
							14.25 ... with rare flint cobbles				14.50-14.70
22/11/16	15.10	1.00	-10.39			Light grey clayey silty fine SAND. (THANET SAND FORMATION: THANET SAND)	15.25	D11	N34	4, 5 / 6, 8, 10, 10	
							17.00 - 17.50 ... becoming very clayey				15.50-15.50
22/11/16	15.10	1.20	-10.39			17.00 - 17.50 ... becoming very clayey	16.00-16.50	B13	N50/ 295 mm	4, 5 / 9, 10, 14, 17	
							17.00 - 17.50 ... becoming very clayey				16.50-17.00
22/11/16	18.00	0.90	-10.39		(7.40)	19.50 ... becoming very clayey	18.00	D16	N44	4, 6 / 8, 10, 12, 14	
							18.50-19.00				18.00-18.00
22/11/16	18.00	1.10	-10.39			19.50 ... becoming very clayey	19.50	D18	N45	3, 5 / 9, 9, 13, 14	
							20.00-20.50				19.50-19.50

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Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
22/11/16	18.00	1.00					21.00 21.00	D20	N33	4, 5 / 7, 8, 8, 10	
						21.50 - 22.00 ... becoming slightly gravelly. Gravel is angular to subangular fine to coarse flint (possible from above)	21.50-22.00	B21			
			-17.79		22.10		22.10-22.50	B22			
22/11/16	18.00	1.40	-18.09		22.40	Black angular to subangular fine to coarse rinded flint GRAVEL with occasional rinded flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)	22.50 22.50	D23	N23	3, 4 / 5, 7, 6, 5	
						White CHALK recovered as: firm, white slightly gravelly SILT. Gravel is extremely weak, low density angular to subangular fine to coarse chalk fragments. (SEAFORD CHALK FORMATION)	23.00-23.50	B24			
						23.00 - 23.50 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with occasional flint black rinded flint cobbles. Gravel comprises extremely weak, medium density white chalk fragments and angular to rounded black rinded flint	24.00 24.00	D25	N25	2, 3 / 5, 6, 6, 8	
22/11/16	18.00	1.00					24.50-25.00	B26			
						25.00 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with rare cobble size moderately weak, medium density white chalk fragments. Gravel comprises extremely weak, medium density white chalk fragments and black rinded flint	25.50 25.50	D27	N36	3, 4 / 4, 11, 10, 11	
22/11/16	18.00	0.90					26.50	D28			
						26.50 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with rare cobble size moderately weak, medium density white chalk fragments. Gravel comprises extremely weak to weak, medium density white chalk fragments and black rinded flint	27.00 27.00	D29	N36	5, 7 / 9, 10, 8, 9	
22/11/16	18.00	0.90					27.50-28.00	B30			
23/11/16	18.00	0.95				27.00 ... gravel becoming angular to subangular fine to medium extremely weak, medium density chalk fragments and rare black rinded flint					
						27.50 ... [NI] recovered as: moderately weak, medium density angular to subangular silty white chalk COBBLES with occasional cobble size weak, medium density chalk fragments and angular to rounded black rinded flint	28.50		N50/ 180 mm	9, 14 / 20, 19, 11	
23/11/16	18.00	1.00				28.50 ... with angular to subangular black rinded flint cobbles	28.50-29.00	B31			
						29.50 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with rare cobble size moderately weak, medium	29.50	D32			
23/11/16	18.00	1.10					30.00		N39	4, 6 / 8, 9, 11, 11	

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Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
23/11/16	18.00	1.40				density white chalk fragments and black rinded flint. Gravel comprises extremely weak, medium density white chalk fragments and black rinded flint	30.00 30.50-31.00	D33 B34		4, 6 / 7, 9, 10, 11	
23/11/16	18.00	1.40	-27.69		32.00	31.50 ... [NI] recovered as: white slightly gravelly SILT. Gravel is angular to subrounded fine to coarse black rinded flint	31.50 31.50	D35	N37		
						End of Borehole					

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CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16 Date Completed 28/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
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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	14.50	DS	23/11/2016	23/11/2016	TC	CB	112	PDC	Geotec 350	AR779
14.50	32.00	RC	24/11/2016	28/11/2016	TC	CB				

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	150	12.20	12.70		100
14.50	150	14.50	150	12.70	13.50		100
32.00	146			13.50	14.50		100
				14.50	16.50		0
				16.50	17.00		100
				17.00	18.50		87
				18.50	20.00		0
				20.00	21.50		100
				21.50	23.00		100
				23.00	24.50		100
				24.50	26.00		100
				26.00	27.50		100
				27.50	28.80		100
				28.80	30.40		69
				30.40	32.00		100

ROTARY FLUSH DETAIL				
From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
14.50	16.50	Water	90	
16.50	17.00	Water	80	
17.00	18.50	Water	0	
18.50	20.00	Water	90	
20.00	32.00	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
12.20	32.00	Cement / Bentonite Grout	28/11/2016

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16 Date Completed 28/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
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Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
23/11/16	0.00				C	12.70	N19	1, 2 / 4, 4, 7, 4	12.00	
23/11/16	14.50	12.50			C	13.50	N20	2, 2 / 5, 6, 5, 4	12.00	
24/11/16	14.50	12.50	2.80	... Rotary flush	S	17.00	N35	2, 4 / 6, 7, 11, 11	14.00	
24/11/16	20.00	14.00	0.90		S	20.00	N46	3, 7 / 7, 11, 13, 15	14.00	
28/11/16	20.00	14.50	6.10		S	21.50	N45	3, 6 / 8, 9, 12, 16	14.50	
28/11/16	32.00	14.50	1.70		S	23.00	N50/0.17	4, 6 / 12, 24, 14	14.50	
					S	24.50	N50/0.015	25 / 50	14.50	
					S	26.00	N50/0.08	18, 7 / 42, 8	14.50	
					S	27.50	N50/0.155	8, 17 / 29, 17, 4	14.50	
					S	28.80	N50/0.245	6, 6 / 8, 9, 20, 13	14.50	
					S	30.40	N50/0.16	16, 7 / 20, 26, 4	14.50	

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Dynamic sampling techniques used from 12.20m to 14.50m. Rotary boring carried out thereafter.
- Water present in the borehole from casing installation through the dock.
- Pressurimeter tests carried out at 16.20m and 19.10m

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
- SPGW - Gas / Temperature Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

HOLE TYPES

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

TESTS S-C-SPT /CPT, V-Shear Vane, PP Pocket Piezometer, MP Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 1 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
23/11/16								(12.20)	Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
Date Completed 28/11/16		Client London City Airport Limited		Method/ Plant Used Dynamic Sampling / Rotary
			Sheet 2 of 4	

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill			
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No	Test Result	
23/11/16	12.50					-7.89		12.20							
24/11/16	12.50	2.80				-7.99		12.30	Soft, brown silty CLAY with frequent dark grey staining. (DOCK SEDIMENT)	12.30	ES01	... VOC 0.3ppm			
						-8.14		12.45	Very soft, dark grey very clayey SILT with strong hydrocarbon odour. (DOCK SEDIMENT)	12.50	B02	N19	1, 2 / 4, 4, 7, 4		
								(1.90)	Dark grey clayey very sandy angular to well rounded fine to coarse flint GRAVEL with hydrocarbon odour. Sand is fine to coarse. (RIVER TERRACE DEPOSIT)	13.00	ES03	... VOC 0.7ppm			
									12.90 ... becoming slightly sandy with no clay	13.40	ES04	... VOC 0.0ppm			
									13.10 ... becoming sandy	13.50	N20	2, 2 / 5, 6, 5, 4			
									13.40 ... with rare angular to rounded flint cobbles	13.50-14.00	B05	... VOC 0.8ppm			
									13.50 ... with no hydrocarbon odour	13.90	ES06				
									14.00 ... becoming very sandy	13.90					
									14.25 ... with rare angular to rounded flint cobbles	14.35					
						-10.04		14.35	Light grey fine clayey SAND. (THANET SAND FORMATION: THANET SAND)						
										16.20		... Pressuremeter test at 16.20m depth			
										16.50-16.70	B07				
										17.00		N35	2, 4 / 6, 7, 11, 11		
										17.00	D08				
										17.50	B09				
												... Pressuremeter test at 19.10m depth			
										19.10					
24/11/16	14.00	0.90						(7.75)		20.00		N46	3, 7 / 7, 11, 13, 15		

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 3 of 4

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill		
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No	Test Result
28/11/16	14.50	6.10							20.00 ... becoming very clayey	20.00	D10			
			100						20.70 ... becoming clayey	20.70	B11			
									21.50 ... becoming very clayey	21.50	D12	N45	3, 6 / 8, 9, 12, 16	
			100	23	20	-17.79		22.10	Black angular to subangular medium to coarse rinded flint GRAVEL with rare angular to subangular black rinded flint cobbles. (THANET SAND FORMATION: BULLHEAD BED)	22.65-23.00	C13			
						-17.84		22.15		23.00	D14	N50/170 mm	4, 6 / 12, 24, 14	
			100	87	40	-18.29		(0.45)	22.25 ... with occasional subangular black rinded flint cobbles	23.00	D14			
									22.30 ... with occasional black rinded flint gravel and occasional chalk cobbles	23.00	D14			
			100	77	57				Strong, medium density white CHALK. (SEAFORD CHALK FORMATION)	24.30-24.45	D15			
									22.60 ... becoming strong and medium density	24.50	D15	N50/15 mm	25 / 50	
			100	80	57				23.00 - 23.10 ... [NI] recovered as: angular to subangular coarse GRAVEL. Gravel is extremely weak, low density white chalk fragments	25.00-25.30	C16			
									23.25 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel is weak, medium density white chalk fragments	26.00	D17	N50/80 mm	18, 7 / 42, 8	
			100	80	57				23.30 - 23.60 ... with vertical fractures	26.00	D17			
									24.20 - 24.30 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density white chalk fragments and black rinded flint	26.80-27.10	C18			
									24.40 ... [NI] recovered as: angular to subangular COBBLES. Cobbles comprise moderately weak, medium density white chalk fragments and occasional black rinded flint	27.50	D19	N50/155 mm	8, 17 / 29, 17, 4	
			100	65	58				24.50 ... with rare cobble size black rinded flint and rare coarse gravel size extremely weak, low density chalk fragments	27.50	D19			
									24.65 ... with open horizontal fracture and purple staining	28.10-28.30	C20			
									24.95 - 25.10 ... with purple staining	28.80	D21	N50/245 mm	6, 6 / 8, 9, 20, 13	
			69	38	31				25.30 - 25.40 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with rare black rinded flint cobbles. Gravel comprises weak, medium density white chalk fragments and medium to coarse black rinded flint	28.80	D21			
									25.60 - 25.70 ... [NI] recovered as: angular to subangular COBBLES with angular to subangular fine to coarse weak, medium density white chalk gravel. Cobbles are angular to subangular fine to coarse gravel size weak, medium density white chalk fragments	29.80-30.15	C22			
									25.90 - 26.00 ... with 1No horizontal fracture with purple staining					
									26.00 - 26.20 ... with a band of angular to subangular medium to coarse gravel and cobble size black rinded flint					
									26.45 ... with wide fractures					
									26.57 ... with fractures infilled with fine to medium gravel size extremely weak, medium density chalk fragments					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 23/11/16	Ground Level (mOD) 4.31	Co-Ordinates E 542970.6 N 180356.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 4 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
28/11/16	14.50	1.70	69	38	31	-27.69		32.00	26.65 ... with occasional subvertical fractures 26.80 ... with 1No wide vertical fracture 27.10 - 27.20 ... with subhorizontal and subvertical fractures and light grey staining 27.30 - 27.40 ... with occasional subvertical fractures 27.40 - 27.50 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel is weak, medium density white chalk fragments 27.50 - 27.80 ... [NI] recovered as: angular to subangular fine to coarse very silty GRAVEL with rare moderately weak, medium density white chalk cobbles. Gravel is weak, medium density white chalk fragments 27.95 ... with rare open, horizontal fractures 28.40 ... with occasional subhorizontal fractures infilled with fine to coarse gravel size weak, chalk fragments 28.50 ... with 1No horizontal fracture infilled with angular to subangular medium to coarse black rinded flint gravel and occasional light grey staining 28.60 ... with rare angular to subangular medium to coarse black rinded flint gravel 29.20 - 29.50 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with rare locally frequent moderately weak, medium density white chalk cobbles. Gravel is weak, medium density white chalk fragments and black rinded flint 29.55 - 29.65 ... with rare vertical fractures with dark grey staining 29.70 ... with 1No horizontal fracture 30.40 - 30.50 ... [NI] recovered as: angular to subangular COBBLES with angular to subangular coarse black rinded flint gravel. Cobbles are weak, medium density white chalk fragments 30.50 - 30.60 ... with vertical fracture with light grey staining 30.60 - 30.70 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel is weak, medium density white chalk fragments 31.00 - 31.10 ... with 1No horizontal fracture 31.15 - 31.30 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel is weak, medium density white chalk fragments 31.15 - 31.60 ... with 1No wide open, vertical fracture and angular to subangular medium to coarse black rinded flint gravel 31.80 - 31.90 ... with 1No horizontal fracture End of Borehole	30.40	D23	N50/160 mm	16, 7 / 20, 26, 4	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16 Date Completed 01/12/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
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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	30/11/2016	01/12/2016	SW	CB			Dando 175	AR909

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
							21.90	22.30	0:45	Gravel
							27.80	28.10	0:30	Gravel
							30.80	31.35	1:00	Gravel

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	200	0.00	200				
19.00	200	18.10	200				
32.00	150	22.10	150				

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
11.95	32.00	Cement / Bentonite Grout	01/12/2016

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

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
Date Completed 01/12/16				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
30/11/16	0.00				C	12.50	N21	4, 6 / 6, 5, 4, 6	12.50	1.00
30/11/16	12.50	12.50	1.00	... see Remark 3	C	13.50	N18	3, 4 / 5, 4, 4, 5	13.50	1.20
30/11/16	13.50	13.50	1.20		C	14.50	N32	4, 7 / 6, 9, 9, 8	14.50	1.50
30/11/16	14.50	14.50	1.50		C	15.50	N24	3, 4 / 6, 7, 6, 5	15.50	1.20
30/11/16	15.50	15.50	1.20		C	16.50	N26	4, 5 / 6, 6, 6, 8	16.50	1.80
30/11/16	16.50	16.50	1.80		S	17.50	N39	4, 7 / 8, 9, 11, 11	17.50	1.50
30/11/16	17.50	17.50	1.50		S	18.50	N20	4, 5 / 6, 5, 5, 4	18.10	1.10
30/11/16	18.50	18.10	1.10		S	20.00	N32	2, 4 / 5, 7, 9, 11	20.00	1.20
30/11/16	20.00	20.00	1.20		S	21.50	N38	3, 4 / 6, 8, 12, 12	21.50	1.40
30/11/16	21.50	21.50	1.40		S	23.00	N21	4, 6 / 5, 5, 6, 5	22.10	1.00
30/11/16	23.00	22.10	1.00		S	24.50	N27	5, 6 / 6, 7, 7, 7	22.10	1.40
30/11/16	24.50	22.10	1.40		S	26.00	N41	6, 8 / 10, 9, 9, 13	22.10	1.00
30/11/16	26.00	22.10	1.00		S	27.50	N50/0.23	7, 9 / 12, 14, 16, 8	22.10	1.20
30/11/16	27.50	22.10	1.20		S	29.00	N48	7, 6 / 8, 10, 13, 17	22.10	1.40
30/11/16	28.50	22.10	1.15		S	30.50	N31	4, 6 / 6, 7, 8, 10	22.10	1.60
01/12/16	28.50	22.10	1.05		S	31.50	N50/0.285	6, 9 / 10, 13, 15, 12	22.10	1.90
01/12/16	29.00	22.10	1.40							
01/12/16	30.50	22.10	1.60							
01/12/16	31.50	22.10	1.90							
01/12/16	32.00	22.10	1.90							

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Ø200mm casing used from pontoon level to 18.10m depth. Bentonite seal inserted between 17.50m and 19.00m and borehole re-drilled with Ø150mm casing to 22.10m 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
- SPGW - Gas (Groundwater) Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

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, C/P-R-Cable Percussion Rotary follow on

TESTS S-C-SPT /CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Multi-point 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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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
30/11/16					(12.00)	Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
			-7.59		12.00		12.00			... VOC 0.1ppm	
30/11/16	12.50	1.00	-8.09		(0.50) 12.50	Soft, dark brown to dark grey clayey SILT with strong hydrocarbon odour. (DOCK SEDIMENT)	12.00-12.40	ES01 B02	N21	4, 6 / 6, 5, 4, 6 ... VOC 0.1ppm	
					(0.75) 12.50	Dark grey sandy angular to well rounded fine to coarse flint GRAVEL with occasional flint cobbles, rare pockets of soft, dark grey clay and strong hydrocarbon odour. (RIVER TERRACE DEPOSITS)	12.50-13.00	ES03 B04			
30/11/16	13.50	1.20	-8.84		13.25	Brown sandy angular to well rounded fine to coarse flint GRAVEL. Sand is fine to coarse. (RIVER TERRACE DEPOSITS) 13.50 - 14.00 ... becoming very sandy	13.50 13.50-14.00	ES06 B07	N18	3, 4 / 5, 4, 4, 5 ... VOC 0.0ppm	
30/11/16	14.50	1.50			(3.65)		14.25 14.50-15.00	D08 B09	N32	4, 7 / 6, 9, 9, 8	
30/11/16	15.50	1.20					15.25 15.50-16.00	D10 B11	N24	3, 4 / 6, 7, 6, 5	
30/11/16	16.50	1.80					16.25 16.50-17.00	D12 B13	N26	4, 5 / 6, 6, 6, 8	
			-12.49		16.90	Light grey very clayey fine SAND. (THANET SAND FORMATION: THANET SAND)	17.00-17.50	B14			
30/11/16	17.50	1.50			(1.30)		17.50 17.50	D15	N39	4, 7 / 8, 9, 11, 11	
30/11/16	18.10	1.10			18.20	White CHALK recovered as: silty angular to subangular fine to coarse GRAVEL with rare cobble size moderately weak, medium density chalk fragments. Gravel comprises weak, medium density chalk fragments and black rinded flint. (SEAFORD CHALK FORMATION) 18.50 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint 19.00 ... with occasional moderately weak, medium density chalk fragments and rare angular to subangular black rinded flint	18.20-18.50 18.50 18.50	B16 D17	N20	4, 5 / 6, 5, 5, 4	
30/11/16	20.00	1.20					19.00-19.50 20.00	B18	N32	2, 4 / 5, 7, 9, 11	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
Date Completed 01/12/16		Method/ Plant Used Cable Percussion		Sheet 3 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
30/11/16	21.50	1.40				cobbles 20.00 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to coarse moderately weak, medium density chalk fragments	20.00	D19			
							20.50-21.00	B20			
						21.50 ... [NI] recovered as: firm, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint	21.50	D21	N38	3, 4 / 6, 8, 12, 12	
						22.00 ... with occasional angular to subangular black rinded flint cobbles	22.00-22.50	B22			
30/11/16	22.10	1.00				23.00 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to coarse moderately weak to weak, medium density chalk fragments	23.00	D23	N21	4, 6 / 5, 5, 6, 5	
						23.50 - 24.00 ... becoming very silty	23.50-24.00	B24			
30/11/16	22.10	1.40				24.50 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to coarse moderately weak to weak, medium density chalk fragments	24.50	D25	N27	5, 6 / 6, 7, 7, 7	
					(13.80)		25.00-25.50	B26			
30/11/16	22.10	1.00				26.00 ... [NI] recovered as: firm, white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	26.00	D27	N41	6, 8 / 10, 9, 9, 13	
						26.50 ... with rare angular to subangular black rinded flint cobbles	26.50-27.00	B28			
30/11/16	22.10	1.20				27.50 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint	27.50		N50/ 230 mm	7, 9 / 12, 14, 16, 8	
						28.00 ... with no chalk cobbles	27.50 28.00-28.50	D29 B30			
30/11/16	22.10	1.15				29.00 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	29.00	D31	N48	7, 6 / 8, 10, 13, 17	
01/12/16	22.10	1.05					29.00 29.50-30.00				
01/12/16	22.10	1.40						B32			

