Appendix B - Northern Line Extension Gas damage assessment - 14.03.13

Dwg No.	Xdisp Ref	Material	Pipe Diameter (m)	Wall thickness	Joint Rot		U ,	Joint Pu				e Strain	
	D41.4	PE	0.000	(mm)	Calculated	Limit	Result	Calculated		Result	Calculated	Limit	Resu PAS
1	B41.1		0.090	5.65	0.306	0.25	FAIL	12.02	25	PASS	0.005	0.075	
3	B34.1	PE PE	0.080	8.00 8.00	0.058	0.25	PASS	4.70 3.84	25	PASS	0.003	0.075	PAS
	B34.2		0.080		0.069	0.25	PASS		25	PASS	0.008	0.075	PA
3	B35.1	Cast Iron	0.914	91.44	0.081	0.01	FAIL	5.06	0.5	FAIL	0.000	0.01	PA
3	B35.2 B36.1	Cast Iron PE	0.914	91.44	0.050	0.01	FAIL	5.06 5.77	0.5	FAIL PASS	0.000	0.01	PA PA
3	B36.2	PE	0.075	7.50 7.50	0.086	0.25	PASS PASS	5.48	25 25	PASS	0.001	0.075	PA PA
3	B30.2 B79.1	Steel	0.914	91.44	0.113	0.25	FAIL	5.48	0.5	FAIL	0.000	0.075	PA
3	B79.1 B79.2	Steel	0.914	91.44	0.070	0.01	FAIL	4.92	0.5	FAIL	0.000	0.05	PA
3	B79.2 B80.1	PE	0.125	7.75	0.070	0.01	PASS	5.09	25	PASS	0.000	0.03	PA
3	B80.1 B81.1	PE	0.090	5.65	0.069	0.25	PASS	3.92	25	PASS	0.001	0.075	PA
3	B81.1 B82.1	Cast Iron	0.152	15.24	0.003	0.23	FAIL	4.02	0.5	FAIL	0.001	0.073	PA
3	B82.1 B83.1	Cast Iron	0.610	60.96	0.070	0.01	FAIL	5.18	0.5	FAIL	0.002	0.01	PA
3	B83.2	Cast Iron	0.610	60.96	0.082	0.01	FAIL	4.24	0.5	FAIL	0.001	0.01	PA
3	B83.2 B84.1	Steel	0.914	91.44	0.080	0.01	FAIL	5.22	0.5	FAIL	0.002	0.01	PA
4	B38.1	PE	0.180	11.00	0.070	0.01	PASS	4.84	25	PASS	0.000	0.075	PA
4	B38.2	PE	0.180	11.00	0.078	0.25	PASS	4.81	25	PASS	0.002	0.075	PA
5	B30.2 B1.1	Cast Iron	0.508	50.80	0.075	0.23	FAIL	4.11	0.5	FAIL	0.000	0.01	PA
5	B1.1 B1.2	Cast Iron	0.508	50.80	0.025	0.01	FAIL	4.60	0.5	FAIL	0.000	0.01	PA
5	B1.3	Cast Iron	0.508	50.80	0.055	0.01	FAIL	4.60	0.5	FAIL	0.000	0.01	PA
5	B1.4	Cast Iron	0.508	50.80	0.072	0.01	FAIL	3.82	0.5	FAIL	0.000	0.01	PA
5	B1.4 B1.5	Cast Iron	0.508	50.80	0.072	0.01	FAIL	4.59	0.5	FAIL	0.001	0.01	PA
5	B1.6	Cast Iron	0.508	50.80	0.006	0.01	PASS	1.55	0.5	FAIL	0.000	0.01	PA
5	B1.0 B2.1	PE	0.125	7.75	0.000	0.25	PASS	4.68	25	PASS	0.000	0.075	PA
5	B2.1 B2.2	PE	0.125	7.75	0.071	0.25	PASS	4.32	25	PASS	0.001	0.075	PA
5	B2.3	PE	0.125	7.75	0.073	0.25	PASS	4.72	25	PASS	0.000	0.075	PA
5	B76.1	PE	0.090	5.65	0.055	0.25	PASS	4.70	25	PASS	0.000	0.075	PA
5	B76.2	PE	0.090	5.65	0.067	0.25	PASS	4.46	25	PASS	0.001	0.075	PA
6	B3.1	PE	0.090	5.65	0.043	0.25	PASS	4.67	25	PASS	0.000	0.075	PA
6	B3.2	PE	0.090	5.65	0.069	0.25	PASS	4.64	25	PASS	0.005	0.075	PA
6	B3.3	PE	0.090	5.65	0.069	0.25	PASS	3.34	25	PASS	0.006	0.075	PA
6	B3.4	PE	0.090	5.65	0.061	0.25	PASS	4.60	25	PASS	0.003	0.075	PA
6	B4.1	PE	0.090	5.65	0.071	0.25	PASS	4.59	25	PASS	0.005	0.075	PA
6	B4.2	PE	0.090	5.65	0.071	0.25	PASS	4.54	25	PASS	0.004	0.075	PA
6	B72.1	PE	0.180	11.00	0.068	0.25	PASS	4.41	25	PASS	0.004	0.075	PA
6	B73.1	Cast Iron	0.508	50.80	0.068	0.01	FAIL	4.46	0.5	FAIL	0.001	0.01	PA
7	B7.1	PE	0.075	7.50	0.050	0.25	PASS	3.61	25	PASS	0.002	0.075	PA
7	B8.1	PE	0.125	7.75	0.049	0.25	PASS	3.35	25	PASS	0.002	0.075	PA
7	B8.2	PE	0.125	7.75	0.049	0.25	PASS	0.59	25	PASS	0.001	0.075	PA
7	B8.3	PE	0.125	7.75	0.047	0.25	PASS	3.34	25	PASS	0.002	0.075	PA
7	B10.1	PE	0.075	7.50	0.052	0.25	PASS	3.63	25	PASS	0.002	0.075	PA
7	B26.1	PE	0.063	6.05	0.077	0.25	PASS	4.51	25	PASS	0.003	0.075	PA
8	B5.1	PE	0.125	7.75	0.040	0.25	PASS	3.01	25	PASS	0.002	0.075	PA
8	B6.1	PE	0.090	5.65	0.039	0.25	PASS	3.03	25	PASS	0.002	0.075	PA
8	B6.2	PE	0.090	5.65	0.039	0.25	PASS	0.29	25	PASS	0.001	0.075	PA
8	B6.3	PE	0.090	5.65	0.039	0.25	PASS	2.87	25	PASS	0.002	0.075	PA
8	B9.1	PE	0.080	8.00	0.044	0.25	PASS	3.22	25	PASS	0.002	0.075	PA
8	B9.2	PE	0.080	8.00	0.044	0.25	PASS	2.71	25	PASS	0.002	0.075	PA
8	B9.3	PE	0.125	7.75	0.041	0.25	PASS	2.71	25	PASS	0.001	0.075	PA
8	B9.4	PE	0.125	7.75	0.041	0.25	PASS	0.24	25	PASS	0.001	0.075	PA
8	B11.1	PE	0.180	11.00	0.040	0.25	PASS	3.06	25	PASS	0.001	0.075	PA
8	B11.2	PE	0.180	11.00	0.039	0.25	PASS	0.26	25	PASS	0.003	0.075	PA
8	B11.3	PE	0.180	11.00	0.040	0.25	PASS	3.00	25	PASS	0.001	0.075	PA
8	B12.1	Ductile Iron	0.100	10.00	0.039	0.01	FAIL	3.72	0.5	FAIL	0.000	0.05	PA
8	B13.1	Cast Iron	0.076	7.62	0.042	0.01	FAIL	4.44	0.5	FAIL	0.001	0.01	PA
8	B14.1	PE	0.076	7.62	0.037	0.25	PASS	2.64	25	PASS	0.004	0.075	P/
8	B14.2	PE	0.076	7.62	0.037	0.25	PASS	4.22	25	PASS	0.001	0.075	PA
8	B25.1	Ductile Iron	0.100	10.00	0.038	0.01	FAIL	3.88	0.5	FAIL	0.000	0.05	PA
8	B25.2	Ductile Iron	0.100	10.00	0.051	0.01	FAIL	3.50	0.5	FAIL	0.000	0.05	PA
8	B27.1	Ductile Iron	0.100	10.00	0.038	0.01	FAIL	2.69	0.5	FAIL	0.000	0.05	PA

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Appendix B Utility damage assessment results table

 Northern Line Extension Reference Design TWAO
 06-01

 Settlement Report
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Revision 03-01 21 March 2013

Appendix B - Northern Line Extension Gas damage assessment - 14.03.13

S	0.002	0.075	PASS
S	0.004	0.075	PASS
L	0.001	0.05	PASS
S	0.004	0.075	PASS
S	0.003	0.075	PASS
S	0.006	0.075	PASS
S	0.006	0.075	PASS

8	B46.1	PE	0.180	11.00	0.040	0.25	PASS	0.35	25	PASS	0.002	0.075	PASS
8	B47.1	PE	0.076	7.62	0.037	0.25	PASS	2.70	25	PASS	0.004	0.075	PASS
8	B64.1	Ductile Iron	0.100	10.00	0.054	0.01	FAIL	4.31	0.5	FAIL	0.001	0.05	PASS
9	B15.1	PE	0.450	27.40	0.043	0.25	PASS	3.10	25	PASS	0.004	0.075	PASS
9	B17.1	PE	0.063	6.05	0.036	0.25	PASS	2.74	25	PASS	0.003	0.075	PASS
9	B17.2	PE	0.063	6.05	0.041	0.25	PASS	2.66	25	PASS	0.006	0.075	PASS
9	B48.1	PE	0.063	6.05	0.041	0.25	PASS	2.78	25	PASS	0.006	0.075	PASS
9	B49.1	PE	0.051	5.08	0.035	0.25	PASS	3.03	25	PASS	0.000	0.075	PASS
9	B54.1	PE	0.051	5.08	0.042	0.25	PASS	3.02	25	PASS	0.004	0.075	PASS
9	B58.1	Cast Iron	0.914	91.44	0.044	0.01	FAIL	3.17	0.5	FAIL	0.001	0.01	PASS
9	B59.1	Cast Iron	0.610	60.96	0.044	0.01	FAIL	3.11	0.5	FAIL	0.001	0.01	PASS
9	B60.1	Cast Iron	0.406	40.64	0.044	0.01	FAIL	3.11	0.5	FAIL	0.001	0.01	PASS
9	B61.1	Cast Iron	0.305	30.48	0.041	0.01	FAIL	3.09	0.5	FAIL	0.001	0.01	PASS
9	B61.2	Cast Iron	0.305	30.48	0.043	0.01	FAIL	3.15	0.5	FAIL	0.002	0.01	PASS
9	B62.1	Cast Iron	0.508	50.80	0.044	0.01	FAIL	3.29	0.5	FAIL	0.001	0.01	PASS
9	B74.1	PE	0.080	8.00	0.036	0.25	PASS	2.87	25	PASS	0.001	0.075	PASS
9	B74.2	PE	0.080	8.00	0.042	0.25	PASS	2.93	25	PASS	0.005	0.075	PASS
10	B16.1	PE	0.063	6.05	0.042	0.25	PASS	2.92	25	PASS	0.007	0.075	PASS
10	B55.1	PE	0.090	5.65	0.046	0.25	PASS	3.35	25	PASS	0.005	0.075	PASS
10	B56.1	Cast Iron	0.914	91.44	0.047	0.01	FAIL	3.22	0.5	FAIL	0.001	0.01	PASS
10	B57.1	Cast Iron	0.914	91.44	0.047	0.01	FAIL	3.23	0.5	FAIL	0.001	0.01	PASS
10	B65.1	PE	0.051	5.08	0.045	0.25	PASS	3.13	25	PASS	0.007	0.075	PASS
10	B75.1	PE	0.063	6.05	0.042	0.25	PASS	2.87	25	PASS	0.002	0.075	PASS
11	B21.1	PE	0.075	7.50	0.085	0.25	PASS	12.28	25	PASS	0.005	0.075	PASS
11	B21.2	PE	0.075	7.50	0.207	0.25	PASS	12.28	25	PASS	0.005	0.075	PASS
11	B22.1	PE	0.075	7.50	0.104	0.25	PASS	8.92	25	PASS	0.039	0.075	PASS
11	B22.2	PE	0.075	7.50	0.181	0.25	PASS	14.11	25	PASS	0.006	0.075	PASS
11	B23.1	PE	0.125	7.75	0.104	0.25	PASS	8.94	25	PASS	0.002	0.075	PASS
11	B43.1	Steel	0.610	60.96	0.053	0.01	FAIL	3.93	0.5	FAIL	0.001	0.05	PASS
11	B63.1	Cast Iron	0.305	30.48	0.044	0.01	FAIL	4.25	0.5	FAIL	0.001	0.01	PASS
11	B63.2	Cast Iron	0.305	30.48	0.055	0.01	FAIL	3.95	0.5	FAIL	0.002	0.01	PASS
12	B18.1	PE	0.125	7.75	0.054	0.25	PASS	3.79	25	PASS	0.027	0.075	PASS
12	B19.1	PE	0.090	5.65	0.053	0.25	PASS	3.96	25	PASS	0.005	0.075	PASS
12	B20.1	Cast Iron	0.152	15.24	0.056	0.01	FAIL	4.09	0.5	FAIL	0.001	0.01	PASS
12	B20.2	Cast Iron	0.152	15.24	0.056	0.01	FAIL	3.63	0.5	FAIL	0.002	0.01	PASS
12	B24.2	PE	0.075	7.50	0.055	0.25	PASS	4.12	25	PASS	0.005	0.075	PASS
12	B32.1	PE	0.063	6.05	0.057	0.25	PASS	4.23	25	PASS	0.004	0.075	PASS
12	B33.1	PE	0.063	6.05	0.057	0.25	PASS	4.12	25	PASS	0.004	0.075	PASS
12	B66.1	PE	0.125	7.75	0.057	0.25	PASS	3.56	25	PASS	0.007	0.075	PASS
12	B67.1	PE	0.125	7.75	0.052	0.25	PASS	3.77	25	PASS	0.003	0.075	PASS
12	B67.1	PE	0.125	7.75	0.034	0.25	PASS	3.92	25	PASS	0.002	0.075	PASS
12	B68.1	PE	0.125	7.75	0.049	0.25	PASS	3.32	25	PASS	0.004	0.075	PASS
12	B69.1	PE	0.125	7.75	0.050	0.25	PASS	3.62	25	PASS	0.003	0.075	PASS
12	B70.1	PE	0.125	7.75	0.050	0.25	PASS	4.19	25	PASS	0.003	0.075	PASS
12	B70.1 B71.1	PE	0.125	11.00	0.055	0.25	PASS	4.19	25	PASS	0.003	0.075	PASS
12				7.75	0.056				25				PASS
	B29.1	PE	0.125			0.25	PASS	6.13		PASS	0.033	0.075	
13	B29.2	PE	0.125	7.75	0.166	0.25	PASS	13.58	25	PASS	0.004	0.075	PASS
13	B29.3	PE	0.125	7.75	0.115	0.25	PASS	9.73	25	PASS	0.001	0.075	PASS
13	B30.1	PE	0.125	7.75	0.067	0.25	PASS	4.38	25	PASS	0.008	0.075	PASS
13	B30.2	PE	0.125	7.75	0.062	0.25	PASS	4.41	25	PASS	0.004	0.075	PASS
13	B31.1	PE	0.125	7.75	0.115	0.25	PASS	9.06	25	PASS	0.005	0.075	PASS