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 30/11/16	Ground Level (mOD) 4.41	Co-Ordinates E 542966.0 N 180322.2	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
01/12/16	22.10	1.60				30.00 ... [NI] recovered as: firm, white SILT.	30.50 30.50	D33	N31	4, 6 / 6, 7, 8, 10	
01/12/16	22.10	1.90				31.00 ... with rare cobble size weak, medium density chalk fragments	31.00-31.50	B34	N50/ 285 mm	6, 9 / 10, 13, 15, 12	
01/12/16	22.10	1.90	-27.59		32.00	31.50 ... [NI] recovered as: firm, white gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	31.50	D35			
						End of Borehole					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
	Date Completed 27/01/17			

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	33.00	RC	25/01/2017	27/01/2017	FD	CB	112	PDC	Geotec 350	AR779

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	150	13.50	15.00		0
33.00	150	15.00	150	15.00	16.50		0
				16.50	18.00		0
				18.00	19.50		80
				21.00	22.50		20
				22.50	24.00		73
				24.00	25.50		93
				25.50	27.00		100
				27.00	28.50		100
				28.50	30.00		33
				30.00	31.50		53
				31.50	33.00		80

ROTARY FLUSH DETAIL				
From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
13.50	33.00	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
13.50	33.00	Cement / Bentonite Grout	27/01/2017

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
	Date Completed 27/01/17			

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
25/01/17	0.00				S	16.50	N32	3, 8 / 8, 7, 8, 9	15.00	
25/01/17	13.50	15.00		... Rotary flush	S	18.00	N26	2, 12 / 10, 7, 5, 4	15.00	
25/01/17	18.00	15.00			S	19.50	N17	2, 3 / 3, 5, 4, 5	15.00	
26/01/17	18.00	15.00			S	21.00	N22	5, 5 / 4, 5, 6, 7	15.00	
26/01/17	27.00	15.00			S	22.50	N18	3, 5 / 5, 5, 3, 5	15.00	
27/01/17	27.00	15.00			S	24.00	N14	3, 3 / 3, 4, 4, 3	15.00	
27/01/17	33.00	15.00			S	25.50	N40	7, 9 / 8, 9, 11, 12	15.00	
					S	27.00	N45	6, 12 / 13, 8, 11, 13	15.00	
					S	28.50	N50/0.235	5, 9 / 11, 15, 20, 4	15.00	
					S	30.00	N44	8, 14 / 13, 11, 10, 10	15.00	
					S	31.50	N44	5, 7 / 11, 11, 10, 12	15.00	
					S	33.00	N31	2, 4 / 6, 7, 8, 10	15.00	

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- 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
- SPGW - Gas / Temperature Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

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, C/P-R-Cable Percussion Rotary follow on

TESTS S-C-SPT / CPT, V-Shear Vane, PP Pocket Piezometer, MP Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 1 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
25/01/17									Water.					
								(13.50)						

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
Date Completed 27/01/17		Method/ Plant Used Rotary		Sheet 2 of 4
Client London City Airport Limited				

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill		
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No	Test Result
25/01/17	15.00					-8.62		13.50	No Recovery.					
			0					(4.50)		16.50	D01	N32	3, 8 / 8, 7, 8, 9	
			0							16.50				
25/01/17	15.00					-13.12		18.00		18.00	D02	N26	2, 12 / 10, 7, 5, 4	
26/01/17	15.00							(0.90)	Black, angular to well rounded rinded flint GRAVEL, with rare cobble size angular to well rounded black rinded flint. (THANET SAND FORMATION: BULLHEAD BED)	18.00				
			80			-14.02		18.90		19.00	B03			
									White CHALK [NI] recovered as: angular to subangular fine to coarse silty GRAVEL with rare moderately weak angular to subangular chalk cobbles. Gravel is weak to moderately weak, medium density white chalk fragments. (SEAFORD CHALK FORMATION)	19.50	D04	N17	2, 3 / 3, 5, 4, 5	
										19.50				

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 3 of 4

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill		
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No	Test Result
26/01/17	15.00								21.00 ... becoming very silty well-rounded angular to subangular fine to coarse GRAVEL, with rare angular to subangular black rinded flint cobbles	21.00	D05	N22	5, 5 / 4, 5, 6, 7	
27/01/17	15.00		20					(5.30)	23.30 - 23.40 ... becoming strong medium density	22.50 22.50	D06	N18	3, 5 / 5, 5, 3, 5	
			73	13	10				24.00 ... [NI] recovered as: silty, angular to subangular fine to coarse GRAVEL. Gravel is weak to moderately weak, medium density chalk fragments	24.00 24.00	D07	N14	3, 3 / 3, 4, 4, 3	
						-19.32		24.20	Strong, medium density white CHALK. (SEAFORD CHALK FORMATION)					
			93	13	7				24.20 ... becoming strong, white medium density chalk					
									24.25 ... with 1No wide open fracture, infilled with angular to subangular fine to coarse weak, medium density chalk fragments	25.50 25.50	D08	N40	7, 9 / 8, 9, 11, 12	
									24.80 ... with occasional angular to subangular fine to coarse black rinded flint gravel	26.10	B09			
			100	27	20				25.50 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL with rare moderately weak, medium density chalk cobbles and rare angular to subangular black rinded flint cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint.					
									26.10 - 26.50 ... with horizontal fractures at 26.15m, 26.30m and at 26.40m					
									26.40 ... with angular to subangular medium to coarse black rinded flint gravel	27.00 27.00	D10	N45	6, 12 / 13, 8, 11, 13	
									26.50 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density white chalk fragments and black rinded flint					
			100						26.90 ... becoming strong, medium density CHALK with occasional purple staining	28.00	B11			
									26.95 ... with 1No horizontal fracture					
									27.00 ... becoming very silty					
									27.50 ... becoming silty with occasional moderately weak to strong, medium density chalk cobbles	28.50		N50/ 235 mm	5, 9 / 11, 15, 20, 4	
									28.50 ... [NI] recovered as: gravelly SILT. Gravel is weak to moderately weak medium density angular to subangular fine to coarse chalk fragments	28.50 28.50	D12 B13			
			33					(8.80)	28.90 ... with rare coarse angular to subangular rinded flint gravel and cobbles					
										30.00		N44	8, 14 / 13, 11, 10, 10	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 25/01/17	Ground Level (mOD) 4.88	Co-Ordinates E 542971.4 N 180248.9	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 4 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
27/01/17	15.00		53						30.00 ... with occasional angular to subangular fine to coarse black rinded flint gravel and rare angular to subangular black rinded flint cobbles	30.50	B14		5, 7 / 11, 11, 10, 12	
			80							31.50 31.50	D15	N44		
						-28.12		33.00	32.60 ... [NI] recovered as: silty, angular to subangular fine to coarse GRAVEL. Gravel is weak, medium density chalk fragments with rare strong, medium density angular to subangular chalk cobbles 32.90 ... with rare angular to subangular black rinded flint cobbles End of Borehole	33.00 33.00	D16	N31	2, 4 / 6, 7, 8, 10	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 18/11/16 Date Completed 21/11/16	Ground Level (mOD) 4.79	Co-Ordinates E 543034.6 N 180352.2	Final Depth 32.00m
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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	18/11/2016	21/11/2016	SW	CB			Dando 175	AR909

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
							27.10	27.50	0:45	Gravel

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	200	0.00	200				
18.50	200	18.10	200				
32.00	150	25.50	150				

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
12.00	32.00	Cement / Bentonite Grout	21/11/2016

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

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 18/11/16	Ground Level (mOD) 4.79	Co-Ordinates E 543034.6 N 180352.2	Final Depth 32.00m
Date Completed 21/11/16				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
18/11/16	0.00				C	13.50	N10	4, 8 / 3, 2, 3, 2	13.50	1.70
18/11/16	12.50	12.50	1.00	... see Remark 3	C	14.50	N12	3, 3 / 2, 3, 4, 3	14.50	1.30
18/11/16	13.50	13.50	1.70		C	15.50	N12	2, 3 / 4, 3, 2, 3	15.50	2.00
18/11/16	14.50	14.50	1.30		C	16.50	N11	2, 2 / 3, 2, 3, 3	16.50	1.80
18/11/16	15.50	15.50	2.00		S	18.00	N20	3, 5 / 4, 6, 5, 5	18.00	2.10
18/11/16	16.50	16.50	1.80		S	19.50	N15	2, 3 / 3, 3, 4, 5	19.50	0.90
18/11/16	18.00	18.00	2.10		S	21.00	N17	2, 3 / 3, 4, 5, 5	21.00	1.00
18/11/16	18.50	18.10	1.70		S	22.50	N20	2, 3 / 4, 5, 5, 6	22.50	0.60
21/11/16	18.50	18.10	1.95		S	24.00	N19	3, 5 / 4, 4, 6, 5	24.00	0.40
21/11/16	19.50	19.50	0.90		S	25.50	N50/0.23	6, 12 / 14, 17, 13, 6	25.50	1.00
21/11/16	21.00	21.00	1.00		S	27.00	N50/0.04	8, 17 / 50	25.50	1.10
21/11/16	22.50	22.50	0.60		S	28.50	N30	5, 8 / 8, 7, 8, 7	25.50	0.90
21/11/16	24.00	24.00	0.40		S	30.00	N38	6, 8 / 9, 10, 9, 10	25.50	0.70
21/11/16	25.50	25.50	1.00		S	31.50	N50/0.29	5, 8 / 9, 9, 13, 19	25.50	1.00
21/11/16	27.00	25.50	1.10							
21/11/16	28.50	25.50	0.90							
21/11/16	30.00	25.50	0.70							
21/11/16	31.50	25.50	1.00							
21/11/16	32.00	25.50	1.00							

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Ø200mm casing used from pontoon level to 18.10m depth. Bentonite seal inserted between 17.20m and 18.50m 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 - Inclinator

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, C/P-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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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 18/11/16	Ground Level (mOD) 4.79	Co-Ordinates E 543034.6 N 180352.2	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
18/11/16					(12.00)	Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 18/11/16	Ground Level (mOD) 4.79	Co-Ordinates E 543034.6 N 180352.2	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
21/11/16	21.00	1.00				medium density chalk fragments 20.00 - 20.50 ... with rare cobble size angular to subangular black rinded flint	21.00 21.00	D20	N17	2, 3 / 3, 4, 5, 5	
						21.00 ... [NI] recovered as: firm, white slightly gravelly SILT. Gravel is angular to subangular fine to medium extremely weak, medium density chalk fragments 21.50 ... with occasional angular to subangular black rinded flint cobbles	21.50-22.00	B21			
21/11/16	22.50	0.60				22.50 ... [NI] recovered as: soft, white gravelly SILT. Gravel comprises angular to subangular fine to medium black rinded flint and extremely weak, medium density chalk fragments 23.00 ... with rare angular to subangular black rinded flint cobbles	22.50 22.50	D22	N20	2, 3 / 4, 5, 5, 6	
						23.00 ... with rare angular to subangular black rinded flint cobbles	23.00-23.50	B23			
21/11/16	24.00	0.40				24.00 ... [NI] recovered as: soft, white slightly gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint	24.00 24.00	D24	N19	3, 5 / 4, 4, 6, 5	
					(14.50)		24.50-25.00	B25			
21/11/16	25.50	1.00				25.50 ... [NI] recovered as: soft, white slightly gravelly SILT. Gravel comprises angular to subangular fine to medium black rinded flint and extremely weak, low density chalk fragments	25.50 25.50	D26	N50/ 230 mm	6, 12 / 14, 17, 13, 6	
						26.50 ... [NI] recovered as: very soft, white very gravelly SILT. Gravel comprises angular to subangular fine to medium black rinded flint and fine to coarse extremely weak, medium density chalk fragments	26.50	D27			
21/11/16	25.50	1.10				27.00 ... [NI] recovered as: soft, white gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint 27.10 ... with occasional angular to subangular black rinded flint cobbles	27.00 27.10-27.50	D28 B29	N50/ 40 mm	8, 17 / 50	
						28.00 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel comprises moderately weak, medium density white chalk fragments and black rinded flint	28.10	D30			
21/11/16	25.50	0.90				28.50 ... [NI] recovered as: soft, white slightly gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint	28.50 28.50	D31	N30	5, 8 / 8, 7, 8, 7	
						29.00-29.50	29.00-29.50	B32			
21/11/16	25.50	0.70					30.00		N38	6, 8 / 9, 10, 9, 10	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 18/11/16	Ground Level (mOD) 4.79	Co-Ordinates E 543034.6 N 180352.2	Final Depth 32.00m
Date Completed 21/11/16		Method/ Plant Used Cable Percussion		Sheet 4 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
21/11/16	25.50	1.00				30.00 ... [NI] recovered as: soft to firm, white slightly gravelly SILT. Gravel is angular to subangular fine to medium black rinded flint	30.00	D33		5, 8 / 9, 9, 13, 19	
						30.50 ... with occasional angular to subangular fine to coarse black rinded flint gravel and rare angular to subangular black rinded flint cobbles	30.50-31.00	B34			
						31.50 ... [NI] recovered as: firm, white SILT.	31.50		N50/ 290 mm		
21/11/16	25.50	1.00	-27.21		32.00		31.50	D35			
						End of Borehole					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17 Date Completed 16/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
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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	17.00	OH	10/01/2017	10/01/2017	FD	CB	112	PDC	Geotec 350	AR779
17.00	45.50	RC	10/01/2017	16/01/2017	FD	CB	112	PDC	Geotec 350	

WATER STRIKES

WATER ADDED

CHISELLING / SLOW DRILLING

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE

CASING

ROTARY RECOVERY

Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	150	12.50	17.00		0
17.00	150	17.00	150	17.00	18.50		47
45.50	146			18.50	20.00		93
				20.00	21.50		100
				21.50	23.00		93
				23.00	24.50		80
				24.50	26.00		86
				26.00	27.50		60
				27.50	29.00		73
				29.00	30.50		87
				30.50	32.00		67
				32.00	33.50		80
				33.50	35.00		87
				35.00	36.50		60
				36.50	38.00		87
				38.00	39.50		80
				39.50	41.00		87
				41.00	42.50		67
				42.50	44.00		100
				44.00	45.50		100

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
17.00	39.50	Water	100	
39.50	45.50	Water	50	

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
17.00	46.00	Cement / Bentonite Grout	16/01/2017

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Date Completed 16/01/17				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
10/01/17	0.00				S	17.00	N37	4, 6 / 7, 8, 10, 12		
10/01/17	17.00	15.00	2.00	... Rotary flush	S	18.50	N34	4, 7 / 9, 8, 9, 8		
10/01/17	24.50	15.00	2.00		S	20.00	N22	3, 5 / 5, 5, 4, 8		
11/01/17	24.50	15.00	2.00		S	21.50	N30	5, 6 / 5, 8, 8, 9		
11/01/17	30.50	15.00	5.00		S	23.00	N36	5, 10 / 9, 9, 8, 10		
12/01/17	30.50	17.00	4.00		S	24.50	N35	4, 7 / 9, 9, 8, 9		
12/01/17	39.50	17.00	4.00		S	26.00	N30	6, 4 / 6, 7, 8, 9		
13/01/17	39.50	17.00			S	27.50	N37	5, 7 / 8, 10, 9, 10		
13/01/17	42.50	17.00			S	29.00	N34	6, 7 / 4, 8, 10, 12		
16/01/17	42.50	17.00			S	30.50	N37	3, 7 / 8, 9, 9, 11		
16/01/17	45.50	17.00			S	32.00	N47	5, 6 / 9, 10, 11, 17		
					S	33.50	N50/0.265	5, 8 / 7, 13, 16, 14		
					S	35.00	N29	3, 6 / 5, 8, 8, 8		
					S	36.50	N50/0.15	4, 10 / 11, 9, 30		
					S	38.00	N39	5, 7 / 7, 9, 11, 12		
					S	39.50	N36	4, 5 / 7, 9, 10, 10		
					S	41.00	N39	4, 6 / 9, 9, 10, 11		
					S	42.50	N41	4, 7 / 6, 8, 12, 15		
					S	44.00	N39	4, 8 / 9, 8, 10, 12		
					S	45.50	N36	5, 6 / 8, 10, 9, 9		

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Borehole drilled open hole between 12.50m and 17.00m 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
- SPGW - Gas / Temperature / Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclometer

HOLE TYPES

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

TESTS S-C-SPT / CPT, V-Shear Vials, PP Pockel Piezometer, MP Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 1 of 5

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
10/01/17									Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 2 of 5

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
10/01/17	15.00	2.00	0			-7.57		12.50	Open hole.					
						-12.07		(4.50)		17.00		N37	4, 6 / 7, 8, 10, 12	
			47					(1.50)	Light grey, very clayey fine SAND. (THANET SAND FORMATION: THANET SAND)	17.00	D01			
						-13.57				17.50	B02			
			93	36	32				White CHALK [NI] recovered as: soft to firm, white very gravelly SILT. Gravel is weak, low to medium density chalk fragments with rare gravel to cobble size angular to subangular coarse black rinded flint. (SEAFORD CHALK FORMATION) 19.00 ... chalk fragments becoming fine to coarse	18.50		N34	4, 7 / 9, 8, 9, 8	
									19.60 - 19.80 ... becoming strong, white CHALK	19.10	B03			
										20.00		N22	3, 5 / 5, 5, 4, 8	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 3 of 5

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
10/01/17	15.00	2.00	100					(4.10)	20.40 ... becoming weak, medium density with occasional subvertical and subhorizontal fractures	20.00	D04			
11/01/17	15.00	2.00							20.75 ... with 1No wide open fracture infilled with angular to subangular fine to coarse gravel size moderately weak to weak, chalk fragments	21.50		N30	5, 6 / 5, 8, 8, 9	
			93	21	18				21.50 - 22.00 ... becoming very silty	21.50	D05			
						-17.67		22.60	22.30 ... with rare angular to subangular black rinded flint cobbles	22.50-22.80	B06			
									Strong, medium density white CHALK. (SEAFORD CHALK FORMATION)	23.00		N36	5, 10 / 9, 9, 8, 10	
									22.60 ... becoming strong and medium density	23.00	D07			
			80	16	15				22.80 ... with 1No horizontal fracture	23.50	B08			
									23.00 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel is weak to moderately weak, medium density chalk fragments with occasional angular to subangular moderately weak chalk cobbles					
									24.00 ... with 1No subhorizontal fracture					
									24.20 ... with occasional cobble size and fine to coarse gravel size black rinded flint	24.50		N35	4, 7 / 9, 9, 8, 9	
										24.50	D09			
									24.90 ... [NI] recovered as: soft, gravelly SILT. Gravel is angular to subangular fine to coarse weak, medium density chalk fragments	25.00	B10			
			86	29	21				25.40 ... with 1No horizontal fracture					
									25.70 ... with 1No horizontal fracture with purple staining	26.00		N30	6, 4 / 6, 7, 8, 9	
									25.80 - 26.00 ... with 1No open wide horizontal fracture	26.00	D11			
			60	44	28				26.80 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel is angular to subangular fine to coarse, weak medium density chalk fragments	27.00	B12			
									26.90 - 27.30 ... becoming intact CHALK	27.50		N37	5, 7 / 8, 10, 9, 10	
									27.00 ... with 1No horizontal fracture	27.50	D13			
			73	50	23				28.10 ... [NI] recovered as: angular to subangular fine to coarse silty GRAVEL. Gravel is weak, medium density chalk fragments					
									28.40 ... with 1No horizontal fracture					
									28.45 - 28.55 ... becoming very silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint	28.90	B14			
									28.60 - 28.70 ... with occasional subvertical and subhorizontal fractures	29.00		N34	6, 7 / 4, 8, 10, 12	
									28.80 ... with 1No vertical fracture	29.00	D15			
			87	46	35				28.85 ... with 1No subhorizontal fracture	29.70	B16			
									29.00 - 29.60 ... [NI] recovered as: soft to firm, slightly gravelly SILT. Gravel comprises angular to	-30.00-30.20	C17			

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 4 of 5

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill		
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result	
11/01/17	15.00	5.00	87	46	35				subangular fine to coarse, weak, medium density chalk fragments and angular to subangular black rinded flint	30.50		N37	3, 7 / 8, 9, 9, 11		
12/01/17	17.00	4.00							29.60 ... with rare angular to subangular black rinded flint cobbles	30.50	D18	N37			
									29.80 ... with 1No horizontal fracture						
									30.00 ... with 1No wide open fracture infilled with angular to subangular fine to coarse extremely weak to moderately weak, medium to low density chalk fragments						
			67						30.00 - 30.15 ... becoming strong and medium density						
									30.00 - 30.20 ... with 1No subhorizontal fracture						
									30.15 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL and occasional angular to subangular moderately weak chalk cobbles. Gravel is weak, medium density white chalk fragments	32.00	D19	N47			5, 6 / 9, 10, 11, 17
									30.20 - 30.50 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL with occasional weak to moderately weak, medium density chalk cobbles and rare black rinded flint cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint	32.00					
									31.00 ... [NI] recovered as: silty, angular to subangular fine to coarse GRAVEL with rare moderately weak medium density chalk cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint.	32.70	B20				
			80	71	63				32.00 ... becoming very silty with rare black rinded flint cobbles	33.50		N50/ 265 mm			5, 8 / 7, 13, 16, 14
									32.70 ... with 1No wide open subhorizontal fracture	33.50	D21				
									32.80 ... with 1No open horizontal fracture	34.10	B22				
									33.00 ... with 1No wide open fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and rare flint cobbles						
			87	62	35			(22.90)	33.20 ... with 1No subhorizontal fracture						
									33.40 ... with 1No horizontal fracture						
									33.50 - 34.00 ... [NI] recovered as: silty, angular to subangular fine to coarse chalk GRAVEL.	35.00	D23	N29	3, 6 / 5, 8, 8, 8		
									34.20 ... with subhorizontal fractures	35.00					
									34.50 ... with 1No horizontal fracture and at 34.70m						
									34.50 - 34.90 ... with 1No vertical wide open fracture with purple staining						
			60	28	17				34.90 - 35.00 ... with angular to subangular coarse black rinded flint gravel and cobbles						
									35.50 - 36.10 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint	36.00-36.50	B24				
									36.10 - 36.20 ... with 1No subvertical fracture	36.50		N50/ 150 mm	4, 10 / 11, 9, 30		
									36.30 ... with 1No horizontal fracture infilled rare angular to subangular fine to coarse black rinded flint	36.50	D25				
									36.35 ... with 1No horizontal fracture infilled with angular to subangular fine to coarse black rinded flint						
									36.45 ... with 1No wide open horizontal fracture						
			87						36.50 ... [NI] recovered as: soft, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint	37.50	B26				
									37.10 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL with rare angular to subangular weak, medium density chalk cobbles. Gravel comprises weak, medium density chalk fragments	38.00		N39	5, 7 / 7, 9, 11, 12		
									38.85 ... with 1No wide open subvertical fracture	38.00	D27				
									38.50 ... with 1No horizontal fracture and at 38.70m, 38.80m						
			80	71	54				38.90 ... with 1No subhorizontal fracture and at 38.95m	39.20-39.50	C28				
									39.10 ... with 1No wide open horizontal fracture						
12/01/17	17.00	4.00								39.50		N36	4, 5 / 7, 9, 10, 10		
13/01/17	17.00									39.50	D29				
			87	54	39				39.50 - 39.80 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL with occasional angular to subangular moderately weak, medium						

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 10/01/17	Ground Level (mOD) 4.93	Co-Ordinates E 543114.1 N 180368.0	Final Depth 45.50m
Client London City Airport Limited			Method/ Plant Used Rotary	Sheet 5 of 5

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
13/01/17	17.00		87	54	39				density chalk cobbles. Gravel is weak, medium density chalk fragments 39.90 - 40.00 ... with 1No subvertical fracture 40.20 - 40.30 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak to moderately weak, medium density chalk fragments and black rinded flint 40.40 ... with 1No subvertical fracture 40.50 - 40.70 ... with 1No wide open subvertical fracture 40.80 ... with 1No horizontal fracture 41.40 - 41.80 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint 41.90 ... with 1No horizontal fracture	40.50	B30		4, 6 / 9, 9, 10, 11	
16/01/17	17.00		67	55	50			42.30 ... with 1No wide open horizontal fracture and weak, medium density angular to subangular fine to coarse chalk fragments 42.50 - 42.60 ... [NI] recovered as: very 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 42.70 ... with 1No wide open fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint 42.70 ... with 1No horizontal fracture and at 43.10m, 43.20m 42.80 ... with 1No horizontal fracture 44.00 - 44.40 ... [NI] recovered as: very silty, angular to subangular fine to coarse GRAVEL with rare weak, medium density chalk cobbles. Gravel comprises weak, medium density chalk fragments and black rinded flint	41.00 41.00	D31	N39			
			100	87	80			44.90 ... with occasional angular to subangular fine to coarse black rinded flint	41.90-42.30	C32				
								44.90 ... with occasional angular to subangular fine to coarse black rinded flint	42.50 42.50	D33	N41			
								45.40 ... with 1No wide open fracture	43.20-43.60	C34				
								End of Borehole	44.00 44.00	D35	N39			
16/01/17	17.00					40.57			45.00-45.30	C36		4, 8 / 9, 8, 10, 12		
									45.50 45.50	D37	N36	5, 6 / 8, 10, 9, 9		

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16 Date Completed 16/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
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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	15.50	OH	14/12/2016	14/12/2016	TC	CB			Geotec 350	
15.50	18.00	DS	14/12/2016	15/12/2016	TC	CB			Geotec 350	AR779
18.00	33.00	RC	15/12/2016	16/12/2016	TC	CB	112	PDC	Geotec 350	AR779

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	150	15.50	17.00		67
18.00	150	14.00	150	17.00	18.00		100
33.00	146			18.00	18.50		100
				18.50	23.00		100
				23.00	24.50		87
				24.50	26.00		100
				26.00	27.50		80
				27.50	29.00		80
				29.00	30.20		100
				30.20	31.50		100
				31.50	33.00		100

ROTARY FLUSH DETAIL				
From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
18.00	33.00	Water	70	

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	33.00	Cement / Bentonite Grout	16/12/2016

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
Date Completed 16/12/16				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
14/12/16	0.00				S	15.50	N15	2, 2 / 3, 3, 4, 5	14.00	
14/12/16	15.50	14.00	2.10	... see Remark 5	S	17.00	N16	3, 2 / 3, 4, 4, 5	14.00	
15/12/16	15.50	14.00	3.10		S	18.50	N29	3, 4 / 4, 8, 8, 9	14.00	
15/12/16	29.00	14.00	1.90		S	20.00	N31	3, 3 / 6, 8, 9, 8	14.00	
16/12/16	29.00	14.00	3.10		S	21.50	N50/0.005	25 / 50	14.00	
16/12/16	33.00	14.00	1.90		S	23.00	N50/0.005	25 / 50	14.00	
					S	24.50	N40	3, 6 / 8, 9, 11, 12	14.00	
					S	26.00	N40	3, 7 / 7, 10, 11, 12	14.00	
					S	27.50	N50	4, 7 / 11, 12, 16, 11	14.00	
					S	29.00	N50/0.105	7, 12 / 21, 29	14.00	
					S	30.20	N28/0.19	6, 13 / 16, 2, 10	14.00	

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Borehole drilled open hole between 12.50m and 15.50m depth.
- Dynamic sampling techniques used from 15.50m to 18.00m. Rotary boring carried out thereafter.
- 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
- SPGW - Gas / Temperature Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

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, C/P-R-Cable Percussion Rotary follow on

TESTS S-C-SPT / CPT, V-Shear Vane, PP Pocket Piezometer, MP Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 1 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
14/12/16									Water					
								(12.50)						

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 2 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
						-8.27		12.50	Open hole					
14/12/16	14.00	2.10				-11.27		15.50		15.50	D01	N15	2, 2 / 3, 3, 4, 5	
15/12/16	14.00	3.10							Dark brown angular to well-rounded flint GRAVEL. (RIVER TERRACE DEPOSITS)	15.50-15.70	B02			
			67					(1.50)						
						-12.77		17.00		17.00		N16	3, 2 / 3, 4, 4, 5	
						-12.87		17.10	Black angular to subangular rinded flint GRAVEL. (THANET SAND FORMATION: BULLHEAD BED)	17.50	B03			
			100						[N1] White CHALK recovered as: subangular to angular fine to coarse silty GRAVEL. Gravel is weak to moderately weak, medium density chalk fragments. (SEAFORD CHALK FORMATION)	18.50				
									17.80 ... with rare black rinded flint cobbles	18.50				
									18.00 ... with angular to subangular fine to coarse black rinded flint gravel	18.50				
									18.20 ... becoming silty with rare cobble size chalk fragments	18.50	D04	N29	3, 4 / 4, 8, 8, 9	
									18.50 - 19.00 ... with a band of angular to rounded fine to coarse black rinded flint gravel and cobbles	19.50				
			100						19.20 - 19.30 ... becoming very silty	19.50	B05			
										20.00		N31	3, 3 / 6, 8, 9, 8	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 3 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill		
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result	
			100							20.00	D06				
										21.50		N50/ 5 mm	25 / 50		
										23.00		N50/ 5 mm	25 / 50		
			87	33	27					23.30 ... with rare rounded flint cobbles	24.00	B07			
										24.10 ... becoming strong, medium density white chalk	24.50		N40	3, 6 / 8, 9, 11, 12	
										24.20 ... with a horizontal fracture and at 24.45m, 25.40m and 25.70m	24.50	D08			
										24.70 - 24.90 ... becoming weak chalk, with rare flint cobbles	25.10	B09			
			100	47	38			(15.90)		25.00 - 25.40 ... with a vertical fracture					
										26.00		N40	3, 7 / 7, 10, 11, 12		
										26.00	D10				
			80	33	17					26.30 - 27.40 ... [NI] recovered as: firm, white very gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	27.00	B11			
										26.80 ... with subvertical and subhorizontal fractures					
										27.10 ... with a black rinded flint cobble	27.50		N50	4, 7 / 11, 12, 16, 11	
										27.40 - 27.75 ... [NI] recovered as: white angular to subangular fine to coarse silty GRAVEL with rare black rinded flint cobbles. Gravel comprises weak to moderately weak, medium density chalk fragments	27.50	D12			
			80	67	57					27.75 - 30.70 ... [NI] recovered as: firm, white very gravelly SILT. Gravel comprises angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	28.00	B13			
										27.90 ... with a wide open horizontal fracture infilled with weak, medium density angular to subangular fine to coarse chalk fragments with occasional purple staining					
15/12/16	14.00	1.90								28.00 ... with a wide open subhorizontal fracture and at 28.10m	29.00		N50/ 105 mm	7, 12 / 21, 29	
16/12/16	14.00	3.10								28.40 - 28.60 ... [NI] recovered as: white angular to subangular fine to coarse silty GRAVEL with rare cobble size black rinded flint. Gravel comprises weak, medium density chalk fragments and black rinded flint	29.00	D14			
			100	75	50					29.40	B15				

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 14/12/16	Ground Level (mOD) 4.23	Co-Ordinates E 543181.6 N 180343.2	Final Depth 33.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 4 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No		
16/12/16	14.00	1.90	100	75	50	-28.77		33.00	28.75 ... with a wide open horizontal fracture infilled with weak to moderately weak, medium density coarse chalk fragments 29.00 - 29.20 ... with a wide open vertical fracture with occasional purple staining 29.25 ... with a wide open vertical fracture and at 29.35m 29.50 - 29.70 ... with rare angular to subangular fine to coarse black rinded flint gravel 29.70 - 29.80 ... with a wide open horizontal fracture infilled with weak, medium density angular to subangular fine to coarse chalk fragments and rare cobble size chalk fragments 29.95 ... with a horizontal fracture and at 30.40m and 30.45m 30.10 ... with a wide open horizontal fracture infilled with weak, medium density angular to subangular fine to coarse chalk fragments 30.70 ... with a horizontal fracture and at 30.90m, 31.00m, 31.10m, 31.20m and 31.40m 31.40 - 31.50 ... [NI] recovered as: firm, white very gravelly SILT with rare black rinded flint cobbles. Gravel is angular to subangular fine to coarse black rinded flint 31.50 ... with a wide open vertical fracture and at 31.70m 31.75 ... with a wide open vertical fracture and at 31.85m and 32.00m 32.40 - 32.50 ... [NI] recovered as: white angular to subangular fine to coarse silty GRAVEL with rare cobble size black rinded flint. Gravel comprises weak to moderately weak, medium density chalk fragments and black rinded flint End of Borehole	30.20		N28/190 mm	6, 13 / 16, 2, 10
			100	85	62					30.60-30.85	C16		
			100							32.10-32.40	C17		

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
Date Completed 18/11/16				

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	32.00	CP	17/11/2016	18/11/2016	SW	CB			Dando 175	AR909

WATER STRIKES

WATER ADDED

CHISELLING / SLOW DRILLING

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
							31.10	31.40	0:45	Gravel

HOLE

CASING

ROTARY RECOVERY

Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	200	0.00	200				
16.00	200	15.10	200				
32.00	150	27.30	150				

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
12.00	32.00	Cement / Bentonite Grout	18/11/2016

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
	Date Completed 18/11/16			

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
17/11/16	0.00			... see Remark 3						
17/11/16	12.50	12.50	1.10		C	12.50	N22	1, 2 / 7, 6, 5, 4	12.50	1.10
17/11/16	13.50	13.50	1.60		C	13.50	N15	4, 4 / 5, 3, 4, 3	13.50	1.60
17/11/16	14.50	14.50	1.40		C	14.50	N12	5, 4 / 4, 3, 2, 3	14.50	1.40
17/11/16	15.50	15.10	1.90		S	15.50	N5	5, 3 / 2, 1, 1, 1	15.10	1.90
17/11/16	16.50	16.50	2.30		S	16.50	N9	1, 2 / 2, 3, 2, 2	16.50	2.30
17/11/16	18.00	18.00	3.10		S	18.00	N11	3, 2 / 3, 2, 3, 3	18.00	3.10
17/11/16	19.50	19.50	2.90		S	19.50	N11	3, 2 / 2, 3, 4, 2	19.50	2.90
17/11/16	21.00	21.00	3.20		S	21.00	N21	2, 3 / 5, 5, 6, 5	21.00	3.20
17/11/16	22.50	22.50	2.80		S	22.50	N34	3, 4 / 5, 13, 8, 8	22.50	2.80
17/11/16	24.00	24.00	3.00		S	24.00	N28	5, 5 / 6, 7, 8, 7	24.00	3.00
17/11/16	26.00	25.30	2.95		S	27.00	N45	4, 7 / 9, 11, 11, 14	27.00	2.80
18/11/16	26.00	25.30	2.90		S	28.50	N50/0.28	5, 8 / 10, 12, 14, 14	27.30	3.10
18/11/16	27.00	27.00	2.80		S	30.00	N50/0.235	12, 13 / 18, 13, 14, 5	27.30	2.90
18/11/16	28.50	27.30	3.10		S	31.50	N50/0.235	9, 12 / 13, 16, 15, 6	27.30	3.00
18/11/16	30.00	27.30	2.90							
18/11/16	31.50	27.30	3.00							
18/11/16	32.00	27.30	3.00							

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Ø200mm casing used from pontoon level to 15.10m depth. Bentonite seal inserted between 14.50m and 16.00m 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
 - SPGW - Gas / Temperature / Monitor Standpipe
 - VWP - Vibrating Wire Piezometer
 - ICM - Inclinator
- 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, C/P-R-Cable Percussion Rotary follow on

TESTS S-C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
17/11/16					(12.00)	Water					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
Date Completed 18/11/16		Method/ Plant Used Cable Percussion		Sheet 2 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
17/11/16	12.50	1.10	-7.31	x x x x	12.00	Soft, dark to light grey SILT with strong hydrocarbon odour and rare glass fragments (<85mm). (DOCK SEDIMENT)	12.00	ES01 B02	N22	... VOC 0.5ppm	
			-7.81		(0.50)		12.00-12.50				12.50
17/11/16	13.50	1.60	-9.81	o o o o	(2.00)	Grey sandy angular to well-rounded fine to coarse flint GRAVEL with hydrocarbon odour. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	12.50-13.00	ES03 B04	N15	4, 4 / 5, 3, 4, 3 ... VOC 0.1ppm	
					13.50 .. becoming very sandy with no hydrocarbon odour		13.25				D05
17/11/16	14.50	1.40	-10.31	o o o o	(0.50)	Off-white to brown very sandy angular to subangular fine to medium flint GRAVEL with occasional black rinded flint cobbles. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	13.50-14.00	ES06 B07	N12	5, 4 / 4, 3, 2, 3	
					14.25		D08				14.50
17/11/16	15.10	1.90		[] []		[NI] White CHALK recovered as: angular to subangular fine to coarse white silty GRAVEL. Gravel is extremely weak, medium density chalk and angular to subangular fine to coarse black rinded flint. (SEAFORD CHALK FORMATION)	15.00-15.50	B10	N5	5, 3 / 2, 1, 1, 1	
							15.50 ... [NI] recovered as: firm to stiff, white SILT				15.50
17/11/16	16.50	2.30		[] []		16.00 ... becoming angular to subangular strong, chalk fragments with no rinded flint	16.50	D13	N9	1, 2 / 2, 3, 2, 2	
							16.50 ... [NI] recovered as: firm to stiff, white SILT				16.50
17/11/16	18.00	3.10		[] []		17.00 ... with cobble size strong, medium density chalk fragments and coarse gravel and cobble size angular to subangular black rinded flint	18.00	D15	N11	3, 2 / 3, 2, 3, 3	
							18.00 ... [NI] recovered as: firm, white SILT				18.00
17/11/16	19.50	2.90		[] []		18.50 ... with rare pockets of white chalk SILT (<200mm)	19.50	D17	N11	3, 2 / 2, 3, 4, 2	
							19.50 ... becoming firm SILT				19.50

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
17/11/16	21.00	3.20				20.00 - 20.50 ... with rare angular to subangular coarse black rinded flint gravel	21.00	D19	N21	2, 3 / 5, 5, 6, 5	
						21.00 ... [NI] recovered as: white gravelly SILT. Gravel is angular to subangular medium to coarse black rinded flint	21.00				
						21.50 - 22.00 ... with no rinded flint	21.50-22.00	B20			
17/11/16	22.50	2.80				22.50 ... [NI] recovered as: firm, white SILT	22.50	D21	N34	3, 4 / 5, 13, 8, 8	
							22.50				
					(17.00)		23.00-23.50	B22			
17/11/16	24.00	3.00				24.50 - 25.00 ... with no rinded flint	24.00	D23	N28	5, 5 / 6, 7, 8, 7	
							24.00				
						25.50 ... [NI] recovered as: firm, white SILT	24.50-25.00	B24			
17/11/16	25.30	2.95				26.00 - 26.50	26.00-26.50	B25			
18/11/16	25.30	2.90									
18/11/16	27.00	2.80				27.00 ... [NI] recovered as: white SILT	27.00	D26	N45	4, 7 / 9, 11, 11, 14	
							27.00				
18/11/16	27.30	3.10				28.00 ... [NI] recovered as: white gravelly SILT. Gravel is angular to subangular fine, extremely weak, low density white chalk and angular to subangular coarse gravel to cobble size black rinded flint	28.00	D27			
						28.50 ... [NI] recovered as: firm, white SILT	28.50	D28	N50/ 280 mm	5, 8 / 10, 12, 14, 14	
							28.50				
18/11/16	27.30	2.90				29.50 ... becoming very silty	29.50	D29			
							30.00		N50/ 253 mm	12, 13 / 18, 13, 14, 5	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 17/11/16	Ground Level (mOD) 4.69	Co-Ordinates E 543245.5 N 180364.4	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
18/11/16	27.30	3.00				30.00 ... [NI] recovered as: firm, white gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint	30.00	D30		9, 12 / 13, 16, 15, 6	
						30.50 ... with no cobble size chalk fragments	31.00	D31			
							31.10-31.40	B32			
						31.50 ... [NI] recovered as: firm, white SILT	31.50		N50/ 235 mm		
18/11/16	27.30	3.00	-27.31		32.00		31.50	D33			
						End of Borehole					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16 Date Completed 14/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
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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	20.00	DS	09/12/2016	13/12/2016	TC	CB	112	PDC	Geotec 350 Geotec 350	AR779 AR779
20.00	31.40	RC	13/12/2016	14/12/2016	TC	CB				