	Xdisp		Diameter/H			Ten	sile Strain (%)	
Dwg No.	Ref	Material	eight (m)	Width (m)	Calculated	Limit	Damage Category	Result
14	B36.1	Brick	1.91	N/A	0.018	0.05	(Negligible)	PASS
14	B36.2	Brick	1.91	N/A	0.033	0.05	(Negligible)	PASS
14	B37.1	Brick	1.60	N/A	0.004	0.05	(Negligible)	PASS
14	B37.2	Brick	1.60	N/A	0.036	0.05	(Negligible)	PASS
14	B38.1	Brick	0.30	N/A	0.004	0.05	(Negligible)	PASS
15	B19.1	Brick	1.14	0.76	0.024	0.05	(Negligible)	PASS
15	B19.2	Brick	1.14	0.76	0.004	0.05	(Negligible)	PASS
15	B19.3	Brick	1.14	0.76	0.027	0.05	(Negligible)	PASS
15	B19.4	Brick	1.14	0.76	0.015	0.05	(Negligible)	PASS
15	B20.1	Brick	1.14	0.76	0.023	0.05	(Negligible)	PASS
15	B20.2	Brick	1.14	0.76	0.005	0.05	(Negligible)	PASS
16	B18.1	Brick	0.30	N/A	0.002	0.05	(Negligible)	PASS
16	B18.2	Brick	0.30	N/A	0.001	0.05	(Negligible)	PASS
16	B18.3	Brick	0.30	N/A	0.004	0.05	(Negligible)	PASS
16	B23.1	Brick	0.91	0.61	0.004	0.05	(Negligible)	PASS
16	B33.1	Brick	1.14	0.76	0.004	0.05	(Negligible)	PASS
16	B34.1	Brick	0.30	N/A	0.003	0.05	(Negligible)	PASS
16	B34.2	Brick	0.30	N/A	0.000	0.05	(Negligible)	PASS
16	B39.1	Brick	0.30	N/A	0.005	0.05	(Negligible)	PASS
16	B40.1	Brick	0.30	N/A	0.004	0.05	(Negligible)	PASS
17	B6.1	Brick	1.91	N/A	0.005	0.05	(Negligible)	PASS
17	B8.1	Brick	1.52	1.02	0.002	0.05	(Negligible)	PASS
17	B8.2	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.3	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.4	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.5	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.6	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.7	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.8	Brick	1.52	1.02	0.002	0.05	(Negligible)	PASS
17	B8.9	Brick	1.52	1.02	0.000	0.05	(Negligible)	PASS
17	B8.10	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.11	Brick	1.52	1.02	0.001	0.05	(Negligible)	PASS
17	B8.12	Brick	1.52	1.02	0.010	0.05	(Negligible)	PASS
17	B8.13	Brick	1.52	1.02	0.009	0.05	(Negligible)	PASS
17	B8.14	Brick	1.52	1.02	0.004	0.05	(Negligible)	PASS
17	B8.15	Brick	1.52	1.02	0.006	0.05	(Negligible)	PASS
17	B8.16	Brick	1.52	1.02	0.008	0.05	(Negligible)	PASS
17	B8.17	Brick	1.52	1.02	0.007	0.05	(Negligible)	PASS
17	B11.1	Brick	0.30	N/A	0.003	0.05	(Negligible)	PASS
17	B12.1	Brick	1.15	N/A	0.004	0.05	(Negligible)	PASS
17	B13.1	Brick	0.23	N/A	0.005	0.05	(Negligible)	PASS
17	B14.1	Brick	0.30	N/A	0.005	0.05	(Negligible)	PASS
17	B15.1	Brick	3.35	2.29	0.004	0.05	(Negligible)	PASS
17	B15.2	Brick	3.35	2.29	0.004	0.05	(Negligible)	PASS
17	B16.1	Brick	3.35	2.29	0.004	0.05	(Negligible)	PASS
17	B17.1	Brick	1.37	0.91	0.004	0.05	(Negligible)	PASS
17	B30.1	Brick	1.75	N/A	0.008	0.05	(Negligible)	PASS
17	B31.1	Brick	0.23	N/A	0.007	0.05	(Negligible)	PASS

APPENDIX B - Northern Line Extension Sewer Damage Assessment 01.02.13

APPENDIX B - Northern Line Extension Sewer Damage Assessment 01.02.13

					0		-	
17	B31.2	Brick	0.23	N/A	0.002	0.05	(Negligible)	PASS
17	B35.1	Brick	0.30	N/A	0.007	0.05	(Negligible)	PASS
17	B35.2	Brick	0.30	N/A	0.007	0.05	(Negligible)	PASS
18	B1.1	Brick	0.31	N/A	0.021	0.05	(Negligible)	PASS
18	B1.2	Brick	0.31	N/A	0.006	0.05	(Negligible)	PASS
18	B21.1	Brick	0.31	N/A	0.064	0.05	(Very Slight)	FAIL
18	B21.2	Brick	0.31	N/A	0.047	0.05	(Negligible)	PASS
18	B22.1	Brick	0.31	N/A	0.107	0.05	(Slight)	FAIL
19	B4.1	Brick	1.37	0.91	0.017	0.05	(Negligible)	PASS
19	B4.2	Brick	1.37	0.91	0.005	0.05	(Negligible)	PASS
19	B5.1	Brick	0.30	N/A	0.023	0.05	(Negligible)	PASS
19	B5.2	Brick	0.30	N/A	0.011	0.05	(Negligible)	PASS
19	B7.1	Brick	1.37	0.91	0.025	0.05	(Negligible)	PASS
19	B9.1	Brick	0.30	N/A	0.003	0.05	(Negligible)	PASS
19	B10.1	Brick	0.30	N/A	0.006	0.05	(Negligible)	PASS
19	B24.1	Brick	0.30	N/A	0.004	0.05	(Negligible)	PASS
19	B24.2	Brick	0.30	N/A	0.003	0.05	(Negligible)	PASS
19	B26.1	Brick	0.30	N/A	0.007	0.05	(Negligible)	PASS
19	B26.2	Brick	0.30	N/A	0.009	0.05	(Negligible)	PASS
19	B27.1	Brick	0.30	N/A	0.003	0.05	(Negligible)	PASS
19	B28.1	Brick	0.30	N/A	0.007	0.05	(Negligible)	PASS
19	B28.2	Brick	0.30	N/A	0.001	0.05	(Negligible)	PASS
19	B28.3	Brick	0.30	N/A	0.009	0.05	(Negligible)	PASS
19	B29.1	Brick	0.30	N/A	0.004	0.05	(Negligible)	PASS
19	B29.2	Brick	0.30	N/A	0.010	0.05	(Negligible)	PASS
19	B41.1	Brick	0.30	N/A	0.006	0.05	(Negligible)	PASS
20	B2.1	Brick	0.31	N/A	0.020	0.05	(Negligible)	PASS
20	B3.1	Brick	0.31	N/A	0.189	0.05	(Moderate)	FAIL
20	B3.2	Brick	0.31	N/A	0.035	0.05	(Negligible)	PASS

Water Damage Assessment 14.03.2013

				Water	Damage A	ssessn	nent 14	.03.2013	5				
Dura	Xdisp		Pipe	Wall	Joint Rota	ation (d	egrees)	Joint P	ull-out	(mm)	Tensil	e Strair	า (%)
Dwg No.	Ref	Material	Diameter	thickness	Calculated	Limit	Pocult	Calculated	Limit	Recult	Calculated	Limit	Posu
	ner		(m)	(mm)						Result			Nesu
21	B48.1	Cast Iron	0.102	10.16	0.000	0.15	PASS	0.00	7.5	PASS	0.000	0.01	PAS
21	B49.1	Cast Iron	0.102	10.16	0.338	0.15	FAIL	12.02	7.5	FAIL	0.011	0.01	FAI
21	B60.1	Cast Iron	0.102	10.16	0.000	0.15	PASS	0.00	7.5	PASS	0.000	0.01	PAS
21	B82.1	Cast Iron	0.102	10.16	0.165	0.15	FAIL	14.06	7.5	FAIL	0.010	0.01	PAS
21	B83.1	Cast Iron	0.762	76.20	0.000	0.15	PASS	0.00	7.5	PASS	0.000	0.01	PAS
21	B83.2	Cast Iron	0.762	76.20	0.000	0.15	PASS	0.00	7.5	PASS	0.000	0.01	PAS
22	B29.1	Cast Iron	0.381	38.10	0.110	0.15	PASS	5.53	7.5	PASS	0.006	0.01	PAS
22	B47.1	Cast Iron	0.102	10.16	0.087	0.15	PASS	5.77	7.5	PASS	0.001	0.01	PAS
22	B47.2	Cast Iron	0.102	10.16	0.113	0.15	PASS	5.48	7.5	PASS	0.012	0.01	FAI
22	B85.1	Cast Iron	0.381	38.10	0.122	0.15	PASS	5.56	7.5	PASS	0.008	0.01	PAS
22	B86.1	Cast Iron	0.762	76.20	0.117	0.15	PASS	5.60	7.5	PASS	0.004	0.01	PAS
23	B30.1	Cast Iron	0.450	27.40	0.071	0.15	PASS	5.37	7.5	PASS	0.001	0.01	PAS
23	B30.2	Cast Iron	0.450	27.40	0.071	0.15	PASS	4.43	7.5	PASS	0.000	0.01	PAS
23	B31.1	Cast Iron	0.800	80.00	0.086	0.15	PASS	5.46	7.5	PASS	0.003	0.01	PAS
23	B31.2	Cast Iron	0.800	80.00	0.086	0.15	PASS	1.01	7.5	PASS	0.000	0.01	PAS
23	B31.3	Cast Iron	0.800	80.00	0.086	0.15	PASS	3.82	7.5	PASS	0.000	0.01	PAS
23	B31.4	Cast Iron	0.800	80.00	0.071	0.15	PASS	4.51	7.5	PASS	0.000	0.01	PAS
23	B45.1	Cast Iron	0.100	5.65	0.079	0.15	PASS	4.85	7.5	PASS	0.009	0.01	PAS
23	B45.2	Cast Iron	0.100	5.65	0.050	0.15	PASS	4.86	7.5	PASS	0.000	0.01	PAS
23	B46.1	Cast Iron	0.152	15.24	0.072	0.15	PASS	5.21	7.5	PASS	0.005	0.01	PAS
23	B61.1	Cast Iron	0.051	5.08	0.081	0.15	PASS	4.88	7.5	PASS	0.013	0.01	FAI
23	B62.1	Cast Iron	0.152	15.24	0.075	0.15	PASS	4.13	7.5	PASS	0.002	0.01	PAS
23	B63.1	Cast Iron	0.152	15.24	0.071	0.15	PASS	5.25	7.5	PASS	0.005	0.01	PAS
23	B64.1	Cast Iron	0.152	15.24	0.073	0.15	PASS	3.94	7.5	PASS	0.002	0.01	PAS
23	B65.1	Cast Iron	0.152	15.24	0.073	0.15	PASS	5.18	7.5	PASS	0.005	0.01	PAS
23	B66.1	Cast Iron	0.150	7.75	0.067	0.15	PASS	4.72	7.5	PASS	0.003	0.01	PAS
23	B67.1	Cast Iron	0.150	7.75	0.070	0.15	PASS	3.96	7.5	PASS	0.008	0.01	PAS
23	B68.1	Cast Iron	0.800	80.00	0.071	0.15	PASS	4.86	7.5	PASS	0.006	0.01	PAS
23	B68.2	Cast Iron	0.800	80.00	0.058	0.15	PASS	5.01	7.5	PASS	0.000	0.01	PAS
23	B69.1	Cast Iron	0.450	27.40	0.071	0.15	PASS	4.59	7.5	PASS	0.015	0.01	FA
23	B69.2	Cast Iron	0.450	27.40	0.060	0.15	PASS	4.91	7.5	PASS	0.002	0.01	PAS
23	B70.1	Cast Iron	0.051	5.08	0.082	0.15	PASS	4.78	7.5	PASS	0.012	0.01	FA
23	B87.1	Cast Iron	0.381	38.10	0.070	0.15	PASS	5.10	7.5	PASS	0.001	0.01	PAS
23	B88.1	Cast Iron	0.102	10.16	0.075	0.15	PASS	5.28	7.5	PASS	0.002	0.01	PAS
23	B89.1	Cast Iron	3.810	381.00	0.082	0.15	PASS	5.27	7.5	PASS	0.001	0.01	PAS
24	B19.1	Cast Iron	0.102	10.16	0.076	0.15	PASS	3.98	7.5	PASS	0.012	0.01	FA
24	B20.1	Cast Iron	0.102	10.16	0.075	0.15	PASS	3.01	7.5	PASS	0.011	0.01	FAI
24	B50.1	Cast Iron	0.100	5.65	0.000	0.15	PASS	0.09	7.5	PASS	0.000	0.01	PAS
24	B59.1	Cast Iron	0.076	7.62	0.008	0.15	PASS	1.74	7.5	PASS	0.000	0.01	PAS
24	B71.1	Cast Iron	0.076	7.62	0.028	0.15	PASS	3.96	7.5	PASS	0.000	0.01	PAS
24	B72.1	Cast Iron	0.102	10.16	0.064	0.15	PASS	3.83	7.5	PASS	0.000	0.01	PAS
24	B73.1	Cast Iron	0.102	10.16	0.076	0.15	PASS	1.15	7.5	PASS	0.000	0.01	PAS
24	B74.1	Cast Iron	0.100	5.65	0.064	0.15	PASS	4.18	7.5	PASS	0.001	0.01	PAS
24	B74.2	Cast Iron	0.100	5.65	0.067	0.15	PASS	4.18	7.5	PASS	0.010	0.01	PAS
24	B74.3	Cast Iron	0.100	5.65	0.067	0.15	PASS	4.02	7.5	PASS	0.001	0.01	PAS
24	B74.4	Cast Iron	0.100	5.65	0.057	0.15	PASS	4.69	7.5	PASS	0.001	0.01	PAS
24	B91.1	Cast Iron	0.102	10.16	0.052	0.15	PASS	3.57	7.5	PASS	0.000	0.01	PAS

APPENDIX B - Northern Line Extension

APPENDIX B - Northern Line Extension Water Damage Assessment 14.03.2013

24 B92.1 Cast Iron 0.305 30.48 0.057 0.15 PASS 0.000 24 B93.1 Cast Iron 0.305 30.48 0.077 0.15 PASS 0.000 24 B94.1 Cast Iron 0.102 10.16 0.073 0.15 PASS 4.72 7.5 PASS 0.001 25 B18.1 Cast Iron 0.102 10.16 0.070 0.15 PASS 4.72 7.5 PASS 0.002 25 B28.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 3.42 7.5 PASS 0.002 25 B32.1 Cast Iron 0.102 10.16 0.002 0.15 PASS 4.43 7.5 PASS 0.002 25 B32.1 Cast Iron 0.102 10.16 0.088 0.15 PASS 4.44 7.5 PASS 0.002 25 B95.1 Cast Iron 0.102 10.16 0.081 </th <th>0 01</th> <th></th>	0 01	
24 B94.1 Cast Iron 0.102 10.16 0.092 0.15 PASS 4.69 7.5 PASS 0.002 24 B94.2 Cast Iron 0.102 10.16 0.073 0.15 PASS 4.72 7.5 PASS 0.001 25 B28.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 3.56 7.5 PASS 0.002 25 B28.2 Cast Iron 0.102 10.16 0.050 0.15 PASS 4.35 7.5 PASS 0.002 25 B32.1 Cast Iron 0.102 10.16 0.072 0.15 PASS 4.40 7.5 PASS 0.002 25 B95.1 Cast Iron 0.102 10.16 0.072 0.15 PASS 4.40 7.5 PASS 0.002 25 B95.1 Cast Iron 0.102 10.16 0.080 0.15 PASS 5.07 7.5 PASS 0.002	0.01	PASS
24 B94.2 Cast Iron 0.102 10.16 0.073 0.15 PASS 4.72 7.5 PASS 0.010 25 B18.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 4.75 PASS 0.000 25 B28.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 4.32 7.5 PASS 0.000 25 B23.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 4.35 7.5 PASS 0.000 25 B31.1 Cast Iron 0.102 10.16 0.058 0.15 PASS 4.40 7.5 PASS 0.000 25 B95.1 Cast Iron 0.102 10.16 0.068 0.15 PASS 4.44 7.5 PASS 0.000 25 B96.1 Cast Iron 0.102 10.16 0.033 0.15 PASS 4.20 7.5 PASS 0.000 26 B1.	0.01	PASS
125 B18.1 Cast Iron 0.178 17.78 0.071 0.15 PASS 4.59 7.5 PASS 0.002 25 B28.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 3.42 7.5 PASS 0.002 25 B22.1 Cast Iron 0.102 10.16 0.050 0.15 PASS 4.35 7.5 PASS 0.002 25 B24.1 Cast Iron 0.102 10.16 0.058 0.15 PASS 4.40 7.5 PASS 0.002 25 B95.1 Cast Iron 0.102 10.16 0.072 0.15 PASS 4.64 7.5 PASS 0.002 25 B95.1 Cast Iron 0.102 10.16 0.068 0.15 PASS 4.64 7.5 PASS 0.002 26 B3.1 Cast Iron 0.102 10.16 0.033 0.15 PASS 3.38 7.5 PASS 0.002	0.01	PASS
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28 B22.1 Cast Iron 0.610 60.96 0.040 0.15 PASS 3.23 7.5 PASS 0.007 28 B26.1 Cast Iron 0.102 10.16 0.044 0.15 PASS 3.23 7.5 PASS 0.007 28 B26.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 3.32 7.5 PASS 0.007 28 B35.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.93 7.5 PASS 0.017 28 B36.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.88 7.5 PASS 0.017 28 B36.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.14 7.5 PASS 0.017 28 B81.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.07 7.5 PASS 0.017	0.01	FAIL
28 B26.1 Cast Iron 0.102 10.16 0.044 0.15 PASS 3.32 7.5 PASS 0.003 28 B35.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.93 7.5 PASS 0.003 28 B35.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.93 7.5 PASS 0.003 28 B36.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.88 7.5 PASS 0.003 28 B55.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.14 7.5 PASS 0.013 28 B51.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.07 7.5 PASS 0.012 29 B7.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	PASS
28 B35.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.93 7.5 PASS 0.014 28 B36.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.93 7.5 PASS 0.014 28 B36.1 Cast Iron 0.102 10.16 0.037 0.15 PASS 2.88 7.5 PASS 0.003 28 B55.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.14 7.5 PASS 0.012 28 B81.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.07 7.5 PASS 0.012 29 B7.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007 29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007 <td>0.01</td> <td>PASS</td>	0.01	PASS
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28 B55.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.14 7.5 PASS 0.012 28 B81.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.07 7.5 PASS 0.012 29 B7.1 Cast Iron 0.914 91.44 0.042 0.15 PASS 3.17 7.5 PASS 0.007 29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	FAIL
28 B81.1 Cast Iron 0.102 10.16 0.039 0.15 PASS 3.07 7.5 PASS 0.011 29 B7.1 Cast Iron 0.914 91.44 0.042 0.15 PASS 3.17 7.5 PASS 0.007 29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007 29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	PASS
29 B7.1 Cast Iron 0.914 91.44 0.042 0.15 PASS 3.17 7.5 PASS 0.007 29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	FAIL
29 B8.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	FAIL
	0.01	PASS
	0.01	PASS
29 B9.1 Cast Iron 0.762 76.20 0.042 0.15 PASS 3.17 7.5 PASS 0.005	0.01	PASS
29 B10.1 Cast Iron 0.305 30.48 0.041 0.15 PASS 3.07 7.5 PASS 0.007	0.01	PASS
29 B11.1 Cast Iron 0.076 7.62 0.041 0.15 PASS 3.02 7.5 PASS 0.007	0.01	PASS
29 B51.1 Cast Iron 0.762 76.20 0.042 0.15 PASS 3.13 7.5 PASS 0.004	0.01	PASS
29 B52.1 Cast Iron 0.102 10.16 0.041 0.15 PASS 3.03 7.5 PASS 0.007	0.01	PASS
29 B53.1 Cast Iron 0.610 60.96 0.042 0.15 PASS 3.14 7.5 PASS 0.005	0.01	PASS
29 B54.1 Cast Iron 0.610 60.96 0.045 0.15 PASS 3.31 7.5 PASS 0.007	0.01	PASS
29 B77.1 Cast Iron 0.762 76.20 0.041 0.15 PASS 1.73 7.5 PASS 0.000	0.01	PASS
29 B106.1 Cast Iron 0.457 45.72 0.045 0.15 PASS 3.32 7.5 PASS 0.010	0.01	PASS

					Damage P								
29	B107.1	Cast Iron	0.254	25.40	0.044	0.15	PASS	3.29	7.5	PASS	0.012	0.01	FAIL
30	B39.1	Cast Iron	0.102	10.16	0.090	0.15	PASS	11.42	7.5	FAIL	0.009	0.01	PASS
30	B108.1	Cast Iron	0.305	30.48	0.055	0.15	PASS	4.19	7.5	PASS	0.006	0.01	PASS
30	B109.1	Cast Iron	0.305	30.48	0.056	0.15	PASS	4.26	7.5	PASS	0.008	0.01	PASS
30	B110.1	Cast Iron	0.305	30.48	0.056	0.15	PASS	4.25	7.5	PASS	0.009	0.01	PASS
30	B111.1	Cast Iron	0.102	10.16	0.225	0.15	FAIL	7.49	7.5	PASS	0.006	0.01	PASS
31	B2.1	Cast Iron	0.076	7.62	0.059	0.15	PASS	4.40	7.5	PASS	0.014	0.01	FAIL
31	B5.1	Cast Iron	0.102	10.16	0.131	0.15	PASS	11.74	7.5	FAIL	0.010	0.01	PASS
31	B6.1	Cast Iron	0.102	10.16	0.120	0.15	PASS	9.90	7.5	FAIL	0.003	0.01	PASS
31	B6.2	Cast Iron	0.102	10.16	0.153	0.15	FAIL	14.13	7.5	FAIL	0.008	0.01	PASS
31	B12.1	Cast Iron	0.102	10.16	0.046	0.15	PASS	3.53	7.5	PASS	0.006	0.01	PASS
31	B13.1	Cast Iron	0.102	10.16	0.046	0.15	PASS	3.50	7.5	PASS	0.007	0.01	PASS
31	B21.1	Cast Iron	0.102	10.16	0.087	0.15	PASS	8.45	7.5	FAIL	0.011	0.01	FAIL
31	B23.1	Cast Iron	0.914	91.44	0.055	0.15	PASS	4.35	7.5	PASS	0.003	0.01	PASS
31	B24.2	Cast Iron	0.508	50.80	0.056	0.15	PASS	4.27	7.5	PASS	0.004	0.01	PASS
31	B25.1	Cast Iron	0.127	12.70	0.055	0.15	PASS	4.20	7.5	PASS	0.005	0.01	PASS
31	B38.1	Cast Iron	0.076	7.62	0.050	0.15	PASS	3.86	7.5	PASS	0.012	0.01	FAIL
31	B40.2	Cast Iron	0.076	7.62	0.051	0.15	PASS	4.12	7.5	PASS	0.002	0.01	PASS
31	B41.1	Cast Iron	0.102	10.16	0.044	0.15	PASS	3.62	7.5	PASS	0.005	0.01	PASS
31	B43.2	Cast Iron	0.102	10.16	0.166	0.15	FAIL	13.56	7.5	FAIL	0.008	0.01	PASS
31	B43.3	Cast Iron	0.102	10.16	0.115	0.15	PASS	9.73	7.5	FAIL	0.001	0.01	PASS
31	B56.1	Cast Iron	0.102	10.16	0.046	0.15	PASS	3.55	7.5	PASS	0.006	0.01	PASS
31	B57.1	Cast Iron	0.127	12.70	0.052	0.15	PASS	4.19	7.5	PASS	0.007	0.01	PASS
31	B78.1	Cast Iron	0.102	10.16	0.048	0.15	PASS	3.93	7.5	PASS	0.005	0.01	PASS
31	B79.1	Cast Iron	0.102	10.16	0.048	0.15	PASS	3.87	7.5	PASS	0.005	0.01	PASS
31	B80.1	Cast Iron	0.102	10.16	0.039	0.15	PASS	4.00	7.5	PASS	0.003	0.01	PASS