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	150	11.20	11.50		100
20.00	150	14.80	150	11.50	12.00		100
31.40	146			12.00	13.00		100
				13.00	14.00		100
				14.00	14.80		50
				14.80	15.80		40
				15.80	16.80		100
				16.80	17.80		100
				17.80	18.90		100
				18.90	20.00		100
				20.00	21.00		100
				21.00	22.50		100
				22.50	24.00		100
				24.00	25.50		100
				25.50	27.00		100
				27.00	28.00		80
				28.00	28.50		100
				28.50	29.90		100
				29.90	31.40		100

ROTARY FLUSH DETAIL				
From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
20.00	28.00	Water	70	
28.00	31.40	Water	75	

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
11.20	31.40	Cement / Bentonite Grout	14/12/2016

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
	Date Completed 14/12/16			

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
09/12/16	0.00				C	12.00	N5	0, 0 / 1, 1, 2, 1	11.00	
09/12/16	11.20	11.00		... see Remark 4	C	13.00	N10	1, 3 / 2, 3, 3, 2	12.00	
09/12/16	12.00	12.00			C	14.00	N9	2, 2 / 2, 2, 2, 3	14.00	
09/12/16	14.80	14.80			S	14.80	N10	2, 2 / 2, 3, 2, 3	14.80	
09/12/16	16.80	14.80	2.20		S	15.80	N10	3, 2 / 2, 2, 3, 3	14.80	
13/12/16	16.80	14.80	1.90		S	16.80	N15	1, 1 / 3, 5, 4, 3	14.80	
13/12/16	28.00	14.80	1.10		S	17.80	N22	3, 3 / 6, 5, 5, 6	14.80	
14/12/16	28.00	14.80	2.80		S	18.90	N20	3, 4 / 5, 5, 5, 5	14.80	
14/12/16	31.40	14.80			S	20.00	N16	3, 2 / 4, 3, 4, 5	14.80	
					S	21.00	N17	4, 3 / 3, 4, 4, 6	14.80	
					S	22.50	N44	6, 7 / 9, 11, 11, 13	14.80	
					S	24.00	N49	3, 4 / 8, 12, 13, 16	14.80	
					S	25.50	N50/0.285	2, 4 / 6, 10, 16, 18	14.80	
					S	27.00	N50/0.245	5, 9 / 11, 14, 17, 8	14.80	
					S	28.50	N50/0.285	4, 6 / 11, 12, 14, 13	14.80	
					S	29.90	N50/0.255	3, 6 / 12, 14, 14, 10	14.80	

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Dynamic sampling techniques used from 11.20m to 20.00m. Rotary boring carried out thereafter.

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
 - SPGW - Gas / Temperature Monitor Standpipe
 - VWP - Vibrating Wire Piezometer
 - ICM - Inclometer
- HOLE TYPES**
- IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
 - CP - Cable Percussion, RC-Rotary Coring, RS-Rotary/Sonic
 - DS - Dynamic Sampling, DS/R-Dynamic Sampling/Rotary
 - DC - Diamond Coring, CPR-Cable Percussion Rotary follow on

TESTS S-C-SPT /CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Multi-hole 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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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 1 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
09/12/16									Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 2 of 4

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill			
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No	Test Result	
09/12/16	11.00					-6.59		11.20							
			100				X		Soft, brown silty CLAY with occasional dark grey staining and strong hydrocarbon odour. (DOCK SEDIMENT)	11.90	D01	N5	0, 0 / 1, 1, 2, 1		
09/12/16	12.00					(1.30)	X			12.00					
			100				X								
			100			-7.89	X		Dark grey sandy angular to well rounded fine to coarse flint GRAVEL with strong hydrocarbon odour. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	13.00		N10	1, 3 / 2, 3, 3, 2		
						(1.20)	O		13.00 ... becoming yellowish brown with slight hydrocarbon odour	13.50	B02				
			100				O								
						-9.09	O		White CHALK recovered as: firm to stiff, SILT. (SEAFORD CHALK FORMATION)	14.00		N9	2, 2 / 2, 2, 2, 3		
			50						13.90 ... becoming slightly gravelly. Gravel is angular to subangular black rinded flint (from above)						
09/12/16	14.80								14.50 ... with occasional moderately weak, medium density chalk cobbles	14.80		N10	2, 2 / 2, 3, 2, 3		
			40												
									15.70 ... with rare subangular to angular coarse black rinded flint gravel	15.70	B03	N10	3, 2 / 2, 2, 3, 3		
									16.20 ... with no black rinded flint	15.80	D04				
			100							15.80					
										16.50	B05				
09/12/16	14.80	2.20							16.80 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with occasional weak, medium density chalk cobbles. Gravel is weak, medium density white chalk fragments	16.80		N15	1, 1 / 3, 5, 4, 3		
13/12/16	14.80	1.90								17.10	B06				
			100												
										17.80		N22	3, 3 / 6, 5, 5, 6		
									18.10 - 18.30 ... with occasional angular to subangular fine to coarse black rinded flint gravel and rare flint cobbles	17.80	D07				
			100							18.10	B08				
										18.90		N20	3, 4 / 5, 5, 5, 5		
			100							18.90	D09				
									19.50 ... with rare angular to subangular fine to coarse black rinded flint gravel	19.10	B10				
										20.00		N16	3, 2 / 4, 3, 4, 5		

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
Date Completed 14/12/16				
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 3 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
			100					20.00 ... becoming sandy		20.00	D11			
								20.50 - 20.80 ... with occasional black rinded flint gravel		20.50	B12			
								20.90 ... with 1No subvertical fracture with purple staining		21.00		N17	4, 3 / 3, 4, 4, 6	
										21.50	B13			
			100	20	10	-17.19		21.80	Strong, medium density white CHALK with occasional subvertical and subhorizontal fractures with purple staining. (SEAFORD CHALK FORMATION)					
						-17.49		22.10	White CHALK recovered as: firm to stiff, SILT. (SEAFORD CHALK FORMATION)					
			100							22.50	D14	N44	6, 7 / 9, 11, 11, 13	
										22.50				
										23.50	B15			
										24.00				
										24.00	D16	N49	3, 4 / 8, 12, 13, 16	
										24.50				
			100	40	27				24.50 ... with 1No subhorizontal fracture at 24.50m and 1No vertical open fracture between 24.50m and 24.70m	24.70	B17			
									24.70 ... with 1No horizontal fracture and at 24.80m, 24.85m and 24.90m					
										25.50		N50/ 285 mm	2, 4 / 6, 10, 16, 18	
										25.50	D18			
			100	43	41									
										26.50-26.70	C19			
								(9.30)	26.40 - 26.50 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL with rare black rinded flint cobbles. Gravel comprises weak, medium density white chalk fragments and rare black rinded flint	27.00		N50/ 245 mm	5, 9 / 11, 14, 17, 8	
									26.65 ... with 1No horizontal fracture and at 26.80m and 26.90m	27.00	D20			
									27.00 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density white chalk fragments and rare black rinded flint	27.50	B21			
									27.40 ... with rare stong, medium density chalk cobbles					
									27.90 - 28.10 ... with angular to subangular fine to coarse black rinded flint gravel and rare black rinded flint cobbles	28.50		N50/ 285 mm	4, 6 / 11, 12, 14, 13	
			100	80	76				28.20 ... with 1No subvertical fracture					
									28.35 ... with 1No wide open fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments	28.50	D22			
									28.70 ... becoming very silty with frequent angular to subangular fine to coarse black rinded flint					
			100	71	64				28.90 ... with subvertical fractures	29.40-29.70	C23			
									29.20 - 29.30 ... with 1No wide open fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and rare black rinded flint cobbles	29.90		N50/ 255 mm	3, 6 / 12, 14, 14, 10	

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 09/12/16	Ground Level (mOD) 4.61	Co-Ordinates E 543300.7 N 180351.6	Final Depth 31.40m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 4 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No		
14/12/16	14.80		100	67	63	-26.79		31.40	29.40 ... with 1No horizontal fracture 29.60 - 29.70 ... with 1No wide open fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint and rare black rinded flint cobbles 30.20 - 30.30 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises weak to moderately weak, medium density white chalk fragments and rare black rinded flint 30.55 ... with 1No horizontal fracture 30.60 ... with 1No vertical fracture 30.90 ... with 1No wide open fracture infilled with angular to subangular fine to coarse moderately weak to weak, medium density chalk fragments 31.10 ... with 1No horizontal fracture End of Borehole	29.90 30.20-30.40 31.10-31.40	D24 C25 C26		

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 07/12/16 Date Completed 08/12/16	Ground Level (mOD) 4.19	Co-Ordinates E 543391.0 N 180334.1	Final Depth 32.00m
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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	18.50	DS	07/12/2016	07/12/2016	TC	CB	112	PCD	Geotec 350	AR779
18.50	32.00	RC	07/12/2016	08/12/2016	TC	CB				

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	150	0.00	200	12.00	12.50		100
18.50	150	17.50	150	12.50	13.50		100
32.00	146			13.50	14.50		100
				14.50	15.20		100
				15.20	16.20		100
				16.20	17.20		80
				17.20	18.50		100
				18.50	19.50		60
				19.50	20.00		100
				20.00	20.60		100
				20.60	21.50		78
				21.50	23.00		100
				23.00	24.50		100
				24.50	26.00		100
				26.00	27.50		100
				27.50	29.00		100
				29.00	30.50		100
				30.50	32.00		100

ROTARY FLUSH DETAIL				
From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour
18.50	19.50	Water	25	
19.50	32.00	Water	75	

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	32.00	Cement / Bentonite Grout	08/12/2016

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 07/12/16	Ground Level (mOD) 4.19	Co-Ordinates E 543391.0 N 180334.1	Final Depth 32.00m
Date Completed 08/12/16				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
07/12/16	0.00				C	13.50	N9	0, 0 / 1, 3, 2, 3	12.50	
07/12/16	12.00	12.50		... see Remark 4	C	14.50	N9	0, 1 / 2, 2, 2, 3	12.50	
07/12/16	18.50	12.50			S	15.20	N10	1, 2 / 2, 2, 3, 3	12.50	
07/12/16	19.50	17.50			S	16.20	N6	3, 4 / 1, 1, 2, 2	12.50	
08/12/16	19.50	17.50	1.70		S	17.20	N10	2, 3 / 3, 3, 2, 2	12.50	
08/12/16	32.00	17.50	0.90		S	18.50	N12	2, 3 / 3, 3, 3, 3	17.50	
					S	20.00	N13	3, 3 / 3, 3, 3, 4	17.50	
					S	21.50	N15	3, 3 / 4, 4, 3, 4	17.50	
					S	23.00	N42	5, 8 / 9, 10, 11, 12	17.50	
					S	24.50	N44	6, 6 / 9, 11, 11, 13	17.50	
					S	26.00	N50/0.24	6, 11 / 13, 18, 15, 4	17.50	
					S	27.50	N42	5, 7 / 8, 11, 11, 12	17.50	
					S	29.00	N50/0.255	4, 8 / 12, 13, 17, 8	17.50	
					S	30.50	N50/0.015	18, 7 / 50	17.50	

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UNO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Dynamic sampling techniques used from 12.00m to 18.50m. Rotary boring carried out thereafter.

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
- SPGW - Gas / Temperature Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

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, C/P-R-Cable Percussion Rotary follow on

TESTS S-C-SPT / CPT, V-Shear Vane, PP Pocket Piezometer, MP Multi-hole 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 07/12/16	Ground Level (mOD) 4.19	Co-Ordinates E 543391.0 N 180334.1	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 1 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
07/12/16									Water.					
								(+12.00)						

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 07/12/16	Ground Level (mOD) 4.19	Co-Ordinates E 543391.0 N 180334.1	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 3 of 4

PROGRESS			STRATA					SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)			Type No
			100						19.60 ... [NI] recovered as : firm, very gravelly SILT. Gravel is angular to subangular fine to coarse moderately weak to weak, medium density chalk fragments and black rinded flint	20.60-21.50	B13		
			78						20.00 - 20.50 ... [NI] recovered as : angular to subangular fine to coarse silty GRAVEL with occasional black rinded flint cobbles. Gravel comprises moderately weak to weak, medium density chalk fragments and black rinded flint	21.50		N15	3, 3 / 4, 4, 3, 4
			100	73	63				20.60 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL with occasional black rinded flint cobbles and rare chalk cobbles. Gravel comprises moderately weak to weak, medium density chalk fragments and black rinded flint	21.50	D14		
									21.50 ... with a band of angular to subangular black rinded flint cobbles	22.00	B15		
									21.70 ... with occasional medium to coarse black rinded flint, rare black rinded flint cobbles and weak, medium density chalk cobbles				
									21.80 ... becoming medium to strong, medium density white CHALK with occasional subvertical fractures and purple staining	23.00		N42	5, 8 / 9, 10, 11, 12
									22.60 - 22.90 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL with rare chalk cobbles. Gravel is weak, medium density chalk fragments	23.00	D16		
									22.90 ... with 1No angular to subangular black rinded flint cobble				
			100	53	43				23.00 ... with occasional angular to subangular medium to coarse black rinded flint	23.80	B17		
									23.20 - 23.60 ... [NI] becoming gravelly SILT. Gravel is angular to subangular fine to coarse black rinded flint				
									24.30 ... with occasional angular to subrounded medium to coarse flint gravel and subvertical and subhorizontal fractures	24.50		N44	6, 6 / 9, 11, 11, 13
									24.50 - 24.70 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL. Gravel is weak medium density chalk fragments	24.50	D18		
									25.00 - 25.30 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL with rare moderately weak, medium density chalk cobbles and occasional black rinded flint cobbles. Gravel is weak, medium density chalk fragments	25.40-25.70	C19		
									25.70 - 26.00 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL with rare black rinded flint cobbles and rare moderately weak, medium density chalk cobbles. Gravel is weak, medium density chalk fragments and black rinded flint	26.00		N50/ 240 mm	6, 11 / 13, 18, 15, 4
									26.00 - 26.30 ... [NI] recovered as : firm, white gravelly SILT with weak medium density chalk cobbles. Gravel is angular to subangular fine to coarse weak, medium density chalk fragments	26.00	D20		
									26.45 ... with 1No horizontal fracture infilled with extremely weak, low density angular to subangular fine to coarse chalk fragments	26.50-26.80	C21		
									26.75 ... with 1No subhorizontal fracture	27.50		N42	5, 7 / 8, 11, 11, 12
									26.85 ... with 1No wide open subhorizontal fracture	27.50	D22		
									27.00 ... with 1No wide open horizontal fracture infilled with weak, medium density angular to subangular fine to coarse chalk fragments				
									27.30 ... with 1No wide open horizontal fracture				
			100	90	53				27.50 - 27.60 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL. Gravel comprises weak, medium density chalk fragments and black rinded flint	28.70	B23		
									27.80 ... with 1No subvertical fracture	29.00		N50/ 255 mm	4, 8 / 12, 13, 17, 8
									28.00 - 28.10 ... with 1No vertical fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint	29.00	D24		
			100	73	50				28.30 ... with 1No subvertical fracture				
									28.50 ... with 1No wide open horizontal fracture	29.80-30.00	C25		
									28.70 - 28.90 ... with 1No wide open horizontal fracture				

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 07/12/16	Ground Level (mOD) 4.19	Co-Ordinates E 543391.0 N 180334.1	Final Depth 32.00m
Client London City Airport Limited			Method/ Plant Used Dynamic Sampling / Rotary	Sheet 4 of 4

PROGRESS			STRATA						SAMPLES & TESTS			Field Records	Instrument/ Backfill	
Date	Casing	Water	TCR %	SCR %	RQD %	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No			Test Result
08/12/16	17.50	0.90	100	73	50	-27.81		32.00	29.00 - 29.40 ... [NI] recovered as : angular to subangular fine to coarse GRAVEL with rare black rinded flint cobbles and rare moderately weak, medium density chalk cobbles. Gravel is weak, medium density chalk fragments and black rinded flint 29.55 ... with 1No horizontal fracture and at 29.65m, 29.80m, 30.00m, 30.10m, 30.40m 30.50 - 30.70 ... [NI] becoming very silty GRAVEL with rare black rinded flint cobbles and rare moderately weak, medium density chalk cobbles. Gravel is angular to subangular fine to coarse weak, medium density chalk fragments and black rinded flint 30.85 ... with 1No wide open horizontal fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments 31.00 - 31.15 ... with rare angular to subangular black rinded flint cobbles 31.35 ... with 1No horizontal fracture 31.55 ... with 1No horizontal fracture 31.70 ... with 1No open wide fracture infilled with angular to subangular fine to coarse weak, medium density chalk fragments and with rare medium weak, chalk cobbles End of Borehole	30.10-30.35 30.50 31.70-32.00	C26 C27	N50/ 15 mm	18, 7 / 50	

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
	Date Completed 16/11/16			

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	31.50	CP	15/11/2016	16/11/2016	SW	CB			Dando 175	AR909

WATER STRIKES					WATER ADDED		CHISELLING / SLOW DRILLING			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks

HOLE		CASING		ROTARY RECOVERY			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Blows	Recovery (%)
0.00	200	0.00	200				
16.50	200	15.10	200				
31.50	150	26.50	150				

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	31.50	Cement / Bentonite Grout	16/11/2016

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Report ID: SUMMARY SHEET 1 || Project: 162900 - LONDON CITY AIRPORT.GPJ || Library: CONCEPT LIBRARY - 2017.GLB || Date: 3 March 2017

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
Date Completed 16/11/16				

Client
London City Airport Limited

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
15/11/16	0.00			... see Remark 3	S	12.00	N0	0, 0 / 0, 0, 0, 0	12.00	0.90
15/11/16	12.00	12.00	0.90		C	14.00	N48	7, 9 / 11, 12, 14, 11	14.00	0.90
15/11/16	13.00	13.00	1.20		S	15.00	N14	2, 3 / 3, 5, 3, 3	15.00	1.00
15/11/16	14.00	14.00	0.90		S	15.10	N10	2, 2 / 3, 2, 2, 3	15.10	1.00
15/11/16	15.00	15.00	1.00		S	17.50	N8	3, 2 / 1, 2, 3, 2	17.50	1.60
15/11/16	16.00	15.10	1.00		S	19.00	N8	2, 2 / 1, 2, 3, 2	19.00	2.20
15/11/16	16.50	15.10	0.95		S	20.50	N11	9, 7 / 3, 2, 3, 3	20.50	1.40
16/11/16	16.50	15.10	0.90		S	22.00	N13	2, 2 / 3, 2, 3, 5	22.00	2.00
16/11/16	17.50	17.50	1.60		S	23.50	N38	5, 6 / 6, 5, 17, 10	23.50	2.80
16/11/16	19.00	19.00	2.20		S	25.00	N24	4, 7 / 7, 6, 5, 6	25.00	1.60
16/11/16	20.50	20.50	1.40		S	26.50	N38	3, 5 / 7, 9, 12, 10	26.50	1.40
16/11/16	22.00	22.00	2.00		S	28.00	N44	6, 8 / 10, 10, 11, 13	26.50	1.10
16/11/16	23.50	23.50	2.80		S	29.50	N50/0.275	10, 11 / 10, 12, 11, 17	26.50	1.50
16/11/16	25.00	25.00	1.60		S	31.00	N50/0.295	8, 10 / 12, 12, 14, 12	26.50	2.10
16/11/16	26.50	26.50	1.40							
16/11/16	28.00	26.50	1.10							
16/11/16	29.50	26.50	1.50							
16/11/16	31.00	26.50	2.10							
16/11/16	31.50	26.50	2.10							