APPENDIX B - Northern Line Extension Water Damage Assessment 14.03.2013

Buro Happold

Appendix C Typical values of volume loss

Recorded Volume Loss	Project	Reference
Maximum recorded volume loss of 0.8%	Channel Tunnel Rail Link Contract 220	Mair (2008)
0.52 to 1.03	West Bound Jubilee Line Extension	Standing and Selman (2001)
0.72 to 1.11	East Bound Jubilee Line Extension	Standing and Selman (2001)
0.25% to 0.75% within London Clay	Channel Tunnel Rail Link contract 220, 230, 240, and 250	Bowers and Moss (2006)
Volume loss assumed in design	Project	Reference
1% to 2% in London Clay	Literature	Bracegirdle et al (1996)
1.5%	Impact of Heathrow Express Tunnel Multi Storey Car Park West Foundation (NATM Tunnel)	Buro Happold (2004)
1.3%	Jubilee Line Extension NATM Tunnel diameters less than	Mair and Taylor (2001)
1.5%	Jubilee Line Extension NATM Tunnel diameters greater than 6m	Mair and Taylor (2001)
2%	Jubilee Line Extension NATM Tunnels interacting with cross passages	Mair and Taylor (2001)

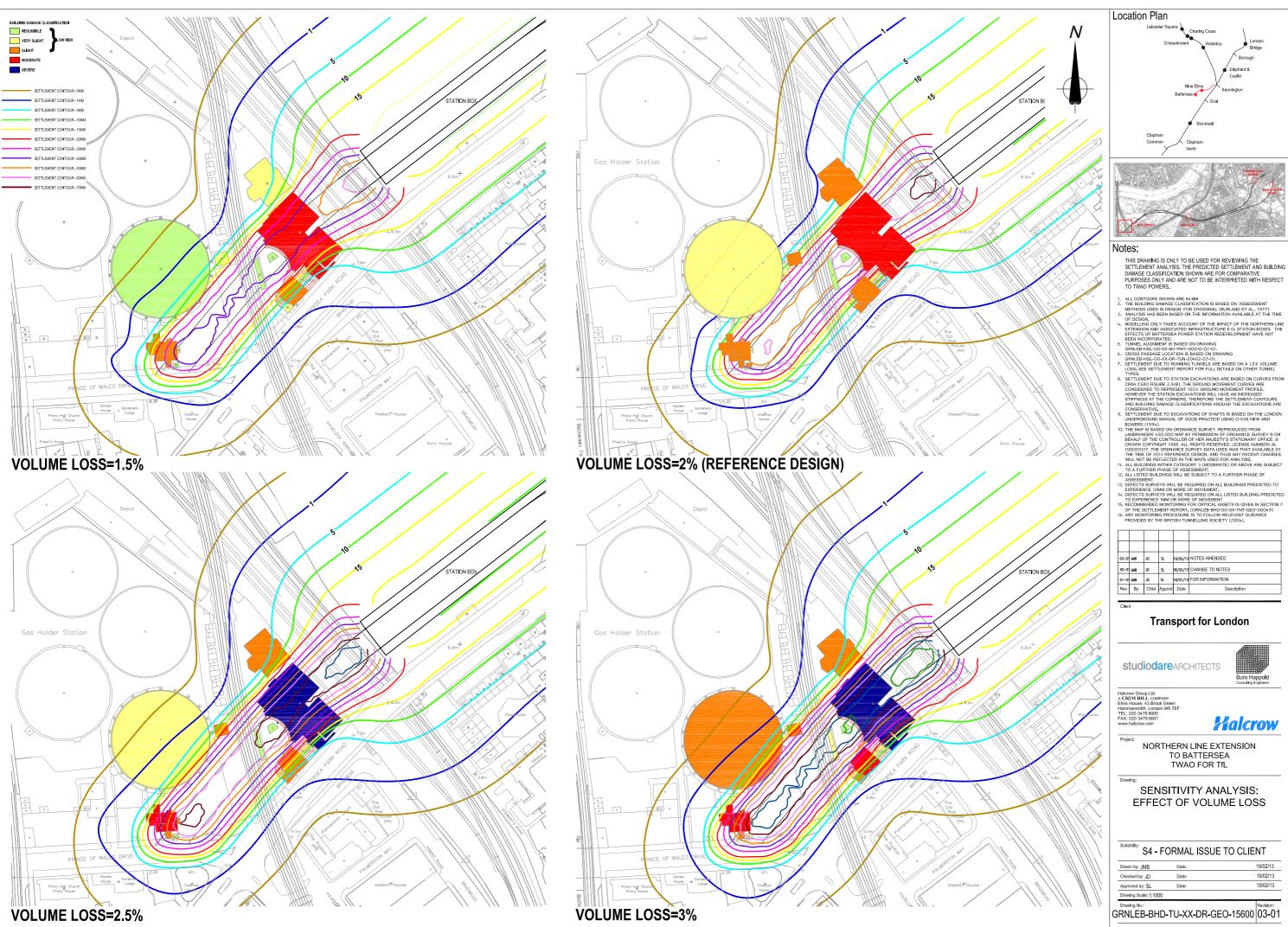
Appendix D Results from sensitivity analysis

Drawing numbers:

GRNLEB-BHD-TU-XX-DR-GEO-15600-03-01 GRNLEB-BHD-TU-XX-DR-GEO-15601-01-01 GRNLEB-BHD-TU-XX-DR-GEO-15602-02-01 GRNLEB-BHD-TU-XX-DR-GEO-15603-01-01 GRNLEB-BHD-TU-XX-DR-GEO-15604-02-01 Buro Happold

Revision 03-01 21 March 2013

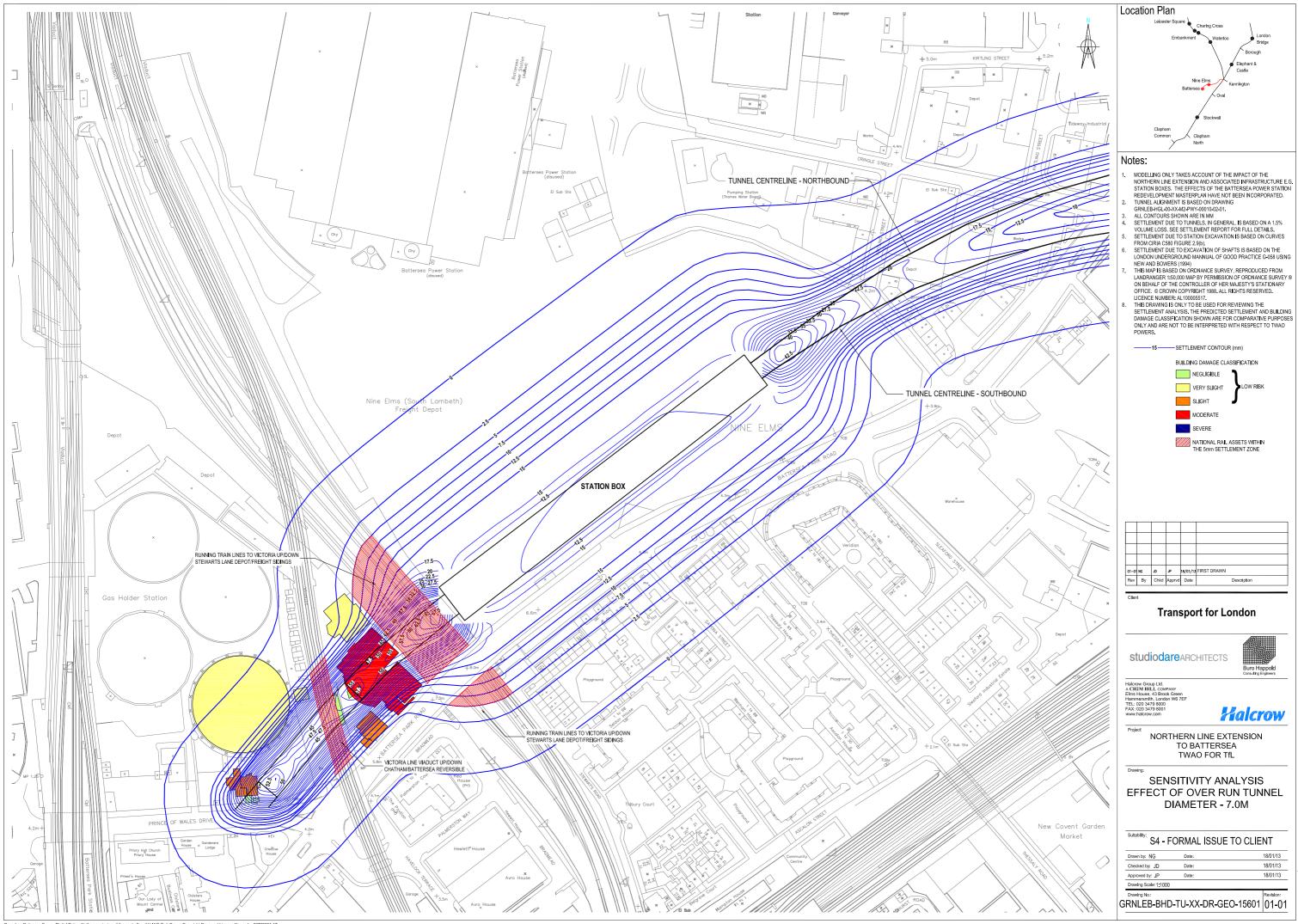


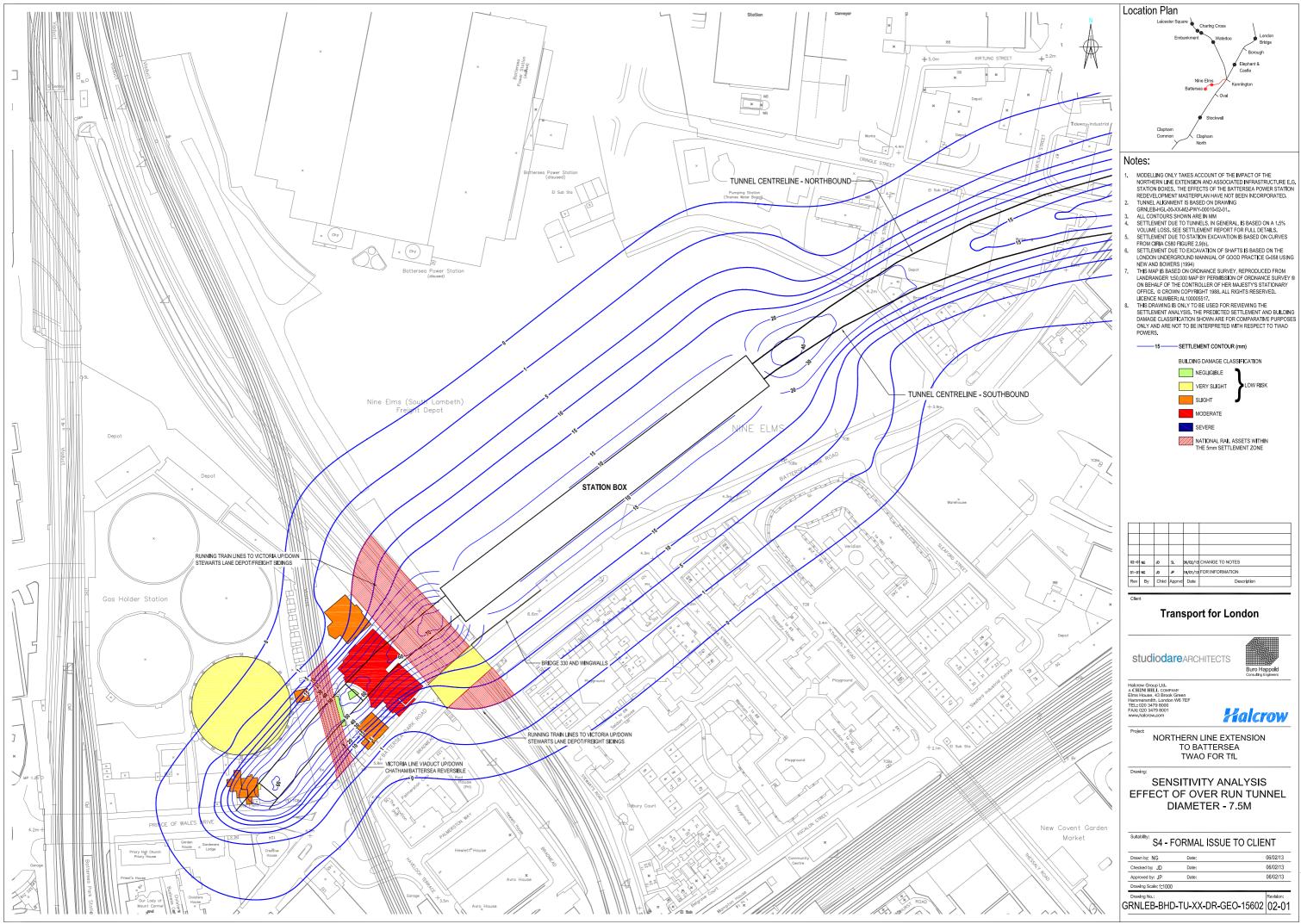


03-01	JMB	JD	SL.	19/02/13	NOTES AMENDED
02-0	JNB	JD	SL	06/02/13	CHANGE TO NOTES
01-01	JWB	JD	SL.	18/01/13	FOR INFORMATION
Rev	By	Chkd	Apprvd	Date	Description

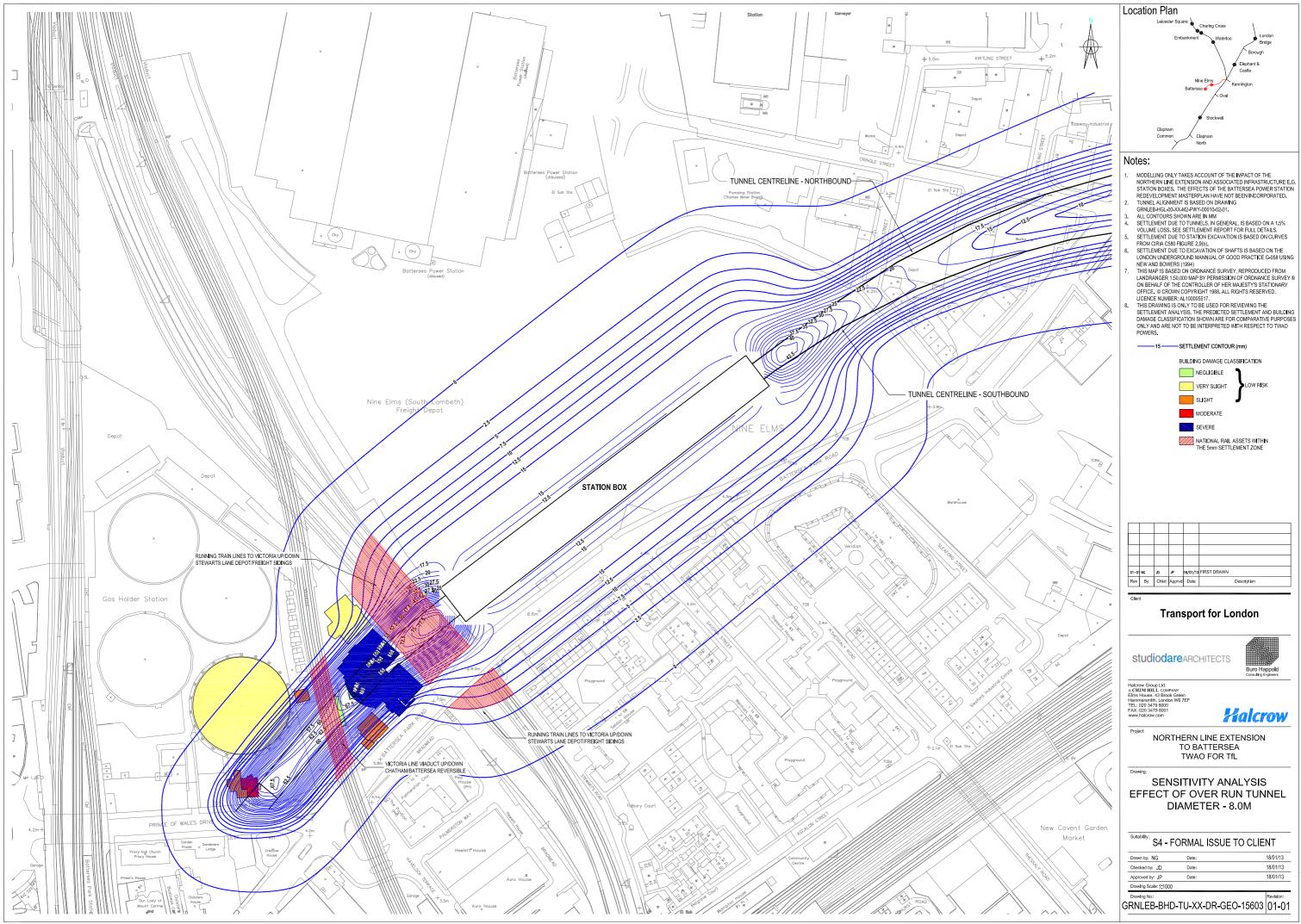
Suitability: S4 - FORMAL ISSUE TO CLIENT
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Deside a bla i		Deviation
Drawing Scale: 1:1000		
Approved by: SL	Date:	19/02/13
Checked by: JD	Date:	19/02/13
Drawn by: JMB	Date:	19/02/13

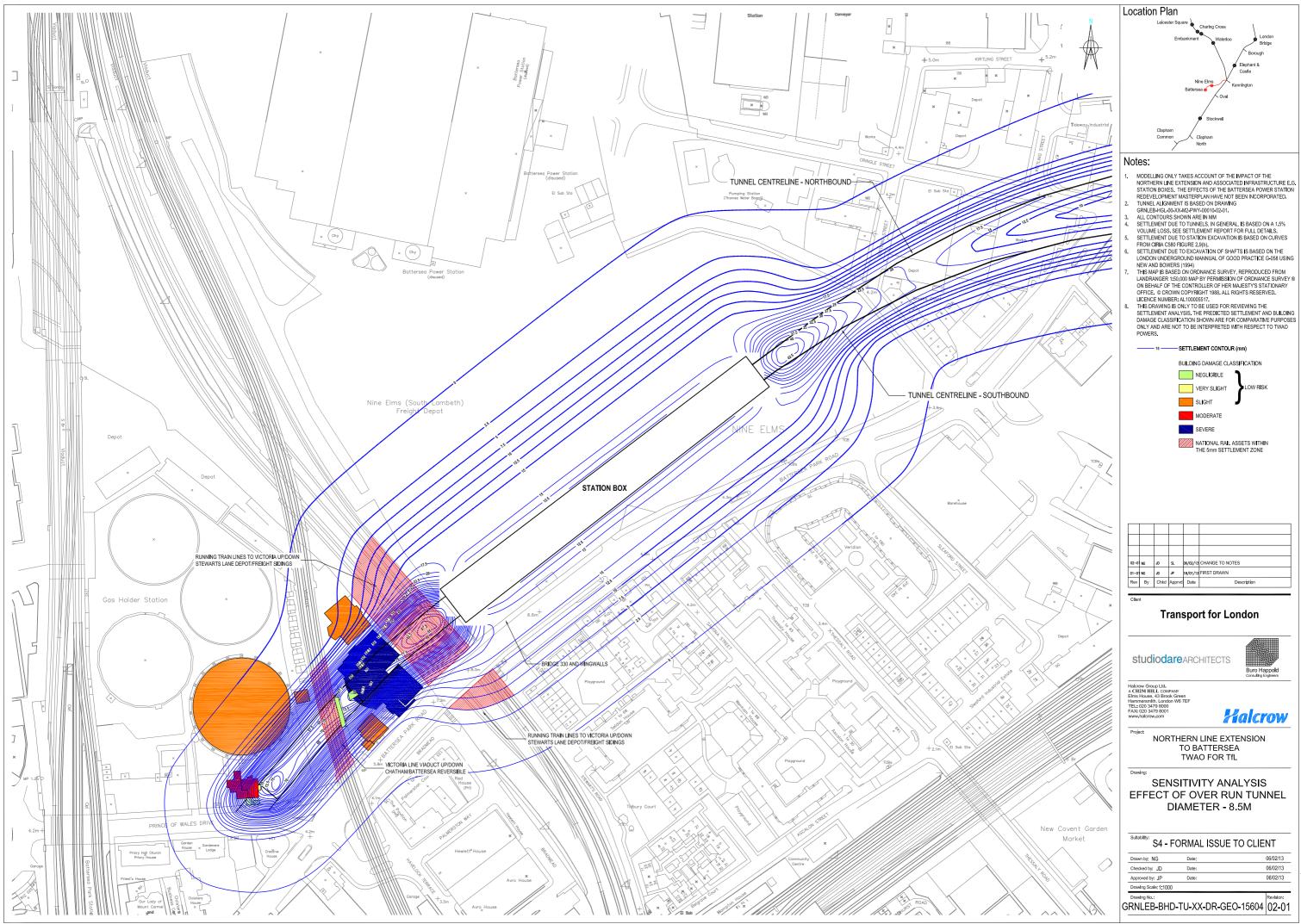




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Iser and Plot Date : Jdewsbur : 6:2:2013 - 4:



User and Plot Date : 12:2:2013 - 11;2 a

Jonathan Dewsbury Camden Mill Lower Bristol Road Bath BA2 3DQ UK

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I3: Concept Consultant Limited - Site Investigation

Environmental Statement

Volume II

SITE INVESTIGATION		SITE INVESTIGATION REPORT
		Northern Line Extension
Northern Line Extens		Kennington Station to Battersea Power Station
Kennington Station to Battersea		
Prepared for: REO (Power		
Concept: 10/2254-FR02		
Unit 8, Warple Me Warple Way		
London W3 0RI Tel: 020 8811 28 Fax: 020 8811 28	CONCEPT	ISSUE 02
e-mail: <u>si@conceptconsul</u> www.conceptconsultar		

ON REPORT

ktension rsea Power Station

owerstation) Ltd

19/07/2010

ble Mews, Way /3 0RF 11 2880 811 2881 consultants.co.uk sultants.co.uk

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Job Number:			10/2254			
Document Typ	e:		Factual Site	e Investigation	n Report	
Document Ref:	Status/Issue No.	Date	Amendment I	Record (Detail)		
10/2254-FR01	Issue - 01	07/07/2010				
				Prepared By:	Checked By:	Approved By:
			Name	D Strong	O Savvidou	A Savidu
			Signature	Bh	08	AS
Document Ref:	Status/Issue No.	Date	Amendment F	Record (Detail)		N.
10/2254-FR02	Issue - 02	19/07/2010				
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				Prepared By:	Checked By:	Approved By:
			Name	D Strong	O Savvidou	A Savidu
			Signature	18h	B	AS
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				Prepared By:	Checked By:	Approved By:
			Name			
			Signature			
Document Ref:	Status/Issue No.	Date	Amendment F	Record (Detail)		I
				Prepared By:	Checked By:	Approved By:
			Name			
			Signature		<u></u>	

		CONCEPT SITE IN
CONTI	ENTS	
1.	PROJ	ECT PARTICULARS
2.	SCOP	E OF WORK
3.	DESC	RIPTION OF WORKS
	3.1	Cable Percussion Boreho
	3.2	Groundwater Monitoring
		3.2.1 – Standpipe/Piezome
		3.2.2 – Water Level Logge
	3.3	Setting Out
	3.4	Logging / Laboratory Test
4.	SITE I	LOCATION PLAN
5.	EXPL	ORATORY HOLE LOCATION
6.	CABL	E PERCUSSION BOREHOLE
7.	GROU	INDWATER MONITORING RE
8.	SPLIT	AND DESCRIBE UNDISTUR
9.	LABO	RATORY TEST RESULTS
10.	CHEM	IICAL TEST RESULTS

Unit 8, Warple Mews, Warple Way, London W3 0RF Tel: 020 8811 2880 Fax: 020 8811 2881 e-mail: si@conceptconsultants.co.uk

Form SI 048 Rev 2/08 4 April 2008

G://0-SI/Excel Templates/Control Document

Northern Line Extension Reference Design

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I PLANS

E LOGS

RESULTS

RBED SAMPLE LOGS

PROJECT PARTICULARS 1.

Site Address:	Locations along the proposed route of the Northern Line Extension between Battersea Power Station (SW8 5BN) and Kennington Underground Station, Kennington Park Road
Client:	REO (PowerStation) Ltd
Date of Fieldwork:	19/04/2010 to 21/05/2010
Engineer:	Buro Happold Limited

SCOPE OF WORK: 2.