GENERAL REMARKS

- Borehole carried out from a pontoon. All levels are recorded relative to the pontoon level.
- Clearance by UXO Magnetometer probe.
- Water present in the borehole from casing installation through the dock.
- Ø200mm casing used from pontoon level to 15.10m depth. Bentonite seal inserted between 14.50m and 16.50m and borehole re-drilled with Ø150mm casing to 26.50m 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
- SPGW - Gas / Temperature / Monitor Standpipe
- VWP - Vibrating Wire Piezometer
- ICM - Inclinator

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, CPR-Cable Percussion Rotary follow on

TESTS S-C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Multi-point 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



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
15/11/16					(11.50)	Water.					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
Date Completed 16/11/16		Method/ Plant Used Cable Percussion		Sheet 2 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
15/11/16	12.00	0.90	-6.55		11.50	Very soft, dark brown and light grey SILT with viscous texture and strong hydrocarbon odour. (DOCK SEDIMENT) 12.00 ... becoming slightly clayey	11.50-12.00	B01	N0	0, 0 / 0, 0, 0, 0	
					(1.95)		11.50	ES02			
							12.00	D03			
							12.75	D04			
15/11/16	13.00	1.20					13.00-13.45	UT05			
			-8.50		13.45	Dark grey sandy angular to rounded fine to coarse flint GRAVEL with rare pockets of very soft dark grey silt (<50mm), occasional flint cobbles, rare pieces of rope (<140mm) and strong hydrocarbon odour. (RIVER TERRACE DEPOSITS)	13.50-14.00	B06	N48	7, 9 / 11, 12, 14, 11	
15/11/16	14.00	0.90	-9.05	(0.55)	13.50		D07				
					13.70		ES08				
					14.00	Light grey very sandy angular to rounded fine to coarse flint GRAVEL with rare flint cobbles and slight hydrocarbon odour. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	14.00-14.50	B09	N14	2, 3 / 3, 5, 3, 3	
15/11/16	15.00	1.00	-9.95	(0.90)	14.00		D11				
			-10.05		14.10	ES10	14.75	D12	N10	2, 2 / 3, 2, 2, 3	
					14.90	D13					
					15.00	White CHALK [NI] recovered as: silty subangular to subrounded medium to coarse GRAVEL. Gravel is angular fine to coarse strong, medium density chalk fragments and black rinded flint. (SEAFORD CHALK FORMATION)	15.50-16.00	B14	N8	3, 2 / 1, 2, 3, 2	
15/11/16	15.10	1.00			15.10		D15				
					16.00	Structureless white putty CHALK [NI] recovered as: white SILT. (SEAFORD CHALK FORMATION)	16.50-17.00	B16	N8	3, 2 / 1, 2, 3, 2	
15/11/16	15.10	0.95			16.50		D17				
16/11/16	15.10	0.90			17.50	B18	17.50	D17	N8	2, 2 / 1, 2, 3, 2	
					18.00-18.50	B18					
					17.50 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with frequent strong, high density chalk cobbles and occasional pockets of very soft chalk silt. Gravel is strong, high density chalk fragments	16.00 ... [NI] recovered as: soft, gravelly SILT. Gravel is angular to subangular very weak, medium density white chalk fragments 16.50 ... [NI] recovered as: angular to subangular fine to coarse GRAVEL with frequent subangular black rinded flint cobbles and rare weak, medium density chalk cobbles. Gravel is very weak, medium density chalk fragments 17.50 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL. Gravel is very weak, low density chalk fragments 18.00 ... becoming angular to subangular COBBLES with occasional angular to subangular fine to coarse gravel size chalk fragments. Cobbles are moderately weak high density chalk 19.00 ... [NI] recovered as: silty angular to subangular fine to coarse GRAVEL. Gravel comprises extremely weak, medium density chalk fragments and black rinded flint 19.50 ... with occasional angular to subangular	17.50	D17	N8	2, 2 / 1, 2, 3, 2	
16/11/16	17.50	1.60			18.00		D19				
					19.00	B20	19.00	D19	N8	2, 2 / 1, 2, 3, 2	
16/11/16	19.00	2.20			19.50-20.00	B20					

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Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
Client London City Airport Limited			Method/ Plant Used Cable Percussion	Sheet 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		
16/11/16	20.50	1.40				black rinded flint and rare black angular rinded flint cobbles	20.50 20.50	D21	N11	9, 7 / 3, 2, 3, 3	
						21.00 ... becoming very silty with rare angular to subangular coarse black rinded flint	21.00-21.50	B22			
16/11/16	22.00	2.00				22.00 ... [NI] recovered as: slightly gravelly SILT. Gravel is angular to subangular fine to coarse extremely weak, low density chalk fragments	22.00 22.00	D23	N13	2, 2 / 3, 2, 3, 5	
						22.50 ... becoming silty	22.50-23.00	B24			
16/11/16	23.50	2.80			(16.50)	23.50 ... [NI] recovered as: firm SILT	23.50 23.50	D25	N38	5, 6 / 6, 5, 17, 10	
							24.00-24.50	B26			
16/11/16	25.00	1.60				25.00 - 26.50 ... [NI] recovered as: firm SILT	25.00 25.00	D27	N24	4, 7 / 7, 6, 5, 6	
							25.50-26.00	B28			
16/11/16	26.50	1.40				27.00 - 27.50 ... with frequent angular to subangular black rinded flint cobbles	26.50 26.50	D29	N38	3, 5 / 7, 9, 12, 10	
							27.00-27.50	B30			
16/11/16	26.50	1.10				28.00 ... [NI] recovered as: firm gravelly SILT. Gravel is medium to coarse black rinded flint	28.00 28.00	D31	N44	6, 8 / 10, 10, 11, 13	
							29.00	B32			
16/11/16	26.50	1.50				29.00 ... [NI] recovered as: very silty angular to subangular fine to coarse GRAVEL with occasional black rinded flint cobbles. Gravel is very weak, medium density chalk fragments	29.50 29.50	D33	N50/ 275 mm	10, 11 / 10, 12, 11, 17	
						29.50 ... [NI] recovered as: firm slightly gravelly SILT. Gravel is fine black rinded flint	29.50 30.00	D33 B34			

Report ID: CONCEPT CABLE PERCUSSION || Project: 162900 - LONDON CITY AIRPORT.GPJ || Library: CONCEPT LIBRARY - 2017.GLB || Date: 3 March 2017



Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 15/11/16	Ground Level (mOD) 4.96	Co-Ordinates E 543460.0 N 180338.9	Final Depth 31.50m
Date Completed 16/11/16		Method/ Plant Used Cable Percussion		Sheet 4 of 4
Client London City Airport Limited				

PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/ Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
16/11/16	26.50	2.10					31.00		N50/ 295 mm	8, 10 / 12, 12, 14, 12	
16/11/16	26.50	2.10	-26.55		31.50	End of Borehole	31.00	D35			

Report ID: CONCEPT CABLE PERCUSSION || Project: 162900 - LONDON CITY AIRPORT.GPJ || Library: CONCEPT LIBRARY - 2017.GLB || Date: 3 March 2017

Project
CADP Surveys Ground Investigation (Dock) - Phase 2

Job No 16/2900	Date Started 29/11/16 Date Completed 29/11/16	Ground Level (mOD) 5.44	Co-Ordinates E 543374.6 N 180188.8	Final Depth 2.00m
Client London City Airport Limited			Method/ Plant Used Machine Excavated	Sheet 1 of 1

STRATA					SAMPLES & TESTS			Field Records
Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth	Type No	Test Result	
	5.14		(0.30) 0.30	CONCRETE.				
			(1.70)	Brown, very sandy GRAVEL with concrete cobbles. Gravel comprises fine to coarse flint with brick and concrete fragments. (MADE GROUND)				
	3.44		2.00	End of Trial Pit				

GENERAL REMARKS

1. Weather was overcast but dry.
2. Trial pit was stable.
3. Water seepage encountered at 2.00m below ground level.
4. Trial pit dimensions 1.90mx 3.20mx 2.00m depth.
5. Trial pit backfilled with soil arisings.
6. 4No Dynamic probes were carried out through the backfilled pit to establish dock profile on the 19/01/17.
7. Water encountered on the rods at 1.40m depth during dynamic probing.
8. Also refer to TP01 sketch.

Report ID: CONCEPT- TRIAL PIT || Project: 162900 - LONDON CITY AIRPORT.GPJ || Library: CONCEPT LIBRARY - 2017.GLB || Date: 28 February 2017

NOTES

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

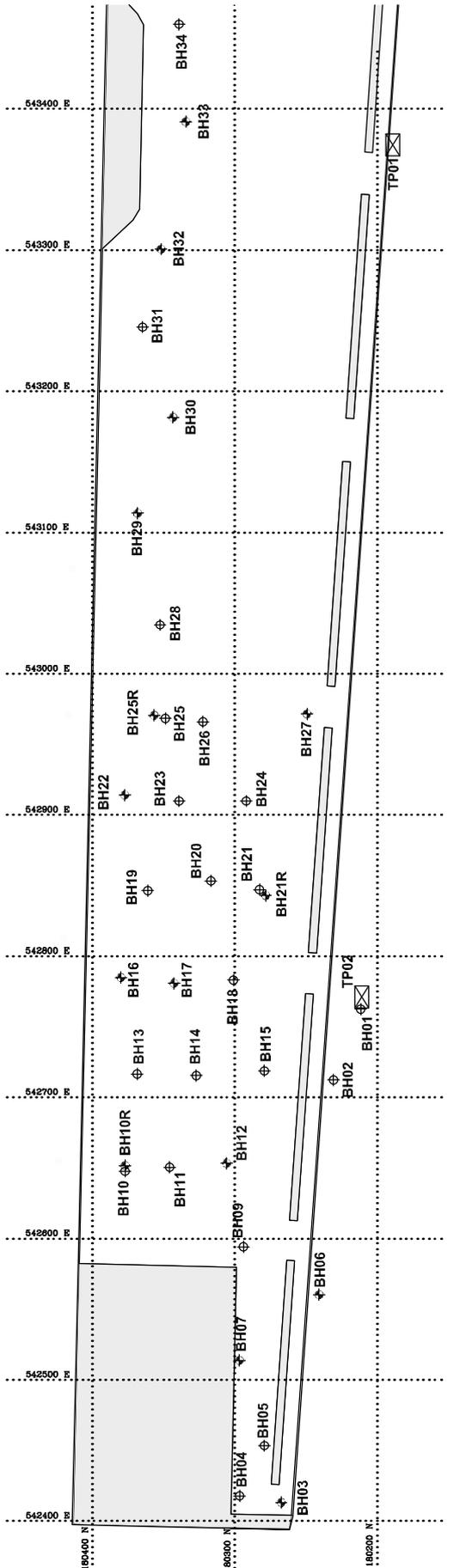


PointID	HoleDepth	Easting	Northing	Elevation (mOD)	TYPE
BH03	34.60	542413.37	180267.86	4.77	DS/RC
BH04	37.50	542417.70	180266.25	4.89	CP
BH05	33.95	542453.30	180270.08	4.68	CP
BH06	30.80	542500.27	180240.47	5.69	DS/RC
BH07	33.50	542513.76	180266.37	4.95	DS/RC
BH09	32.00	542594.06	180293.69	5.02	CP
BH10	32.50	542677.53	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	180306.55	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	180326.68	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	180292.34	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	180345.20	4.23	DS/RC
BH31	32.00	543245.51	180364.44	6.49	DS/RC
BH32	31.40	543300.74	180351.60	4.61	DS/RC
BH34	32.00	543390.97	180344.13	4.19	DS/RC
BH34	31.50	543459.99	180338.91	4.96	CP
TP01	2.00	543374.64	180188.76	5.44	TP
TP02	3.50	542771.33	180218.40	5.55	TP

Date	Checked	Drawn	Revised

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Client: London City Airport	
Project: CADD Surveys - Ground Investigation (Dock) - Phase 2	
Title: Figure 1 Exploratory Hole Location Plan	
Dwg. No: 162300/00	
Status: Issue	
Scale: NTS	
Drawn RD/EV	Checked OS
Passed MD	Date February 17



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

APPENDIX 8

Quest, 2017, Geoarchaeological Deposit Model Report

LONDON CITY AIRPORT, HARTMANN ROAD, LONDON E16

Geoarchaeological Deposit Model Report

NGR: TQ 42300 80300

Date: 19th May 2017

Site Code: LCA17

Written by: Dr D.S. Young

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1. NON-TECHNICAL SUMMARY

A programme of geoarchaeological investigation was carried out at the site in order to (1) to clarify the nature of the sub-surface stratigraphy, in particular the presence and thickness of alluvium and peat across the site, (2) to evaluate the potential of the sedimentary sequences for reconstructing the environmental history of the site and its environs, and (3) to investigate the archaeological potential of the site. In order to address these aims, three new geoarchaeological boreholes were put down at the site, the stratigraphic data from which were combined with existing geotechnical records to produce a deposit model of the major depositional units across the site.

Up to 2.8m of peat was identified within the Holocene alluvium at the site, overlying a Shepperton Gravel surface which lay at between -5.10 and -2.92m OD. The Gravel topography was indicative of a potential Late Devensian/Early Holocene palaeochannel, aligned broadly north-south, in the western area of the site. Although the lower Gravel surfaces across the present site are considered to be of negligible archaeological potential, the peat deposits have the potential to contain a wealth of further information on the past landscape in addition to archaeological material, through the assessment/analysis of palaeoenvironmental remains. It is therefore recommended that a programme of environmental archaeological assessment is undertaken on one selected borehole from the site (LCY-BHAC03).

2. INTRODUCTION

2.1 Site context

This report summarises the findings arising out of the geoarchaeological deposit modelling undertaken by Quaternary Scientific (University of Reading) in connection with the proposed development of land at London City Airport, Hartmann Road, London E16 (National Grid Reference: centred on TQ 42300 80300; Figures 1 & 2). Quaternary Scientific were commissioned by the City Airport Development Programme (CADP) undertake the geoarchaeological investigations. The site is situated on the River Thames floodplain, ca. 500m to the north of the present course of the river and to the north of Hartmann Road (see Figures 1 and 2). British Geological Survey (BGS) mapping shows the site lying at the interface between Palaeogene Thanet Sand and Lambeth Group bedrock, both described as 'Clay, Silt and Sand'. The superficial geology is shown at the site as Alluvium, described as 'Clay, Silty, Peaty, Sandy' (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). In fact, the alluvial deposits of the Lower Thames and its tributaries are almost everywhere underlain by Late Devensian Late Glacial Gravels (in the Thames valley, the Shepperton Gravel of Gibbard, 1985, 1994), and this gravel is widely recorded in BGS archive boreholes in the vicinity of the site.

2.2 Palaeoenvironmental and archaeological significance

The existing geotechnical borehole records in the area of the site (RPS, 2016) indicate considerable variation in the height of the Gravel surface, and the type, thickness and age of the subsequent Holocene alluvial deposits. In the five geotechnical boreholes, the Gravel surface was recorded at

between -3.65 and -5.0m OD, overlain by a variable thickness of Holocene alluvial deposits which in all five boreholes contained up to 2.8m of peat. Such variations in the alluvial sequence are significant as they represent different environmental conditions that would have existed in a given location. For example: (1) the varying surface of the Gravel may represent the location of former channels and bars; (2) the presence of soil and peat represents former terrestrial or semi-terrestrial land-surfaces, and (3) the various alluvial units represent periods of changing hydrological conditions. Thus by studying the sub-surface stratigraphy across the site in greater detail, it will be possible to build an understanding of the former landscapes and environmental changes that took place across space and time.

The alluvial and organic-rich sediments (in particular peat) also have high potential to provide a detailed reconstruction of past environments on both the wetland and dryland. In particular, they provide the potential to increase knowledge and understanding of the interactions between hydrology, human activity, vegetation succession and climate. Significant vegetation changes include the Mesolithic/Neolithic decline of elm woodland, the Neolithic colonisation and decline of yew woodland; the Late Neolithic/Early Bronze Age growth of elm on Peat, and the general decline of wetland and dryland woodland during the Bronze Age. Such investigations are carried out through the assessment/analysis of palaeoecological remains (e.g. pollen, plant macrofossils & insects) and radiocarbon dating, and have been undertaken at the nearby sites such as Albert Road (Spurr et al., 2001), North Woolwich Pumping Station (Sidell, 2003), Barge House Road (Corcoran et al., 2001), Gallions Point (Branch et al., 1999) and Plot 2.3, Royals Business Park (Young & Batchelor, 2013) (see Figure 1).

Finally, areas of high gravel topography, soils and peat represent potential areas that might have been utilised or even occupied by prehistoric people, evidence of which may be preserved in the archaeological (e.g. features and structures) and palaeoenvironmental record (e.g. changes in vegetation composition). Such prehistoric archaeological activity has been recorded on higher gravel topography at Royal Docks Community School ca. 1.2km to the northwest, where a soil horizon containing Mesolithic flint flakes was recorded, overlain by a Neolithic and Bronze Age soil containing over 1300 fragments of flint tools, debris and pottery (Holder, 1998).

2.3 Aims and objectives

A programme of geoarchaeological fieldwork (incorporating three new geoarchaeological boreholes) and deposit modelling was carried out in order to: (1) clarify the nature of the sub-surface stratigraphy, in particular the presence and thickness of alluvium and peat across the site, (2) to evaluate the potential of the sedimentary sequences for reconstructing the environmental history of the site and its environs, and (3) to investigate the archaeological potential of the site. In order to address these aims, the stratigraphic data from the new and existing stratigraphic records were used to produce a deposit model of the major depositional units across the site.