The works carried out for this investigation included the following:

- 10 No. Cable Percussion Boreholes to a maximum depth of 40.00m below ground level;
- Installation of standpipes and vibrating wires;
- Associated geotechnical and chemical laboratory testing.

DESCRIPTION OF WORKS 3.

3.1 **Cable Percussion Boreholes**

10 No. Cable percussion boreholes (BH01-BH10) were drilled to a maximum depth of 40.00m below the existing ground level using standard cable percussion boring rigs (Dando 150 and Dando 175) with 200mm and 150mm diameter equipment. The locations of the boreholes are shown on the Exploratory Hole Location Plan in Section 5 of this report.

Concrete and asphalt surfaces, where present at the locations of the boreholes. were broken out in advance of the drilling to allow for the hand excavation of an inspection pit to 1.20m depth. Where no hard surfacing was present, hand excavated inspection pits advanced using hand digging tools to 1.20m depth. All surfaces were reinstated to match existing upon completion of the borehole works.

Bulk samples were taken at regular intervals in the Made Ground and at each change in strata. Undisturbed 102mm nominal diameter (U102) samples were taken using a down-hole sliding hammer at regular intervals in cohesive material where possible or continuously as instructed by the Engineer.

Standard penetration tests (SPT) were carried out at regular intervals alternating with undisturbed samples. The resulting SPT 'N' values are presented in the borehole records. SPT's were taken using a split shoe sampler. Where an SPT using the split shoe sampler was not possible, due to the granular nature of the material, a solid cone was used.

CONCEPT SITE INVESTIGATIONS

Small, disturbed samples were either retrieved from the cutting shoe of the U4 sampler or from the SPT split spoon sampler. Environmental samples (Tubs, jars and vials) for chemical analysis were taken within the Made Ground at regular intervals.

Within BH02 chemical analysis were screened for Volatile Organic Content (VOC) using a Photocheck 1000+ PID at regular intervals throughout the made around.

Groundwater observations carried out during the fieldworks and subsequent to completion of the fieldworks (as appropriate) are reported in the relevant borehole logs presented in Section 6 and groundwater monitoring Section 7 of this report.

3.2 Groundwater Monitoring

Groundwater Monitoring Results are presented in Section 7 of this report. Full Installation details are presented on the relevant borehole logs in Section 6 of this report.

3.2.1 Standpipe/Piezometer Installations

50mm groundwater monitoring standpipes/piezometers and vibrating wires were installed in the boreholes as tabulated below.

ВН	Diameter of Installation (mm)	Type of Installation	Tip (m bgl)	Top of Response Zone (m bgl)	Bottom of Response Zone (m bgl)
BH01		VW	21.00		20.00
BH02		VW	26.00		25.00
BH03		VW	26.00		25.00
BH04		VW	33.00		32.00
BH05	50	SP	35.10	33.10	35.10
BH06	50	SP	37.00	24.00	37.00
BH07	50	SP	31.00	27.00	31.00
BH08		VW	23.00		22.00
BH09	50	SP	25.00	22.00	25.00
BH10	50	SP	31.00	23.00	31.00
Note:	SP indicates Sta	ndpipe/piezomete	r installation		·

SP indicates Standpipe/piezometer installation VW indicates vibrating wire installation

3.2.2 Water Level Loggers

Solinist © Level loggers were installed in all standpipes on 04/06/2010. The level loggers recorded the change in water level every 5 minutes over a 3 week period.

A barometric pressure logger ("barologger") was installed above the water level in BH09. All of the presented results have been corrected for barometric pressure variations.

BH05 Level Logger results have been produced in 2 parts due to a faulty logger.

3.3 Setting Out

The locations of the boreholes were set out using GPS surveying equipment based on the coordinates provided by Buro Happold. Some of the Boreholes were subsequently relocated and a survey was carried out on completion of the fieldworks to establish "as drilled" coordinates and levels.

3.4 Logging / Laboratory Testing

Logging of the samples was carried out in accordance with BS 5930:1999 incorporating Amendment No.1 (Dec '07).

Undisturbed samples selected by the engineer were extruded and described. Individual sample descriptions and Photographs are presented in Section 8 of this report.

All soil tests were carried out in accordance with BS1377 (1990). The results are presented in Section 9 of this report.

All chemical testing has been carried out by Alcontrol in accordance with the requirements of UKAS ISO17025 and ISO17020. The results are presented in tabular formats in Section 10 of this report.

REFERENCES

British Standards Institution, Methods of test for soils for civil engineering purposes, British Standard BS 1377: 1990, BSI, London, 1990.

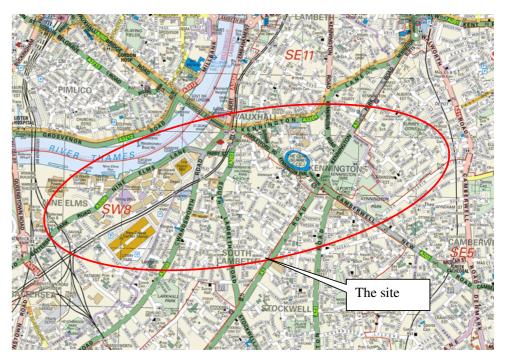
British Standards Institution, (1999) Code of practice for site investigations, British Standard BS 5930: 1999 incorporating Amendment No.1 (Dec '07), BSI, London.

Specification for Ground Investigation, Site Investigation Steering Group, Thomas Telford, London, 1999.

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

CONCEPT SITE INVESTIGATIONS

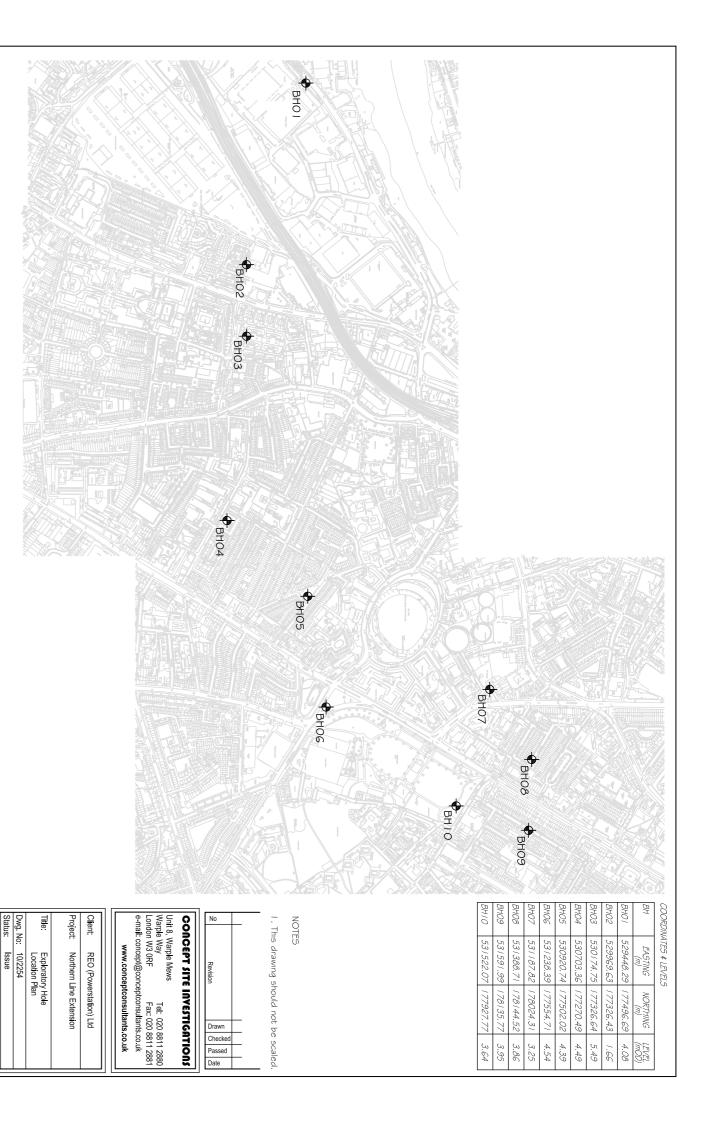
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SITE LOCATION PLAN

5. EXPLORATORY HOLE LOCATION PLAN



Northern Line Extension Reference Design

10/2254

AS

12 0

8 Warple London V Telephor E-mail: s	e Way W3 ORF ne: 020 a si@conc	8811 288	SITE 30_Fax: 0. ultants.co.	20 8811 28		GATIONS Borehole No BH01						
Project			[:ma]	-	•							
Job No			Line E							D .		
	0/225		ate Star ate Com		19/05/10 21/05/10		Co-Ordinat	tes 448.3 N 17	77406 7		nal Depth 40.00m	
Client		Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: Property of the system Image: P	Method/	++0.3 IN I	//490./	Sh						
	EO (Powe	STRATA Pla Level (mOD) Legend Depth (Thickness) Strata Description	Plant Used	Cable Pe	rcussio		1 of 6				
PRO	OGRI	ESS			S	TRATA	1	SAMPL	ES & 1	TESTS		nt/
		-	Level (mOD) Legend Depth (Thickness) Strata Description y 4.01 4.7.31 0.07 TOPSOIL. Brown clayey SAND with occasional and concrete rubble. (MADE GROUND) Brown to reddish brown very sandy Classical					Field	Instrument/			
Date	Casing	Wat	(mOD)	Legend		Strata Description	on	Depth (m)	Type No	Test Result	Records	Instr
9/05/10		Dry	4.01		0.07/		sional brick	0.20			Roots of live	
					(0.60)	and concrete rubble.	ISIOIIAI DITCK	- 0.50	B01		appearance to 0.20m depth	
			3 41		- 0.67	(MADE OROUND)		- 0.50	DOI			
					-	Brown to reddish brown very sa with brick and concrete fragme	andy CLAY	-				
					-	(MADE GROUND)		- 1.00	B02			
								1.20-1.65	U03	10 blows		
					(1.73)			-				
					(1.75)			1.70	D04			
					-			2.00		N17	1, 1 / 2, 4, 4, 7	
								2.20-2.65	D05			
			1.68		2.40			2.20-2.70	B06			
			1.48	<u>^</u>	2.60	Soft to firm, brown mottled gre reddish brown sandy silty CLA	y and spotted Y with clayey	-				
				0000	-	(ALLUVIUM)	/	-				
9/05/10	2.70	3.00 ₁		.000		Medium dense to dense, yellow orangish brown very sandy wel	l rounded fine	3.00-3.50 3.00	B07	N39	4,6/7,10,11,11	
		=		0000		to coarse flint GRAVEL with r fragments.	are sandstone	-				
				0000 0000	-	(RIVER TERRACE DEPOSIT	S)	-				
				0.00	4 I			-				
9/05/10	4.00	3.60		0 0 0				4.00-4.50	B08	2122	2 4 4 5 6 9	
				°0 50				4.00		N23	3, 4 / 4, 5, 6, 8	
9/05/01	4.50	1		0 0.0 0 0 0	-			-				
9/03/01	4.50	Į		0000				-				
				0.00	-			-	Dee			
9/05/10	5.00	3.10		.000				5.00-5.50 5.00	B09	N30	3, 3 / 5, 8, 8, 9	
				000				-				
				00.02	(5.70)			-				
				0.000				-				
9/05/10	6.00	2.90		000				- 6.00-6.50 - 6.00	B10	N22	22/5566	
				°0 0 0	ŧ			- 0.00		1822	2, 2 / 5, 5, 6, 6	
				0 0 0 0 0 0 0 0				-				
				0 1 0 1				-				
0/05/10	7.00	2.20		0.00		becoming grey to greyish gre	een and silty	7.00-7.50	B11			
9/05/10	7.00	3.20		0.0		1		1.00-1.00	1 011		I	
	hisellin	<u> </u>	Law		Added (m)	GENERAL REMA 1. An inspection pit has l	hand excavated to	0 1.20m below	ground lev	vel, prior to	boring commencing.	
From	To		Hours	From	To 4.50	 2. Ø200m casing used fr ground level. 	om ground level	to 9.10m depth	and then	reduced to	Ø150m to 34.50m below	W
				2.60	4.30	 Water seepage encour Slight water seepage e A vibrating wire pieze Borehole backfilled w and 19.00m and with ber 	encountered at 23 ometer installed a ith bentonite pell	.50m below gro t 20.00m depth lets from 40.00	ound level m to 21.00	l. Om, with sa		m
Icarr 1	I No		1		!	Driller		I				
Issue 1	No. 03	3				SW					AGS	