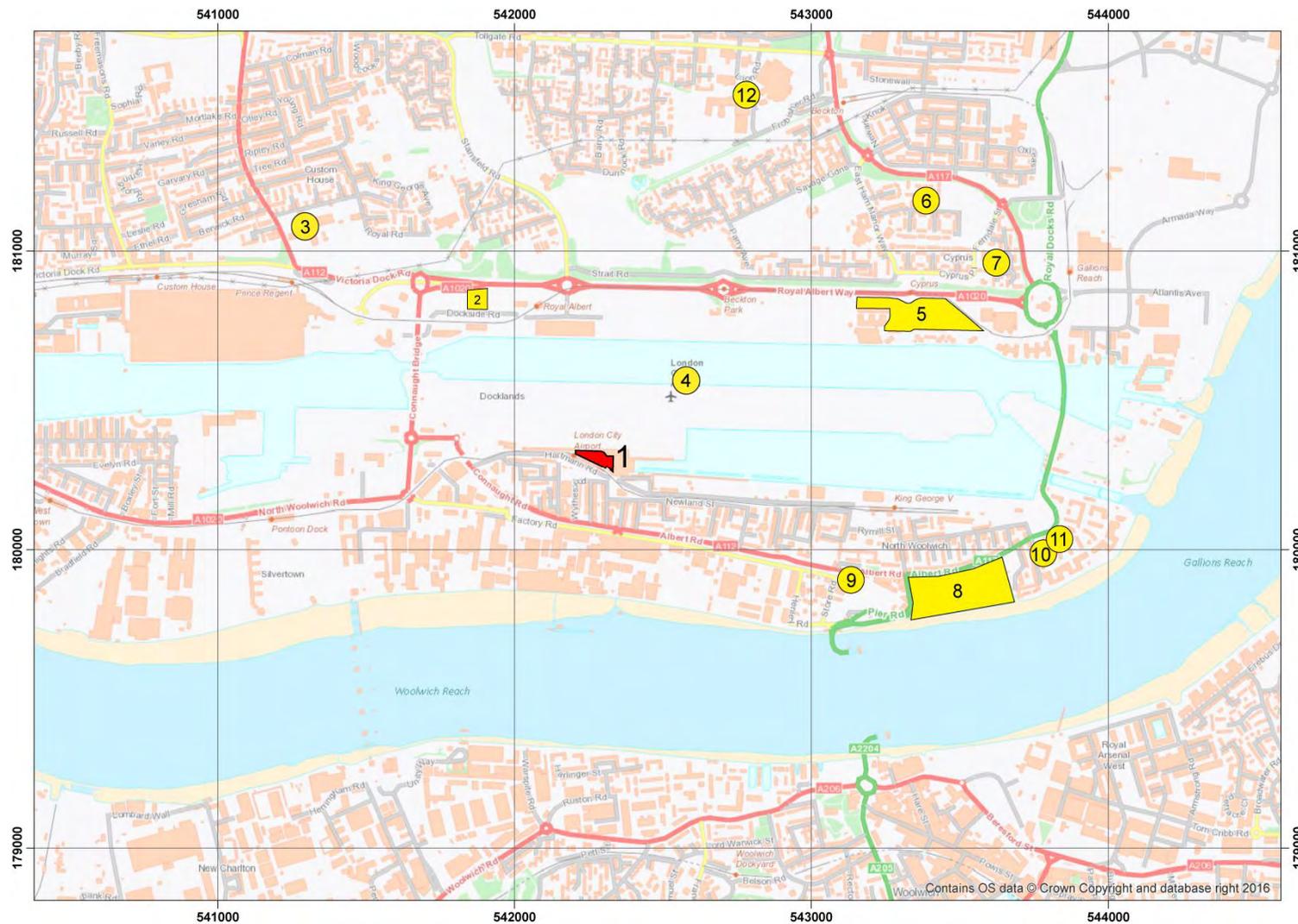


Figure 1: Location of the present investigation (1) and selected sites of geoarchaeological/archaeological investigation: (2) Plot 2.3, Royals Business Park (Young & Batchelor, 2013); (3) Royal Docks Community School (Holder, 1998); (4) Albert Dock (Spurrell, 1889); (5) Royal Albert Dock (Batchelor, 2009); (6) East Ham Football Club (PYR00; Scaife, 2001); (7) Ferndale Street (Divers, 1995); (8) North Woolwich Pumping Station (Sidell, 2003); (9) Albert Road (Spurr et al., 2001); (10) Barge House Road (Corcoran et al., 2001); (11) Gallions Point (Branch et al., 1999); (12) Beckton Tollgate (Tamblyn, 1994).

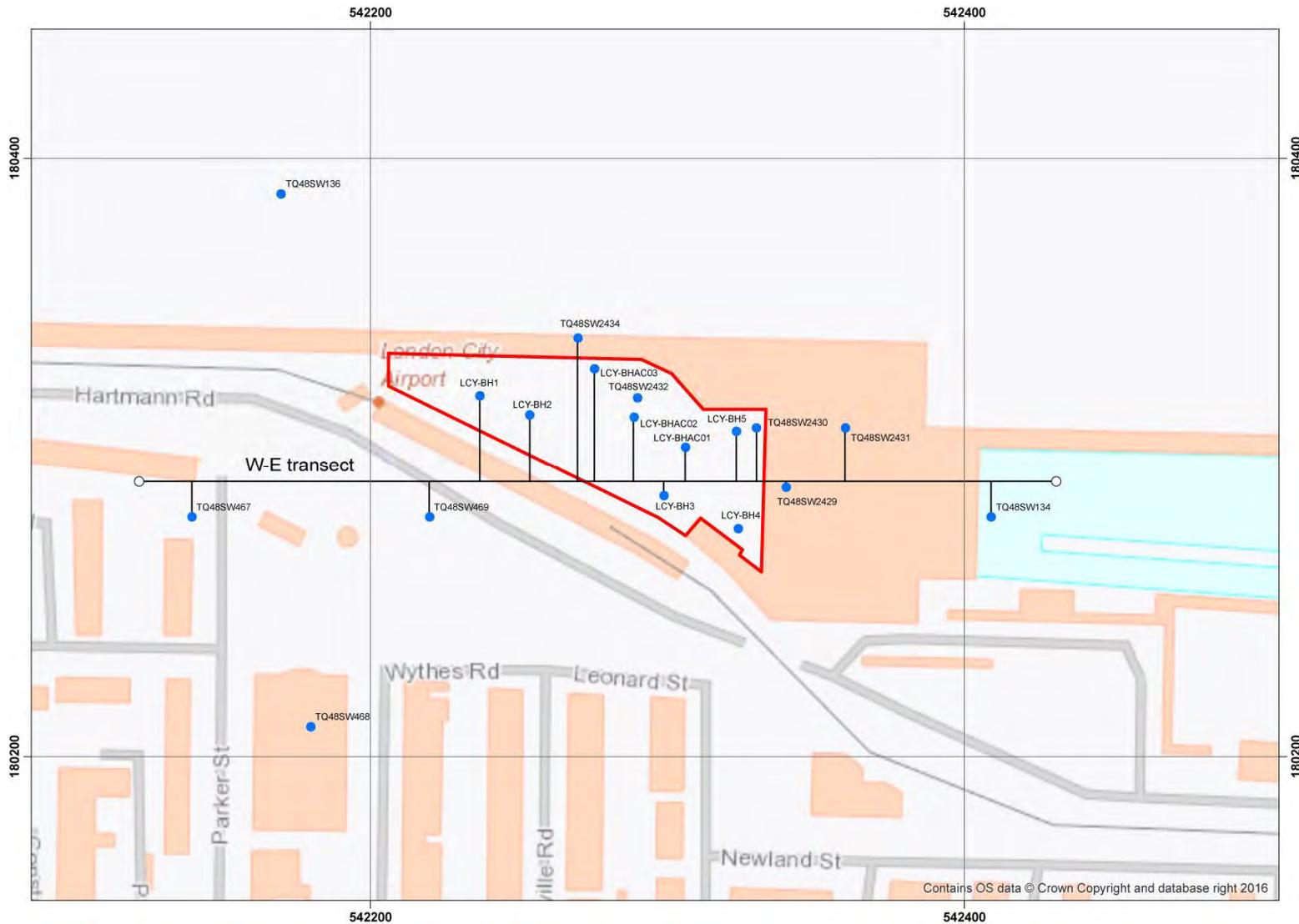


Figure 2: Location of the new geochaeological borehole sequences (LCY-BHAC01 to BHAC03), existing geotechnical (LCY-BH1 to BH5) and BGS archive boreholes (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>) used in the deposit model at London City Airport. Position of the west-east transect (Figure 3) also shown.

3. METHODS

3.1 Field investigations

A total of three new geoarchaeological boreholes (LCY-BHAC01 to LCY-BHAC03) were put down by Concept Engineering Consultants Ltd in March 2017 using a rotary/dynamic sampler, and monitored by Quaternary Scientific. All samples were retained in metre long plastic tubes and removed from site for description in the laboratory. Samples were retained from the base of the Made Ground to the surface of the gravel. All borehole locations were recorded by Concept Engineering Consultants Ltd (see Table 1).

3.2 Lithostratigraphic descriptions

The lithostratigraphy of boreholes LCY-BHAC01 to LCY-BHAC03 was described in the laboratory using standard procedures for recording unconsolidated/organic sediments, noting the physical properties (colour), composition (gravel, sand, clay, silt and organic matter) and inclusions (e.g. artefacts) (Tröels-Smith, 1955). The procedure involved: (1) cleaning the samples with a spatula or scalpel blade and distilled water to remove surface contaminants; (2) recording the physical properties, most notably colour using a Munsell Soil Colour Chart; (3) recording the composition; gravel (*Grana glareosa*; Gg), fine sand (*Grana arenosa*; Ga), silt (*Argilla granosa*; Ag) and clay (*Argilla steatoides*); (4) recording the degree of peat humification and (5) recording the unit boundaries e.g. sharp or diffuse. The results of the lithostratigraphic descriptions are displayed in Tables 2 to 4.

3.3 Deposit modelling

The deposit model for the site was based on a review of 18 borehole records, incorporating the three new geoarchaeological boreholes (LCY-BHAC01 to BHAC03), five existing geotechnical records (LCY-BH1 to BH5) (RPS, 2016) and ten BGS archive boreholes (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>). Sedimentary units from the boreholes were classified into six groupings: (1) Gravel, (2) Sand, (3) Lower Alluvium, (4) Peat, (5) Upper Alluvium and (6) Made Ground. The classified data for groups 1-6 were then input into a database with the RockWorks 16 geological utilities software. Models of surface height were generated for the Gravel (Figure 4), Lower Alluvium (Figure 5), Peat (Figure 6) and the Upper Alluvium (Figure 8). Thickness of the Peat (Figure 7), the combined Holocene alluvial sequence (Figure 9), and the Made Ground (Figure 10) were also modelled (also using a nearest neighbour routine). Because the boreholes are not uniformly distributed over the area of investigation, the reliability of the models generated using RockWorks is variable. In general, reliability improves from outlying areas where the models are largely supported by scattered archival records towards the core area of boreholes.

Because of the 'smoothing' effect of the modelling procedure, the modelled levels of stratigraphic contacts may differ slightly from the levels recorded in borehole logs and section drawings. As a consequence of this the modelling procedure has been manually adjusted so that only those areas for which sufficient stratigraphic data is present will be modelled. In order to achieve this, a maximum distance cut-off filter equivalent to a 50m radius around each record is applied to all deposit models, with the exception of the more widely present Gravel, Upper Alluvium and Made Ground, to which a 100m radius is applied. Finally, it is important to recognise that multiple sets of

boreholes are represented, put down at different times and recorded using different descriptive terms and subject to differing technical constraints in terms of recorded detail including the exact levels of the stratigraphic boundaries.

4. RESULTS AND INTERPRETATION OF THE DEPOSIT MODELLING

A summary of the borehole data included in the deposit model is shown in Table 1, with the results of the deposit modelling displayed in Figures 3 to 10. Figure 3 is a two-dimensional west-east transect of selected boreholes across the site; Figures 4 to 10 are surface elevation and thickness models for each of the main stratigraphic units. The results of the deposit modelling indicate that the number and spread of the logs is sufficient to permit modelling with a high level of certainty across the site. The full sequence of sediments recorded in the boreholes comprises:

Made Ground – widely present
Upper Alluvium – widely present
Peat – widely present
Lower Alluvium – locally present
Sand – only locally present (one borehole)
Gravel (Shepperton Gravel) – widely present

4.1 Shepperton Gravel

The Shepperton Gravel was present in all boreholes, underlying the Holocene alluvial sequence. It was deposited during the Late Glacial (15,000 to 10,000 years before present) and comprises the sands and gravels of a high-energy braided river system which, while it was active would have been characterised by longitudinal gravel bars and intervening low-water channels in which finer-grained sediments might have been deposited. Such a relief pattern would have been present on the valley floor at the beginning of the Holocene when a lower-energy fluvial regime was being established.

The surface of the Gravel (see Figures 3 and 4) lies at between -5.10 and -2.92m OD within the area of the site, generally falling from the east in the area of boreholes LCY-BHAC01, TQ48SW2430 and TQ48SW2432 (ca. -2.9 to -3.5m OD) to west in the area of boreholes LCY-BH1 and BH2 (ca. -4.9 to -5.1m OD). Beyond the margins of the site the Gravel rises to -2.70m OD to the east (TQ48SW2431) and falls to -5.20m OD just to the west (TQ48SW469). The general relief pattern of the Gravel in the area of the site is thus indicative of a possible Late Devensian/Early Holocene channel, broadly aligned north-south and whose main axis lay towards the west of the site.

4.2 Sand

A horizon of sand was recorded in one borehole (LCY-BH1) between -4.1 and -9.0m OD, directly overlying the Gravel and recorded towards the main axis of the possible palaeochannel identified above. This unit is indicative of moderate energy fluvial conditions, apparently limited to within this former channel; however, its absence in the existing geotechnical sequences does not necessarily

mean it is not present as an individual unit, as it is sometimes difficult to identify sand units within the silty/sandy Lower Alluvium due to the nature of the coring methods and less precise method of description.

4.3 Lower Alluvium

The Lower Alluvium rests directly on the Shepperton Gravel (overlying the Sand in LCY-BH1) and was recorded in four boreholes in the area of the site (LCY-BH2, TQ48SW136, TQ48SW468 and TQ48SW467) (Figure 5). The deposits of the Lower Alluvium are described as predominantly silty or clayey, tending to become increasingly sandy downward in most sequences. The Lower Alluvium frequently contains detrital wood or plant remains, and in many cases is described as organic and with occasional Mollusca remains. The surface of the Lower Alluvium (Figure 5) is variable, lying at between -3.05 (TQ48SW467) and -4.8m OD (TQ48SW136/LCY-BH2). The surface of the Lower Alluvium is lowest within the possible palaeochannel identified above, in the area of boreholes TQ48SW136 and LCY-BH2.

The sediments of the Lower Alluvium are indicative of deposition during the Early to Mid-Holocene, when the main course of the Thames was probably confined to a single meandering channel. During this period, the surface of the Shepperton Gravel was progressively buried beneath the sandy and silty flood deposits of the river. The richly-organic nature of the Lower Alluvium suggests that this was a period during which the valley floor was occupied by a network of actively shifting channels, with a drainage pattern on the floodplain that was still largely determined by the relief on the surface of the underlying Shepperton Gravel.

4.4 Peat

Recorded either directly overlying the Shepperton Gravel or the Lower Alluvium in all but one borehole (LCY-BHAC01) is a unit of peat, usually described as woody and in places silty. The surface of this unit (Figure 6) was variable in the area of the site, recorded at between -1.5 (LCY-BH3) and -3.5m OD (LCY-BHAC02); in general, lower peat surfaces are recorded within the area of the site than in those records to the east and west (see Figure 6). The peat is between 0.6 (TQ48SW2430) and 2.8m (LCY-BH2) in thickness (Figure 7), with greater thicknesses recorded towards the west of the site, particularly in the area of the palaeochannel identified within the surface of the Gravel (see above).

Significantly, the peat is indicative of a transition towards semi-terrestrial (marshy) conditions, supporting the growth of either saltmarsh, sedge fen/reed swamp and/or woodland communities. Such semi-terrestrial conditions may have represented former land surfaces that might have been utilised by prehistoric communities. Assuming that 1m of peat represents 1000 years of peat formation (a typical figure in fen peatlands), the Peat may represent up to 3000 years of accumulation in such conditions.

4.5 Upper Alluvium

The Upper Alluvium overlies the Peat across the site, the deposits of which are described as predominantly silty or clayey and occasionally organic-rich. The surface of the Upper Alluvium (Figure 8) is relatively even, lying at between 1.1 (LCY-BH2) and -1.7m OD (TQ48SW2430). However, given the variable thicknesses of Made Ground across the site, it is possible that such surfaces may have been truncated to lower levels in places. The sediments of the Upper Alluvium are indicative of deposition within low energy fluvial and/or semi-aquatic conditions during the Holocene. The high mineral content of the sediments may reflect increased sediment loads resulting from intensification of agricultural land use from the later prehistoric period onward, combined with the effects of rising sea level.

The combined Holocene alluvial sequence (incorporating the Sand, Lower Alluvium, Peat and Upper Alluvium) is recorded in thicknesses of between 2.6 (TQ48SW2430) and 6.0m (LCY-BH2) in the area of the site (Figure 9). Greater thicknesses are recorded towards the west of the site within the area of the palaeochannel identified above.

4.6 Made Ground

Between 3.4 (LCY-BH2) and 8m (LCY-BHAC01) of Made Ground caps the Holocene alluvial sequence across the site (Figure 10). The Made Ground is generally thickest towards the east of the site; in one borehole here (LCY-BHAC01) a thick layer of concrete was recorded directly overlying the Gravel at 9.0m below ground level (bgl).

Table 1: Spatial data for those records used in the deposit model at London City Airport, Hartmann Road, London E16.

Borehole	Easting	Northing	Elevation (m OD)
New geoarchaeological boreholes			
LCY-BHAC01	542306.13	180303.59	5.08
LCY-BHAC02	542288.94	180313.56	4.10
LCY-BHAC03	542275.53	180329.74	4.92
Existing geotechnical records (RPS, 2016)			
LCY-BH1	542236.88	180320.75	4.50
LCY-BH2	542253.75	180314.33	4.50
LCY-BH3	542298.92	180287.15	5.20
LCY-BH4	542323.93	180276.10	5.20
LCY-BH5	542323.33	180308.84	5.25
BGS archive boreholes (http://mapapps.bgs.ac.uk/geologyofbritain/home.html)			
TQ48SW468	542180.00	180210.00	1.55
TQ48SW469	542220.00	180280.00	1.10
TQ48SW134	542409.00	180280.00	2.64
TQ48SW467	542140.00	180280.00	1.85
TQ48SW2429	542340.00	180290.00	5.30
TQ48SW2431	542360.00	180310.00	5.60
TQ48SW2430	542330.00	180310.00	5.50
TQ48SW2432	542290.00	180320.00	4.90
TQ48SW2434	542270.00	180340.00	5.50
TQ48SW136	542170.00	180388.00	1.60

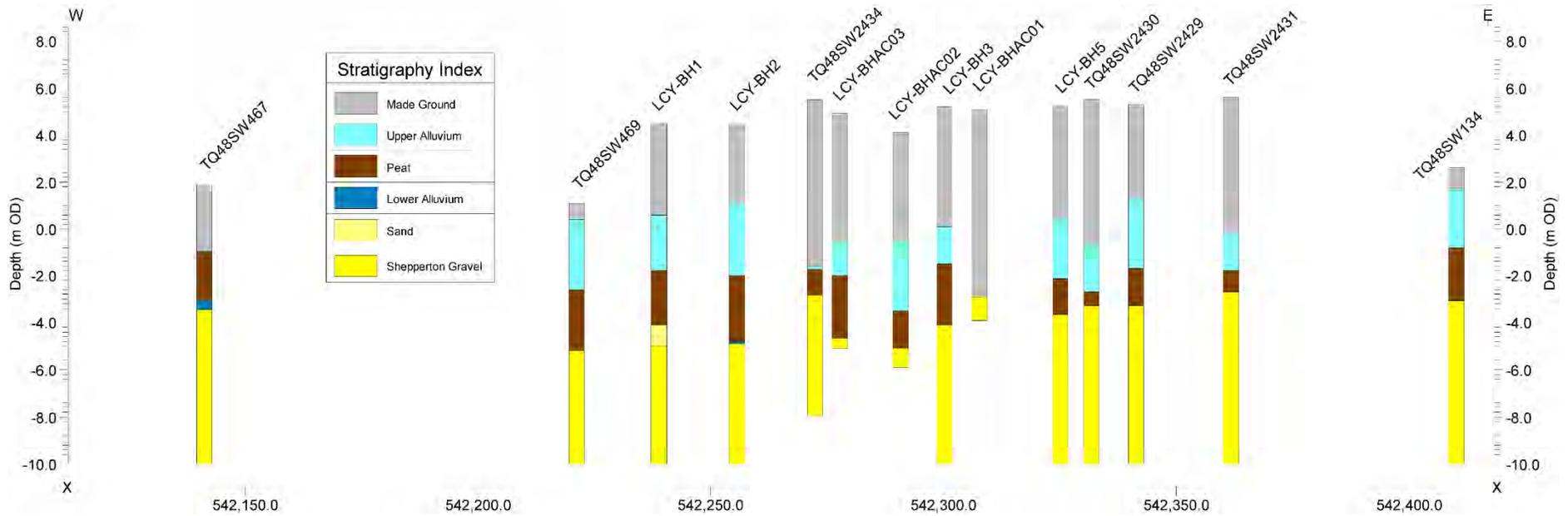


Figure 3: West-east transect of selected boreholes across the London City Airport site

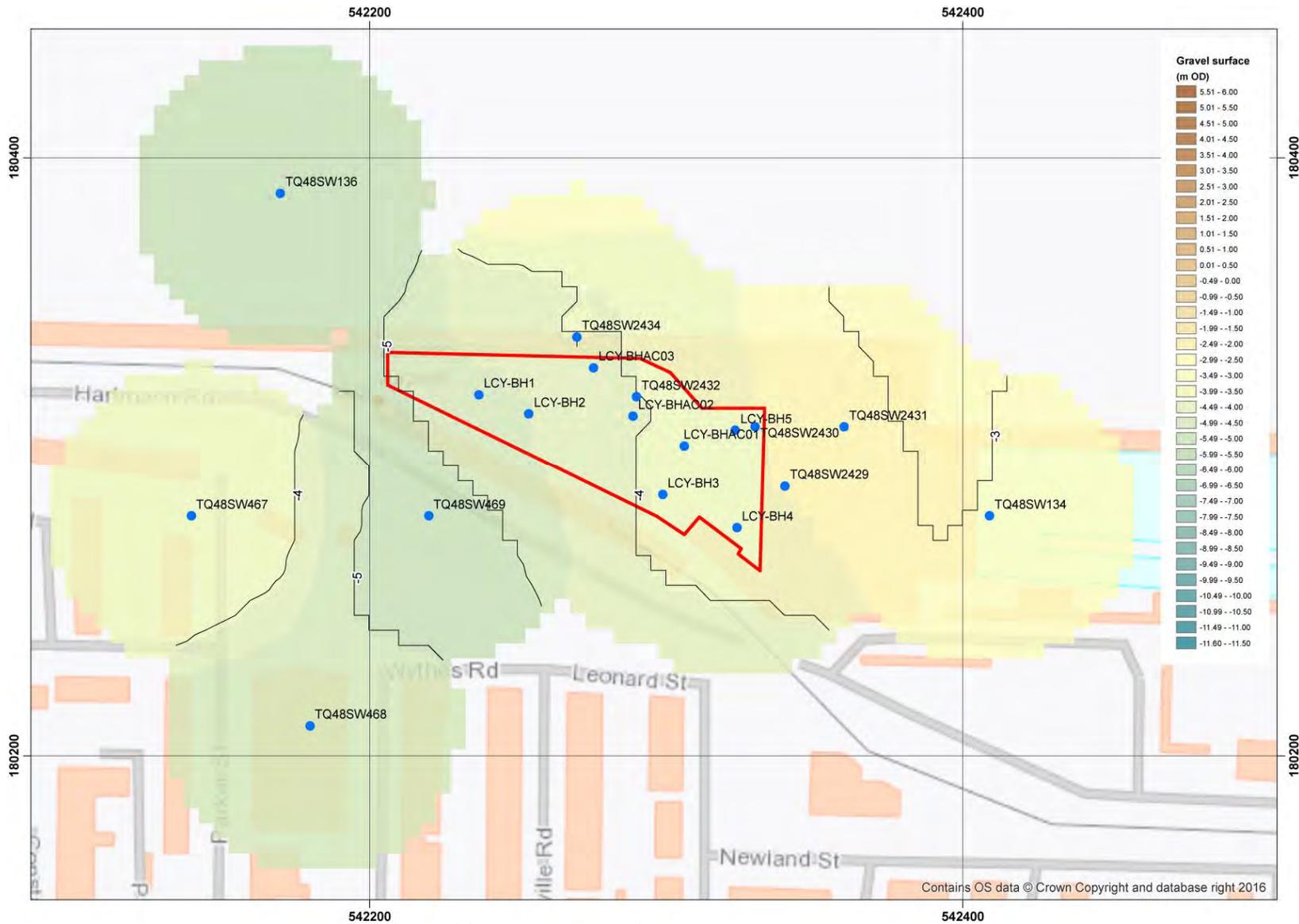


Figure 4: Top of the Shepperton Gravel (m OD) (site outline in red).

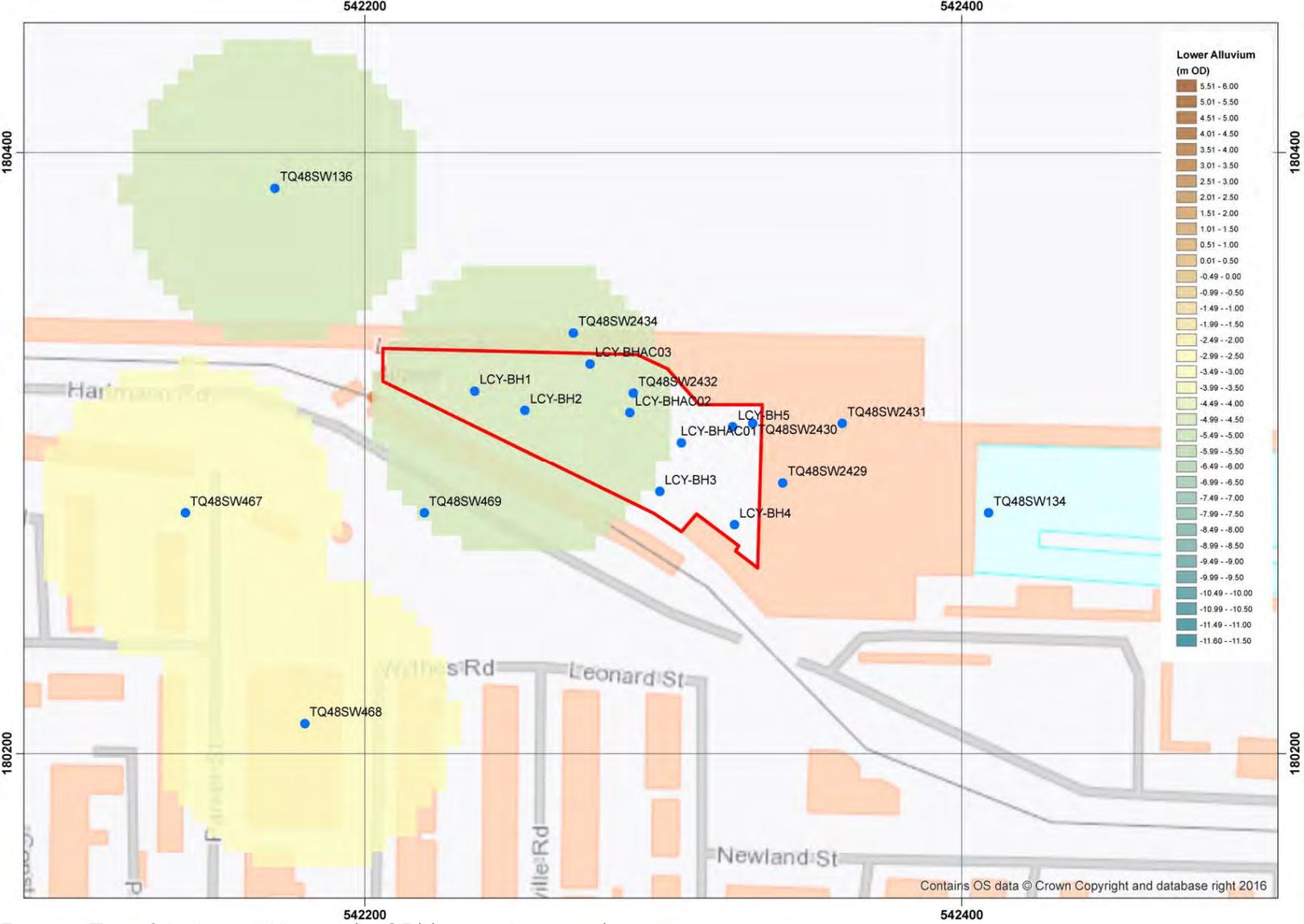


Figure 5: Top of the Lower Alluvium (m OD) (site outline in red).

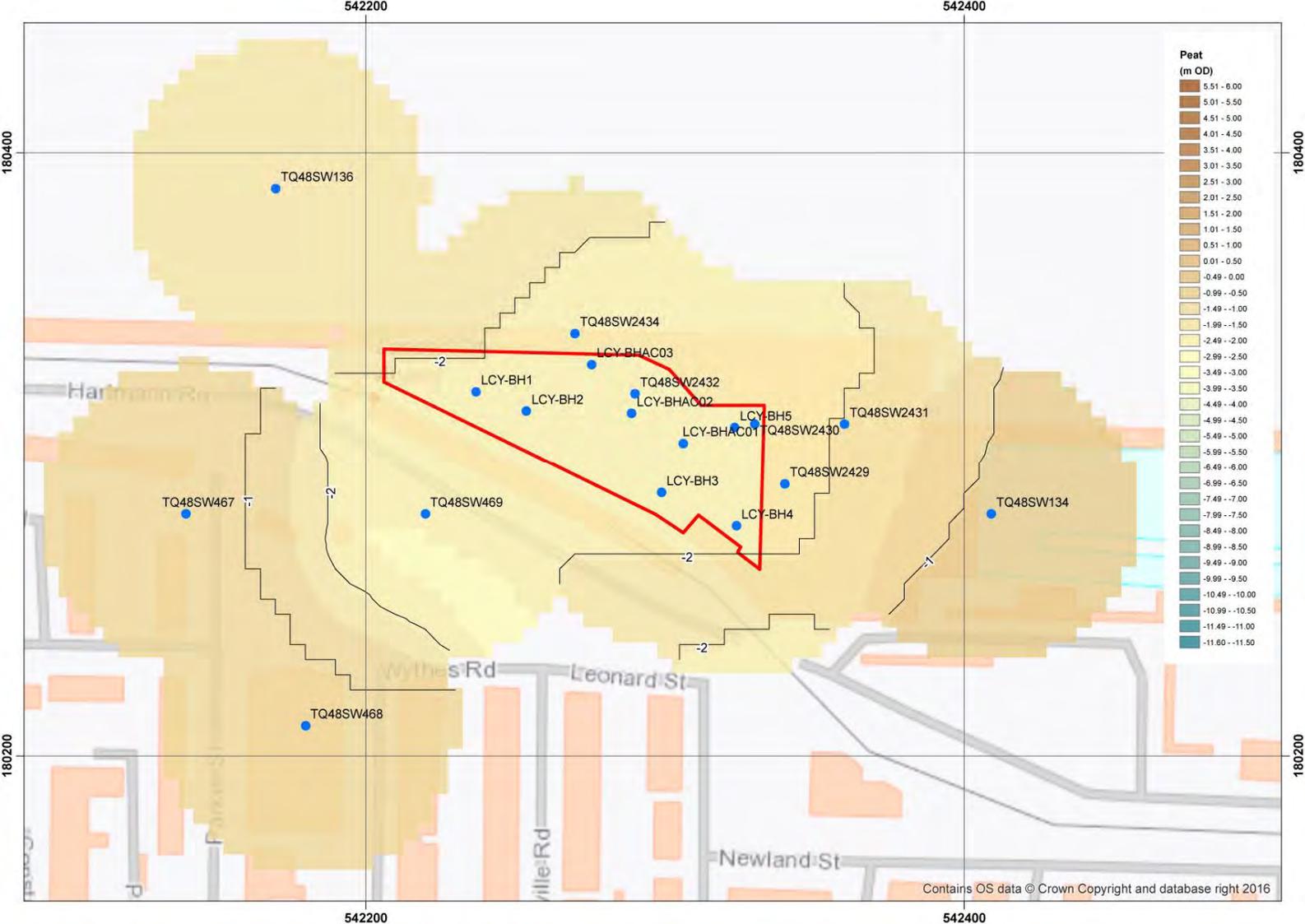


Figure 6: Top of the Peat (m OD) (site outline in red).

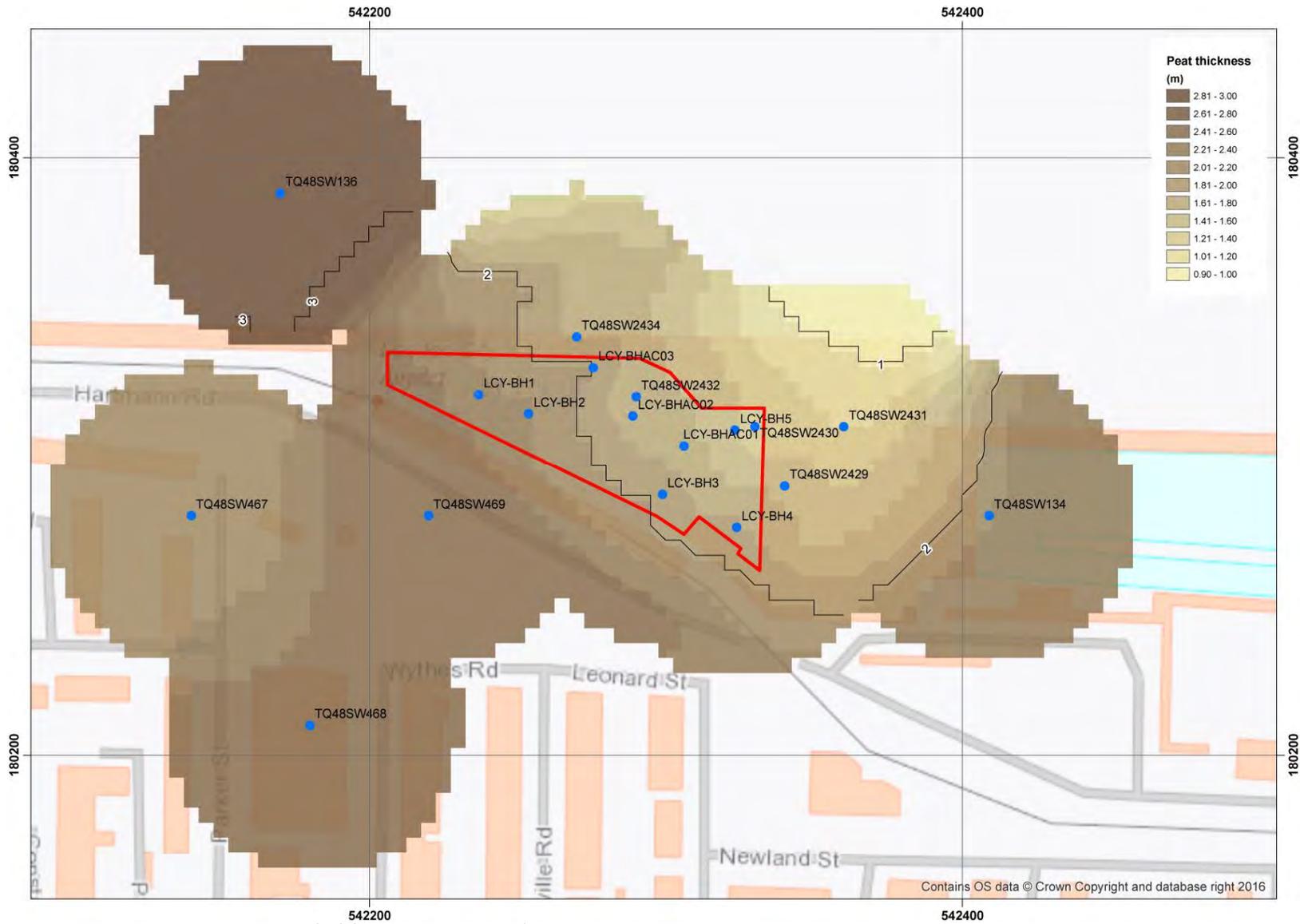


Figure 7: Thickness of the Peat (m) (site outline in red).

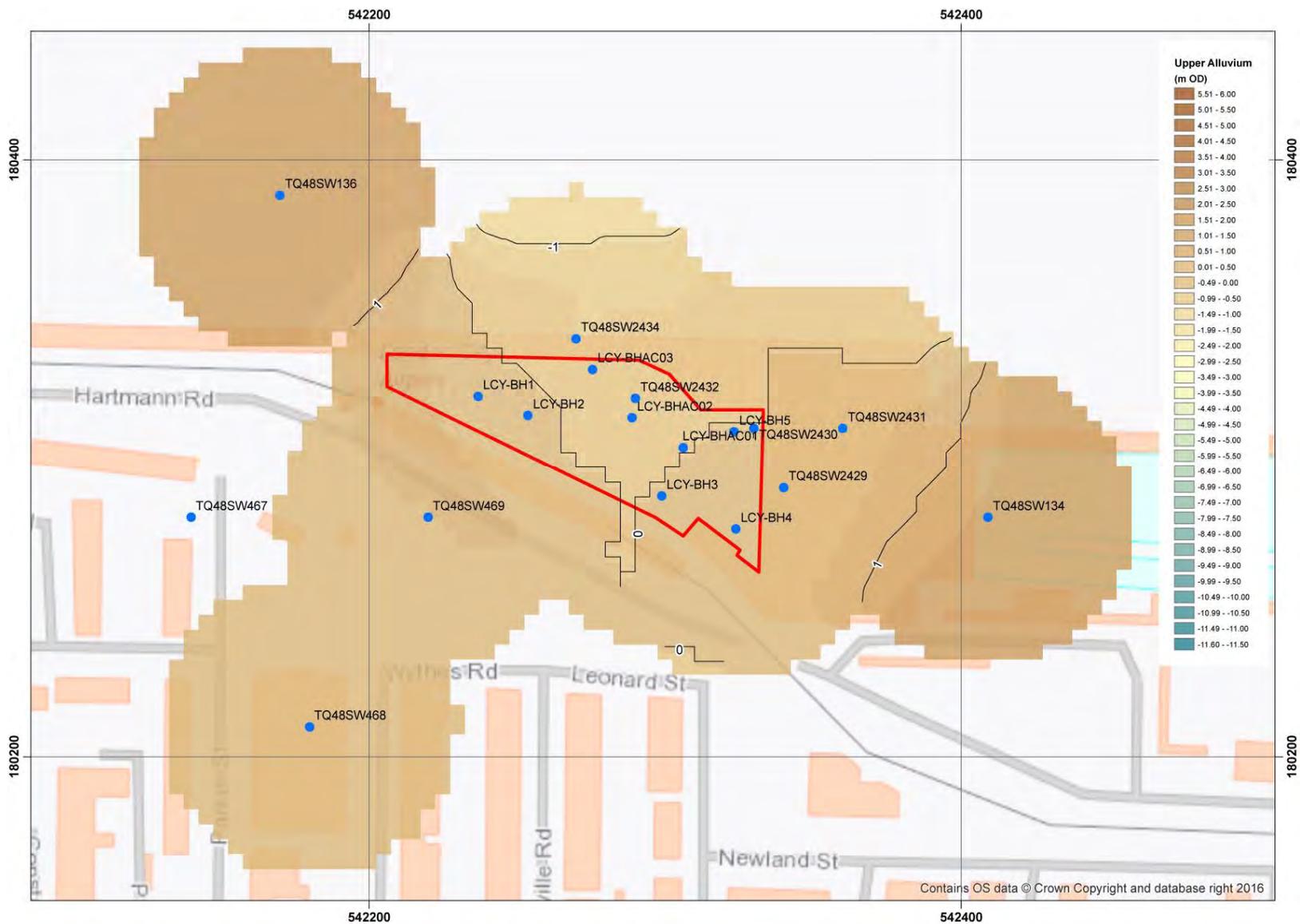


Figure 8: Top of the Upper Alluvium (m) (site outline in red).