6. CABLE PERCUSSION BOREHOLE LOGS

10/2254

Northern Line Extension Reference Design



Project

Northern Line Extension

Job No		Da	ate Start	ed	19/05/10	Ground Level (mOD)	Co-Ordinat	tes		Fi	nal Depth	
	0/2254				21/05/10			448.3 N 17	7496.7		40.00m	
Client				-			Method/		, 190.7		eet	
	EO (l	Powe	rstatio	n) Ltd			Plant Used	Cable Per	rcussio	n ⁵¹¹	2 of 6	
PRO	OGRE	SS			ST	RATA		SAMPLE	ES & T	ESTS		nt/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
		-		°0.0°0 •0.00	-	below 6.80m		- 7.00		N27	2, 4 / 5, 6, 8, 8	
9/05/10	8.00	3.00	-4.22		8.30	Firm to stiff, grey slightly sandy gravelly CLAY. Gravel is angu	y slightly	8.00 8.00 8.30-8.70	B12 B13	N16	3, 5 / 5, 4, 4, 3	I
			-4.42			gravelly CLAY. Gravel is angu rounded fine to coarse flint. (REWORKED LONDON CLA TERRACE DEPOSITS)	/	-				
9/05/10	8.90	8.70			-	Stiff, extremely closely fissured grey CLAY with occasional po brownish grey silty sand. (LONDON CLAY)	brownish ckets of dark	- 9.00-9.45 -	U14	36 blows		I
19/05/10 20/05/10	9.10 9.10	9.26 9.20			-	with a band of claystone betw and 8.85m	veen 8.70m	- 9.50 -	D15			I
20/05/10	9.10	Dry			-			- 10.00-10.45 - 10.00	D16	N19	3, 4 / 4, 5, 5, 5	I
					- - - - - -			11.00-11.45	U17	54 blows		I
					-			- 11.50	D18			I
					-	becoming slightly silty below	v 12.00m	12.00-12.45	D19	N23	3, 4 / 5, 5, 6, 7	I
					-			- 13.00-13.45	U20	60 blows		I
					- - -			13.50	D21			
								- 14.00-14.45	D22			
	higa11:.	- (mc)		Woter A		GENERAL REMAI	DKS			I	1	
From	hiselling To		Hours	From	Added (m)		1173					
		+				-						
Issue N	,					Driller						

Borehole No

BH01

8 Warple London V Telephon E-mail: s Project	Way V3 ORF e: 020 881 i@concept	1 2880 consult)_Fax: 02 tants.co.u	20 8811 28 Ik	381	SATIONS		B	UK	AS LINE ZAMENT 01	Borehole No BH01	•
N Job No	orthe		ine E		ion 19/05/10	Ground Level (mOD)	Co-Ordinat	tes		Fi	nal Depth	
1(0/2254				21/05/10			448.3 N 17	7496.7		40.00m	
Client R	EO (Po	ower	statio	n) Ltd		·	Method/ Plant Used	Cable Per	cussio	n Sh	eet 3 of 6	
PRO		TRATA	1	SAMPLES & TEST				hent/				
Date	Casing	Water		Legend		Strata Descriptio	Depth (m)	Type No	Test Result	Field Records	Instrument/	
		a (mOD) Legend (Thickness) (mOD)		becoming very closely fissur Fissures are 0 - 10° and 80°- 90 smooth. with occasional tabular pyrit (35x25mm) at 17.00m	-	14.00 15.00-15.45 15.10 15.20 15.30 15.50 16.00-16.45 16.00 17.00-17.45 17.50 18.00 18.00	U23 D24 D25 U26 D27 D28	N25 68 blows V250+kPa V250+kPa N27 80 blows N32				
C	hiselling (To	1	ours	Water A	added (m)	with a band of claystone bett and 19.80m becoming silty below 20.00r	n	19.00-19.45 19.50 20.00-20.45 20.00 21.00-21.45	U29 D30 D31 U32	84 blows N34 86 blows	4, 5 / 7, 8, 9, 10	
Issue N	No. 03					Driller SW						



8 Warple Way

London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk



Project Northern Line Extension Job No Date Started 19/05/10 Ground Level (mOD) Co-Ordinates **Final Depth 10/2254** Date Completed 21/05/10 4.08 E 529448.3 N 177496.7 40.00m Client Method/ Sheet Plant Used Cable Percussion 4 of 6 **REO (Powerstation) Ltd** PROGRESS STRATA SAMPLES & TESTS Field Water Depth asing Level Type No Test Depth Date Strata Description Records Legend (mOD) (Thicknes (m) Result . becoming very closely fissured below 21.10 - Failed ... becoming very closely insured below 21.00m. Fissures are randomly orientated with smooth polished surfaces and occasionally infilled with up to 1mm of brown and grey sand. 21.20 21.30 - Failed - Failed 21.50 D33 22.00-22.45 D34 4, 5 / 6, 9, 10, 13 N38 23.00-23.45 U35 94 blows ... becoming extremely closely fissured with occasional bioturbation below 23.00m Ŷ 23.50 D36 20/05/10 9.10 24.00-24.45 D37 N38 5, 7 / 8, 9, 10, 11 (31.20) 25.00-25.45 U38 100 blows ... becoming slightly sandy below 25.00m 25.50 D39 26.00-26.45 D40 4, 5 / 7, 8, 8, 12 N35 27.00-27.45 27.10 27.20 27.30 U41 100 blows V - Failed ... becoming very stiff extremely closely to very closely fissured below 27.00m. Fissures Failed subhorizontal polished smooth zerostation and a subhorizontal polished smooth surfaces. ... with a pyritised wood fragment at 27.15m Failed 27.50 D42 28.00-28.45 D43 GENERAL REMARKS Water Added (m) Chiselling (m) То Hours From То From Issue No. 03 Driller

SW

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project **Northern Line Extension** Job No Date Started 19/05/10 Ground Level (mOD) C **10/2254** | Date Completed 21/05/10 4.08 Client **REO (Powerstation) Ltd** PROGRESS STRATA Water Depth Level Date Strata Description Casi (mOD) Legend (Thickne ... becoming very stiff to stiff extre closely fissured below 31.00m. Fis - 20°, planar and smooth to rough 20/05/10 34.50 Dry 21/05/10 34.50 Dry Dry GENERAL REMARK Chiselling (m) Water Added (m) То Hours From То From Issue No. 03 Driller SW



Borehole No

BH01

/Iethod/ Plant Used	448.3 N 17		1		
	Cable Per	cussio	n Sho	40.00m eet 5 of 6	
	SAMPLE	ES & T	ESTS		ent/
	Depth (m)	Type No	Test Result	Field Records	Instrument Backfill
	28.00		N50/ 0.275	6, 8 / 12, 14, 15, 9	
	- 29.00-29.40	U44	100 blows		
	29.45	D45			
	- 30.00-30.45 - 30.00 	D46	N50/ 0.22	6, 9 / 13, 16, 21	
emely ssures are 0	- 31.00-31.35 - 31.10 - 31.20	I	100 blows P250+kPa P250+kPa		
	31.40	D48			
	- 32.00-32.45 - 32.00	D49	N50/ 0.25	5, 9 / 12, 14, 15, 9	
	33.00-33.45	U50	100 blows		
	33.50	D51			
-	- 34.00-34.45 - 34.00 - 34.00	D52	N50/ 0.265	5, 7 / 12, 13, 16, 9	
	- 35.00-35.35	U53	100 blows		
KS					

Project

Northern Line Extension

Borehole No

BH01

B VAS

Job No 10/22		Date Start Date Com		19/05/10 21/05/10		Co-Ordinat E 5294	tes 448.3 N17	7496.7		nal Depth 40.00m	
Client REO	I	verstatio				Method/ Plant Used	Cable Pe		Sh		
PROGI				ST	RATA		SAMPL	ES & 1	TESTS		ent/
Date Date	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
				-			35.40	D54			
				- - - - - - - -			36.00-36.45	D55	N50/ 0.22	6, 11 / 15, 16, 19	
				- - - -			- 37.00-37.35	U56	100 blows		
							- 37.40 -	D57			
				- - - - - - - -			38.00-38.45	D58	N51/ 0.225	5, 8 / 14, 16, 21	
				-			- 39.00-39.35	U59	100 blows		
		-35.62		- - - - 39.70	Stiff, dark grey silty CLAY wi	th block flint	- 39.40 - 39.50-39.95 - 39.50	D60 D61	N50/ 0.175	9, 13 / 16, 22, 12	
21/05/10 34.5	0 Dry	-35.72		<u>39.80</u> <u>40.00</u>	(HARWICH FORMATION) Stiff to very stiff, grey mottled sandy CLAY with cemented sh (LAMBETH GROUP) End of Borehole		- - - - - - - - - - - - - -				
Chisel	ing (m)		Water A	Added (m)	GENERAL REMA	RKS					1
	`o	Hours	From	To							
Issue No.)3			1	Driller						BALINIA II BUTCHLA I COMMUNICAL II COLUM

8 Warple London V Telephon	CONCEPT SITE INVESTIGATIONS Varple Way ndon W3 ORF lephone: 020 8811 2880_Fax: 020 8811 2881 mail: si@conceptoonsultants.co.uk oject Northern Line Extension							R	SURAN UK	AS ATTY MENT D1	Borehole No BH02	
Project Northern Line Exter		Extens	ion					I		_		
Job No		Da	te Star	ted	17/05/10 18/05/10				7326.4		nal Depth 40.00m	
Client R	REO (Powerstation) Ltd PROGRESS STR		1.00	Cable Pe		Sh	eet 1 of 6					
PRO		ESS		•	ST	TRATA		SAMPL	ES & 1	ESTS		ont/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
17/05/10		Dry	1.58 1.41 1.26		0.08 0.25 0.40	Asphalt. Medium dense, brown clayey g coarse SAND and brick fragme angular flint.		0.10 0.10 0.50	ES01 ES02		VOC 0.00ppm	
			0.98		0.68	(MADE GROUND) Compacted brick and concrete (MADE GROUND) Very dark grey to blue, very sau	//	0.50 0.50 - 1.00	B03 ES04		VOC 0.00ppm	
			0.46			with frequent cobble sized brick fragments. (MADE GROUND) Firm to stiff, grev slightly silty	k and concrete	1.00 1.00 1.20-1.65	B05 U06	4 blows	VOC 0.00ppm	
	05/10 2.20 Dry			(1.10)	rare subrounded flint gravel. (ALLUVIUM) Very soft, greenish brown mott brown gravelly peaty CLAY wi semi-decayed wood fragments.	led reddish	1.70 1.70-2.15 1.70-2.20 1.70	D07 D08 B09	N1	0, 1 / 0, 0, 1, 0		
17/05/10	2.20	2	-0.64		2.30	angular to rounded coarse flint. (ALLUVIUM) Stiff, light grey to greenish grey		2.00 2.00 2.20-2.65	ES10 U11	9 blows	VOC 0.00ppm	
		Ŧ	-1.39		(0.75)	sandy silty CLAY. (ALLUVIUM)		2.70 2.70-3.15 2.70-3.05 2.70 3.00	D12 D13 B14 ES15	N3	0, 1 / 0, 1, 1, 1	
17/05/10	2.60	1	-1.94		(0.55)	Stiff, black very clayey PEAT (ALLUVIUM)	peaty CLAY.	3.00 3.05-3.20 3.20-3.65	B16 U17	18 blows	VOC 0.00ppm	
17/05/10 17/05/10	3.60 3.70	2.48	-1.94		(1.25)	Medium dense to dense, grey to sandy subangular to subrounded flint GRAVEL. (RIVER TERRACE DEPOSIT	d fine to coarse	3.70 3.70-4.20 3.70	D18 B19	N17	2, 3 / 3, 4, 5, 5	
17/05/10	4.70	2.30	-3.19	0000	- 4.85	Firm to stiff, fissured grey silty (LONDON CLAY)	CLAY.	- 4.70-4.85 - 4.70 - 4.85-5.20	B20 B21	N13	5, 4 / 3, 3, 3, 4	
17/05/10	5.50	Dry				()		5.50-5.95	U22	38 blows		
					+ - - - -			- 6.00 -	D23			
					- - - - -			6.50 6.50	B24	N12	No Recovery 2, 2 / 2, 3, 3, 4	
C	hisellin	g (m)		Water A	dded (m)	GENERAL REMAI			<u> </u>	1		_
From	Chiselling (m) Water Added (m) om To Hours From To			То	1. An inspection pit has 1 2. Ø200m casing used fr 35.70m below ground lev 3. Water seepage encoun 4. Water seepage encoun 5. A vibrating wire pieze 6. Borehole backfilled w and 24.00m and with ber	om ground level vel. tered at 3.60m be tered at 39.10m ometer installed a ith bentonite pell	to 5.50m depth elow ground lev below ground lo t 25.00m depth ets from 40.00r	and then vel, rising evel, risin n to 26.00	reduced to to 2.48m a g to 33.80 a 0m, with sa	Ø150m at 34.10m up to fter 20 minutes. after 20 minutes.		
Issue N	No. 03		1		1	Driller					AGS	



8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Project

Job No

Issue No. 03

Northern Line Extension

Warple Way ondon W3 ORF	T SITE INV 1 2880 Fax: 020 8811 2 20nsultants.co.uk		ATIONS			Borehole No BH02
roject Norther	n Line Extens	sion				
ob No	Date Started	17/05/10	Ground Level (mOD)	Co-Ordinates		Final Depth
10/2254	Date Completed	18/05/10	1.66	E 529969.6	N 177326.4	40.00m