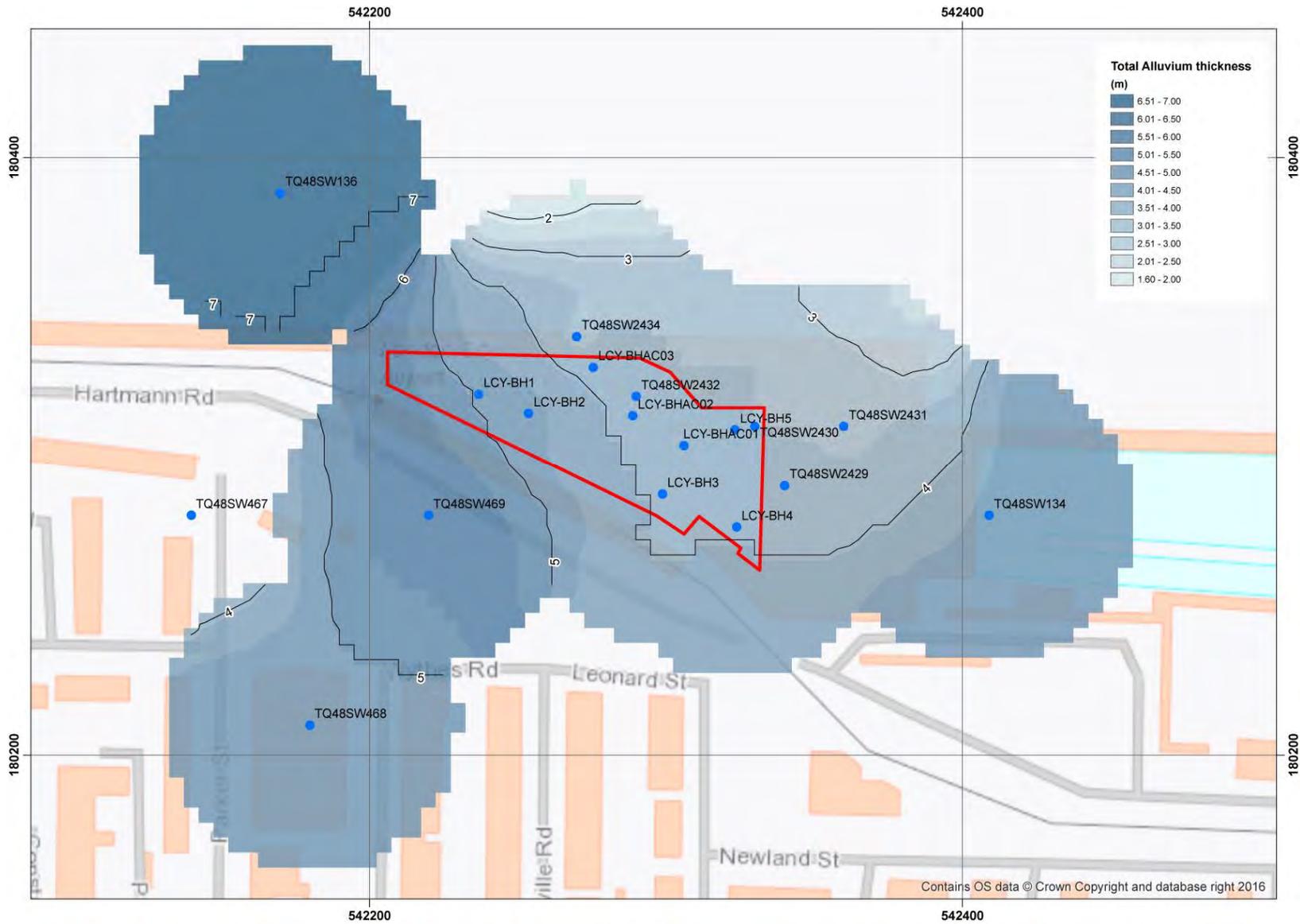


Figure 9: Thickness of the Holocene alluvial sequence (Lower Alluvium, Peat and Upper Alluvium) (m) (site outline in red).

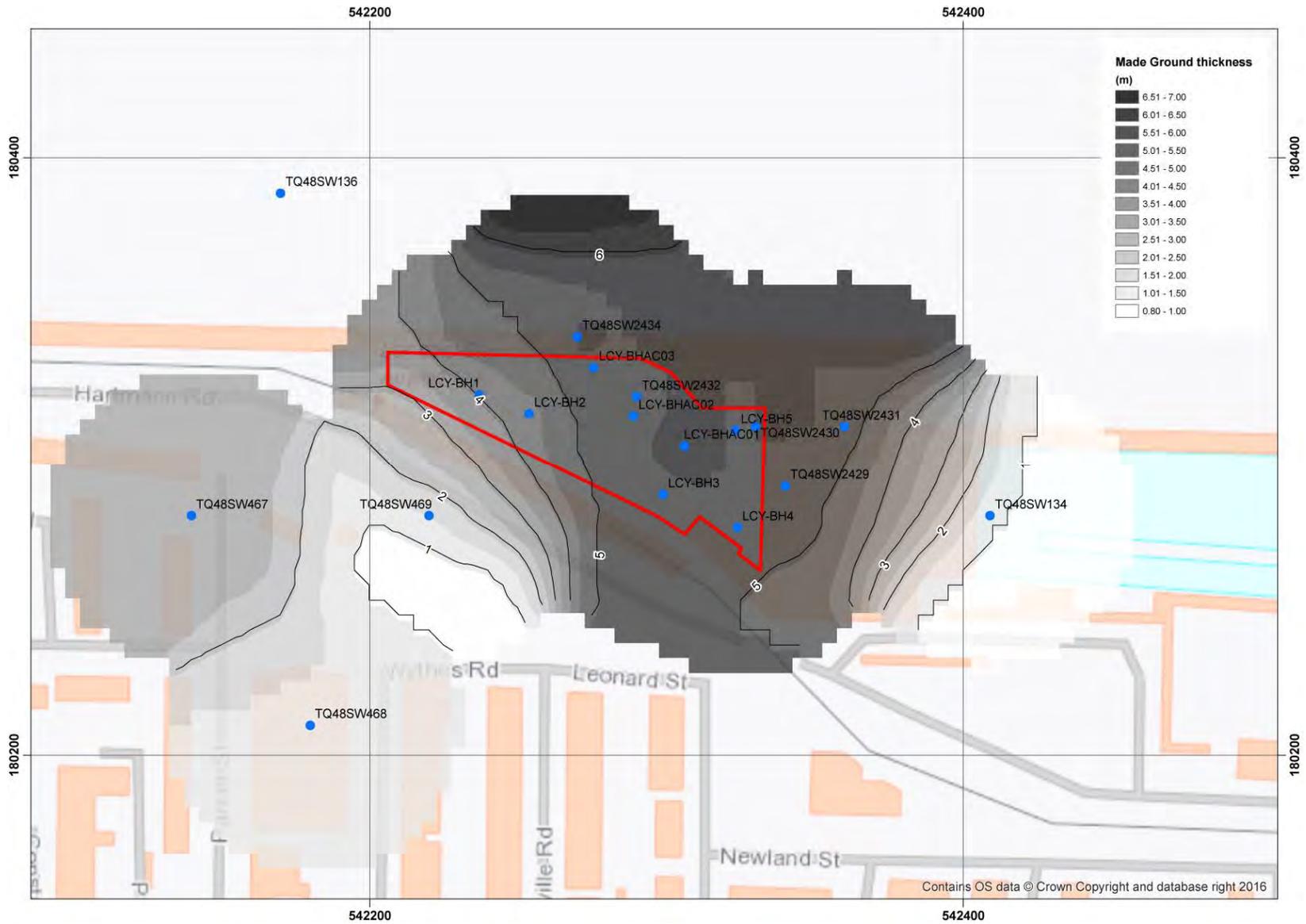


Figure 10: Thickness of Made Ground (m) (site outline in red).

Table 2: Lithostratigraphic description of borehole LCY-BHAC01, London City Airport, Hartmann Road, London E16.

Depth (m bgl)	Depth (m OD)	Description	Interpretation
0.00 to 4.00	5.08 to 1.08	Made Ground of tarmac/concrete over variably silty/clayey/sandy material including brick fragments, chalk and redeposited alluvium	MADE GROUND
4.00 to 8.00	1.08 to -2.92	Concrete	
8.00 to 9.00	-2.92 to -3.92	Gg3 Ga1; sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 20mm.	SHEPPERTON GRAVEL

Table 3: Lithostratigraphic description of borehole LCY-BHAC02, London City Airport, Hartmann Road, London E16.

Depth (m bgl)	Depth (m OD)	Description	Interpretation
0.00 to 2.20	4.10 to 1.90	Made Ground of tarmac/concrete over variably silty/clayey/sandy material including brick fragments, chalk and redeposited alluvium	MADE GROUND
2.20 to 4.60	1.90 to -0.50	Redeposited alluvium (gravelly silty clay)	
4.60 to 6.50	-0.50 to -2.30	As3 Ag1; grey silty clay. Diffuse contact in to:	UPPER ALLUVIUM
6.50 to 6.75	-2.30 to -2.65	As3 Ag1; grey silty clay with dark blue mottling. Diffuse contact in to:	
6.75 to 7.25	-2.65 to -3.15	Ag2 As1 D1; dark grey clayey silt with detrital wood. Large wood macrofossil at 7.1-7.2. Diffuse contact in to:	
7.25 to 7.60	-3.15 to -3.50	Ag2 Sh1 Dh1 D1+; dark brownish grey organic silt with detrital herbaceous material and a trace of detrital wood. Becoming more organic with depth. Diffuse contact in to:	
7.60 to 8.95	-3.50 to -4.85	Sh3 T1 ² 1 Ag+; humo. 2/3; dark reddish brown moderately to well humified woody peat with a trace of silt. Diffuse contact in to:	PEAT
8.95 to 9.20	-4.85 to -5.10	Ag2 Sh2; humo. 2/3; dark brownish grey moderately to well humified very silty peat. Sharp contact in to:	
9.20 to 9.60	-5.10 to -5.50	Gg4 Ga+; gravel with a trace of sand. Clasts are flint, sub-angular to rounded, average diameter 40mm.	SHEPPERTON GRAVEL

Table 4: Lithostratigraphic description of borehole LCY-BHAC03, London City Airport, Hartmann Road, London E16.

Depth (m bgl)	Depth (m OD)	Description	Interpretation
0.00 to 5.42	4.92 to -0.50	Made Ground of tarmac/concrete over variably silty/clayey/sandy material including brick fragments, chalk and redeposited alluvium. Sharp contact in to:	MADE GROUND
5.42 to 6.92	-0.50 to -2.00	As3 Ag1; blue grey silty clay with occasional Mollusca fragments. Very sharp contact in to:	UPPER ALLUVIUM
6.92 to 7.00	-2.00 to -2.08	Sh4; humo. 3; black well humified peat. Diffuse contact in to:	PEAT
7.00 to 7.80	-2.08 to -2.88	Sh3 Ag1 T1+ Th+; humo. 4; brown very well humified silty peat with traces of woody and herbaceous material. Diffuse contact in to:	

Depth (m bgl)	Depth (m OD)	Description	Interpretation
7.80 to 9.60	-2.88 to -4.68	Sh2 Tl ¹ Ag1 Th+; humo. 3; reddish brown well humified silty woody peat with a trace of herbaceous material. Sharp contact in to:	
9.60 to 9.90	-4.68 to -4.98	Gg3 Ga1; sandy gravel. Clasts are flint, sub-angular to well-rounded, average diameter 20mm.	SHEPPERTON GRAVEL

5. DISCUSSION

The aims of geoarchaeological investigation were: (1) to clarify the nature of the sub-surface stratigraphy, in particular the presence and thickness of alluvium and peat across the site, (2) to evaluate the potential of the sedimentary sequences for reconstructing the environmental history of the site and its environs, and (3) to investigate the archaeological potential of the site. In order to address these aims, three geoarchaeological boreholes were put down across the site and the new and existing stratigraphic data used to produce a deposit model of the major depositional units.

The results of the deposit modelling indicate that the sediments recorded at the site are similar to those recorded elsewhere in the Lower Thames Valley, with Late Devensian Shepperton Gravel overlain by a sequence of Holocene alluvial sediments, including peat, and buried beneath modern Made Ground. Elsewhere in the Lower Thames Valley, the surface of the Late Devensian Shepperton Gravel is often uneven (Gibbard, 1985; 1994) with relief features that can be identified as longitudinal gravel bars and palaeochannels with a relief amplitude commonly of 3-4m and in some places up to 6m. At the present site and across the modelled area, the relief features of the Shepperton Gravel surface are indicative of a possible Late Devensian/Early Holocene channel, the main axis of which is probably located towards the western area of the site, and which may have been aligned broadly north-south. Within this palaeochannel the Gravel surface falls to -5.2m OD, falling from ca. -2.9 to -3.5m OD towards the east of the site and beyond the margins of this feature. Similar but in places slightly higher Gravel surfaces of between -1.59 and -5.16m OD were recorded at the Plot 2.3, Royals Business Park site (Young & Batchelor, 2013) ca. 800m to the northwest. Elsewhere, surfaces of between -1.6 and -3.0m OD were recorded at Royal Albert Dock ca. 1.2km to the northeast (Batchelor, 2009), with similar elevations at Ferndale Street ca. 1.5km to the northeast (ca. -3m OD; Divers, 1995), and to the southeast at Albert Road (-4.5m OD; Spurr et al., 2001), and North Woolwich Pumping Station (ca. -5m OD; Sidell, 2003), Barge House Road (Corcoran et al., 2001) and Gallions Point (Branch et al., 1999). The highest Gravel surfaces identified at the present site (ca. -2.9m OD) are significantly lower than the elevation of the Gravel at the Royal Docks Community School ca. 500m to the northwest (ca. 0.5m OD), at which a soil horizon containing Mesolithic flint flakes was recorded, overlain by a Neolithic and Bronze Age soil containing over 1300 fragments of flint tools, debris and pottery (Holder, 1998) (Holder, 1998). On this basis, it is considered unlikely that the London City Airport site will contain in situ evidence of prehistoric activity on the surface of the Gravel.

At the present site, the Holocene alluvial sequence overlying the Gravel is comprised (in stratigraphic order) of the Lower Alluvium, Peat and Upper Alluvium, although within the channel itself, a thick (0.9m) unit of Sand (indicative of moderate-energy fluvial activity) was identified. The Peat recorded across the site is between 0.6 and 2.8m thick, its surface lying at between -3.5 and -1.5m OD; in general, greater thicknesses of both Peat and the combined Holocene alluvial deposits are recorded towards the west, in the area of the possible former channel. Generally thinner deposits of up to 1.1m of Peat were recorded at the Plot 2.3, Royals Business Park site (Young & Batchelor, 2013), where it was present at elevations of between ca. -2 and -1m OD and radiocarbon dated to the Bronze Age (3390-3270 to 3640-3470 cal BP). Accumulation of the Peat at this site occurred during the Bronze Age, slightly later than that recorded at other sites to the east, despite their similar elevation. At Ferndale Street, the base of the Peat was recorded at -1.89m OD, and was radiocarbon dated to 5314-4870 cal BP (Divers, 1995), similar to that recorded at East Ham Football Club (-1.47m OD; 5600-5050 cal. BP; Scaife, 2001). At the Royal Albert Dock site, Peat was recorded between -1.63 and -1.00m OD. Radiocarbon dating indicated that this horizon accumulated between 4410-4080 and 3630-3360 cal BP (during the Late Neolithic). To the southeast of the present site at Albert Road (Spurr et al., 2001) the base of the Peat was recorded at -4.40m OD, and was radiocarbon dated to 7150-6670 cal BP (Late Mesolithic). To the east of here at the North Woolwich Pumping Station (Sidell, 2003) it was recorded at ca. -4.50m OD (7640-6340 cal. BP); at Barge House Road (Corcoran et al., 2001) at -4.80m OD (ca. 6760-6450 cal. BP); and at Gallions Point (Branch et al., 1999) at ca. -5.10m OD (prior to 6170-5650 cal. BP).

6. CONCLUSIONS AND RECOMMENDATIONS

A relatively thick sequence of peat has been identified at the London City Airport site, overlying a Shepperton Gravel surface of variable height and which is indicative of a potential Late Devensian/Early Holocene palaeochannel towards the west. The results of the investigation have thus demonstrated variation in the type and thickness of the Holocene alluvial sequence. Such variations are significant as they represent different environmental conditions that would have existed in a given location; for example, the peat horizons recorded represent former semi-terrestrial land surfaces, whereas fine to medium grained sediments such as sands, silts and clays represent periods of estuarine or freshwater flooding. Thus studying the sub-surface deposits at the site has enabled us to start building our understanding of the former landscapes and environmental changes that took place over both space and time across the site.

Areas of higher gravel topography and peat deposits represent potential areas that might have been utilised or even occupied by prehistoric and historic people, evidence of which may be preserved in the archaeological record (e.g. features and structures). Although the lower Gravel surfaces across the present site are considered to be of negligible archaeological potential, the peat sediments have the potential to contain a wealth of further information on the past landscape in addition to archaeological material, through the assessment/analysis of palaeoenvironmental remains (e.g. pollen, plant macrofossils and insects) and radiocarbon dating, as demonstrated at other sites in the wider area of the site. So called environmental archaeological or

palaeoenvironmental investigations can identify the nature and timing of changes in the landscape, and the interaction of different processes (e.g. vegetation change, human activity, climate change, hydrological change) thereby increasing our knowledge and understanding of the site and nearby area. In the case of human activity, palaeoenvironmental evidence can include: (1) decreases in tree and shrub pollen suggestive of woodland clearance; (2) the presence of herbs indicative of disturbed ground, pastoral and/or arable agriculture; (3) charcoal/microcharcoal suggestive of anthropogenic or natural burning, and (4) insect taxa indicative of domesticated animals. Such investigations are routinely carried out (where required) as part of planning conditions across the Lower Thames Valley and its tributaries, instructed by the LPA Archaeological Advisor. On the basis of radiocarbon dates from sites nearby, it is possible that the Peat at the present site accumulated from the Late Mesolithic through to Bronze Age cultural periods.

It is therefore recommended that a programme of environmental archaeological assessment is undertaken on one selected borehole from the site (LCY-BHAC03), incorporating: (1) radiocarbon dating of the base and top of the Peat in order to ascertain the age of peat accumulation and cessation; (2) organic matter determinations to aid identification of the sedimentary units; (3) assessment of the palaeobotanical remains (pollen, waterlogged wood and seeds) to provide a provisional reconstruction of the vegetation history; (4) assessment of the diatoms to provide an indication of the palaeohydrology (e.g. marine, brackish or freshwater), and (5) assessment of the zooarchaeological remains (insects and Mollusca) to provide information on the general environmental conditions, climatic change and hydrology of the site. The assessment will also highlight any indications of nearby human activity, and provide recommendations for further analysis (if necessary).

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8. APPENDIX 1: OASIS

OASIS ID: [quaterna1-285460](#)

Project details

Project name	London City Airport, Hartmann Road, London
Short description of the project	A programme of geoarchaeological investigation was carried out at the site, including three new boreholes and deposit modelling, in order to (1) to clarify the nature of the sub-surface stratigraphy, in particular the presence and thickness of alluvium and peat across the site, (2) to evaluate the potential of the sedimentary sequences for reconstructing the environmental history of the site and its environs, and (3) to investigate the archaeological potential of the site. A relatively thick sequence of peat has been identified at the site (up to 2.8m), overlying a Shepperton Gravel surface of variable height and which is indicative of a potential Late Devensian/Early Holocene palaeochannel towards the west. Although the lower Gravel surfaces across

the present site are considered to be of negligible archaeological potential, the peat sediments have the potential to contain a wealth of further information on the past landscape in addition to archaeological material, through the assessment/analysis of palaeoenvironmental remains. It is therefore recommended that a programme of environmental archaeological assessment is undertaken on one selected borehole from the site (LCY-BHAC03).

Project dates Start: 01-01-2017 End: 19-05-2017

Previous/future work No / Yes

Type of project Environmental assessment

Survey techniques Landscape

Project location

Country England

Site location GREATER LONDON NEWHAM NEWHAM London City Airport, Hartmann Road

Postcode E16 2PX

Site coordinates TQ 42300 80300 51.503191554343 0.050495748439 51 30 11 N 000 03 01 E Point

Project creators

Name of Quaternary Scientific (QUEST)
Organisation

Project brief London City Airport (CADP)
originator

Project design D.S. Young
originator

Project C.R. Batchelor
director/manager

Project supervisor D.S. Young

Type of Developer
sponsor/funding
body

Project archives

Physical Archive No
Exists?

Digital Archive No
Exists?

Paper Archive LAARC
recipient

Paper Contents "Environmental", "Stratigraphic"

Paper Media "Report"
available

Entered by Daniel Young (d.s.young@reading.ac.uk)

Entered on 19 May 2017