Borehole No

AGS=

1	0/225		ate Star	npleted		1.66		969.6 N 17	7326.4		40.00m	
Client R	EO (on) Ltd		1.00	Method/ Plant Used	Cable Pe		s	heet 2 of 6	
PRO	OGRF	SS	T		ST	RATA		SAMPLI	ES & 1	rests		nt/
Date	Casing	Water	Level (mOD)) Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Resul	Field Records	Instrument/ Backfill
					-	becoming stiff, very closely i greyish brown at 7.50m. Fissur and 50°- 90°, planar, smooth w dustings of fine to medium sand with orangish brown staining 7.77m becoming slightly sandy belo with occasional black stainin 9.50m and 9.95m	Fissured dark es are 0-10° ith occasional d and silt. on fissures at	(III) 7.50-7.95 7.80 8.00 8.50-8.95 8.50 9.50-9.95 9.85 10.00 10.50-10.95 10.50 11.50-11.95 11.60 12.00 12.50-12.95 12.50	U25 D26 D27 U28 D29 D30 U31 D32 D33	60 blow V - Faile N22 64 blow V180kP N24 68 blow V188kP N29 N29	s ad 3, 3 / 5, 5, 6, 6 s a 3, 3 / 5, 5, 6, 6 s 4, 5 / 6, 8, 7, 8	
					-			- 14.00	D35			
С	hiselling	g (m)		Water A	dded (m)	GENERAL REMAI	RKS	<u> </u>				
From	То		Hours	From	To	_						

Driller

SW

8 Warple London V Telephon E-mail: s	Way W3 ORF le: 020 88 si@concep	11 288	30 Fax: 0	20 8811 28		GATIONS		R	UK UK	A S	Borehole No BH02	
Project N		rn I	Line F	Extensi	ion							
Job No 1(Client	0/2254	Da Da	ate Star ate Com	ted Ipleted	17/05/10 18/05/10		Method/	tes 969.6 N 17 Cable Per		Sh	nal Depth 40.00m eet	
	EO (P DGRES		rstatio	on) Ltd		TRATA	Plant Used	I			3 of 6	1
Date	Casing	Water 6	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
					-	with a band of claystone bet and 14.05m becoming silty below 14.50r		- 14.50-14.95 - 14.50	D36	N28	3, 5 / 6, 7, 7, 8	II
						becoming extremely closely occasional pockets of brownish with rare bioturbation below 15	fissured with grey sand and 5.50m	- - - 15.50-15.95 -	U37	74 blows		
					-			16.00 16.50-16.95 16.50	D38 D39	N32	4, 5 / 7, 8, 8, 9	
					-	becoming slightly micaceous shell fragments between 17.50	s and with rare m and 17.95m	17.50-17.95 17.85 18.00	U40 D41	82 blows V192kPa		
					-	with a band of claystone bet and 18.40m	ween 18.20m	18.50-18.95 18.50	D42	N33	3, 5 / 7, 8, 9, 9	
					. (28.65)			- 19.50-19.95 -	U43	84 blows		
					-			20.00	D44 D45	N35	4, 6 / 6, 9, 9, 11	
	higelling	(m)		×− ×−]	ddad ()	GENERAL REMA	PKS					
From	To	_	Hours	From	Idded (m)	UENEKAL KEMAI	NRJ					
Issue N	No. 03					Driller					AGS	



Project

NT AL	Τ •	Extension
Northern	LINE	HIVTENSION
	Lint	L'AUTISIUII
1 (OI CHICI II		Lincension

Job No			ate Star	Extens ted	17/05/10	Ground Level (mOD)	Co-Ordinat	es		Fi	nal Depth	
1(0/225	4 D	ate Com		18/05/10			969.6 N17	7326.4		40.00m	
Client R	EO (Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Per	rcussio	n Sh	eet 4 of 6	
PRO	OGRI	ESS			ST	RATA		SAMPLE	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description		Depth (m)	Type No	Test Result	Field Records	Instrument/
					with occasional bioturbation pyritised wood fragments below	and rare / 21.50m	21.50-21.95 22.00 22.50-22.95 22.50	U46 D47 D48	100 blows N37	5, 6 / 7, 9, 10, 11		
						becoming very stiff extremel fissured and slightly sandy belo Fissures are subhorizontal smoo and rarely infilled with up to 1n and brown sand.	y closely w 23.50m. th unpolished nm of grey	23.50-23.85 23.60 23.75 23.90 23.90 24.50-24.95 24.50	U49 D50 D51	100 blows V - Failed V - Failed N40		
7/05/10 8/05/10	5.50 5.50	Dry Dry		 		becoming very closely fissure 25.50m	ed below	25.50-25.90	U52 D53	100 blows		
					-			26.50-26.95	D54	N45	5, 6 / 8, 11, 12, 14	
					- - - - - - - -	with sand lenses at 27.50m		27.50-27.95	U55	100 blows		
			<u> </u>	<u></u>		i		28.00	D56			
	hisellin				dded (m)	GENERAL REMAN	RKS					
From	То		Hours	From	То	-						
Issue N	No. 03					Driller SW					AGS	

Borehole No

BH02

8 Warple London V	Way V3 ORF e: 020 88	11 288	0 Fax: (020 8811 2		SATIONS		B		A S ANY D1	Borehole No BH02	
Project				Extens	ion							
Job No 1(0/2254		te Star te Con		17/05/10 18/05/10		Co-Ordinat E 529	tes 969.6 N17	7326.4		nal Depth 40.00m	
Client R	EO (P	owe	rstatio	on) Ltd			Method/ Plant Used	Cable Per	rcussio	n Sh	eet 5 of 6	
PRO	OGRES	SS			ST	TRATA	1 	SAMPLE	ES & T	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
					- - - - - - - - -			- 28.50-28.95 28.50	D57	N47/ 0.29	5, 7 / 9, 13, 12, 13	
								29.50-29.95	U58	100 blows		
								- 30.00 -	D59			
								- 30.50-30.95 - 30.50	D60	N50/ 0.25	6, 8 / 9, 12, 14, 15	
								- 31.50-31.90	U61	100 blows		
								31.95	D62			
					-			- 32.50-32.95 32.50	D63	N50/ 0.233	5, 9 / 12, 14, 16, 8	
		2	-31.84		33.50	Very stiff, greyish brown thinly laminated slighty sandy slightly with occasional lignite fragmen occasional bioturbation. Lamin	to thickly silty CLAY	- - - - - - - - - - - - - - - - - - -		100 blows V - Failed V - Failed V - Failed V - Failed		
		-	-32.54	4	(0.70) 	occasional bioturbation. Lamin: smooth surfaces occasionally in to 1mm of brown sand. (LAMBETH GROUP - Lamina	filled with up	- 34.00 - 34.10	D65 D66			
					- - - - - - - - - - - - - - - - - - -	with a band of siltstone (?) / s between 34.10m and 34.20m Stiff to very stiff, fissured grey with whole shells and shell frag (LAMBETH GROUP)	sandstone /	- 34.50-34.95 - 34.50	D67	N50/ 0.22	8, 11 / 14, 16, 20	
C	hiselling	(m)		Water A	Added (m)	GENERAL REMAI	RKS	L	1	I	1	
From 34.10	To 34.20	Н	lours .45.00	From	To	_						
Issue N	No. 03					Driller SW					AGS=	



Project

Northern

I. E	
Line Extension	

Job No	Date Sta	Extens		Cround Level (mOD)	Co Ondin -4	205		F 2	nal Donth	
JOD NO 10/2254		mpleted	17/05/10 18/05/10		Co-Ordinat	es 969.6 N17	73264		nal Depth 40.00m	
Client REO (Po				1.00	Method/ Plant Used	Cable Per		Sh	eet 6 of 6	
PROGRES	S		ST	TRATA		SAMPLI	ES & 1	TESTS		ent/
Date Casing Casing Casing	Leve (mOI		Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
18/05/10 34.70	-33. -34. -37. -38. 1.65 -38.		35.65 35.90 (3.20) (0.60) 39.70 40.00	Stiff to very stiff, grey to green mottled dark grey silty CLAY occasional shells and lenses of (LAMBETH GROUP) becoming extremely closely brown mottled bluish grey belo Stiff to very stiff, very closely f mottled bluish grey CLAY. (LAMBETH GROUP) Medium dense to dense, brown medium SAND. (LAMBETH GROUP) Stiff to very stiff, fissured bluis brown CLAY. (LAMBETH GROUP) End of Borehole	fissured and w 35.70m issured brown	35.30-35.65 35.70-36.10 36.15 36.15-36.50 36.50-36.95 36.50 37.85 38.50-38.95 38.50 39.10-39.50 39.50-39.95 39.50	B68 U69 D70 B71 D72 U73 D74 D75 B76 D77	100 blows N50/ 0.185 100 blows N50/ 0.19 N50/ 0.22	9, 9 / 15, 15, 20	
Chiselling (Added (m)	GENERAL REMAI	RKS					
From To 35.30 35.65	Hours 01.15.00	From	То	_						
Issue No. 03			,	Driller SW					AGS=	

Borehole No

BH02

B VAAS

8 Warple London W Telephone	Way V3 ORF e: 020 88	311 28	SITE 80_Fax: 0. ultants.co.	20 8811 2		GATIONS		R	URAN	AAS ALIMINT 101	Borehole No BH03	
Project N		rn]	Line E	Extens	ion					·		
Job No			ate Star		07/05/10		Co-Ordina	tes		Fi	nal Depth	
1(0/2254	Da	ate Com	pleted	12/05/10	5.49	E 530	174.8 N 17	77326.6	5	38.70m	
Client R	EO (P	owe	erstatio	on) Ltd			Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 1 of 6	
PRC	OGRES			i	ST	TRATA	1	SAMPL	ES & 1	rests		nent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
07/05/10		Dry	5.40		0.09	Concrete. Medium dense, brown and grey	rish brown	0.30	B01			
			5.09		(0.31) 0.40	sandy clayey coarse GRAVEL concrete fragments.	with brick and	0.50	B01 B02			
					(0.50)	(MADE GROUND) Firm, dark brown gravelly silty		-				
			4.59		0.90	occasional brick and concrete f	ragments.	-				
				- · · · ·	_	Medium dense, brown and oran	gish brown	1.00	B03			
					(0.50)	clayey SAND with occasional t flint gravel.		- 1.20-1.65 - 1.20	D04 B05	NIDO		
			4.09	000	1.40	(RIVER TERRACE DEPOSIT Medium dense to dense, yellow	vish brown	1.20 1.50	B06	N22	0, 1 / 1, 1, 9, 11	
				01.01		sandy subrounded fine to coarse GRAVEL.	e flint	-				
			(RIVER TERRACE DEPOSIT	S)	2.00-2.45	D07						
				000				2.00	B08	N44	3, 6 / 7, 11, 12, 14	
		000°				-						
				0.00	-			-				
				0 / 0/	-			-				
				Pr 20	-			3.00-3.45	D09 B19			
					-			3.00	217	N26	1, 3 / 5, 6, 7, 8	
				0.00	-			-				
				0 1.0								
				0.000	(4.90)			- 4.00-4.45	D20			
				0.0.0	-			- 4.00	B21	N25	2, 4 / 4, 6, 7, 8	
				00.00				4.00		1823	2, 7, 7, 0, 7, 0	
				0.00				-				
				000				-				
				000				5.00-5.45	D22			
				0.70				5.00 5.00	B23	N32	2, 3 / 5, 6, 9, 12	
				0000				-				
				000	ţ			-				
				0000	-			-				
				101141				- 6.00-6.45 - 6.00	D24	N14	2,4/7,3,2,2	
			-0.81	0.00	6.30			[
						Very stiff, fissured grey to brow CLAY.	vnish grey silty	6.45	B25			
				<u> </u>		(LONDON CLAY)		-				
					-			- 7.00-7.45	U26	29 blows		
C	hiselling	(m)		Water A	Added (m)	GENERAL REMAI	RKS					
From	То	Ť	Hours	From	To	1. An inspection pit has l 2. Ø200m casing used fr	hand excavated to	to 7 50m depth	ground lev	vel, prior to	boring commencing. Ø150m to 38 00m belo	w
		+				ground level. 3. Water seepage encount	0	•				
						 A vibrating wire piezo Borehole backfilled w 	ometer installed a with bentonite pell	tt 25.00m depth lets from 38 7m	i. 1 to 26 001	m with san		1
						and 24.00m and with ber	ntonite pellets fro	om 24.00m to g	round leve	el.		
Issue N	No		1			Driller						
1550C N	Image: constraint of the second se			SW					AGS			



Project

Northern Line Extension

N	orth	ern]	Line I	Extens	ion							
Job No			ate Star		07/05/10		Co-Ordina				nal Depth	
	0/225	4 Da	ate Con	pleted	12/05/10	5.49		174.8 N 17	7326.6	5	38.70m	
Client R	EO (Powe	erstatio	on) Ltd	l		Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 2 of 6	
PRO	OGRE	ESS			ST	TRATA	l	SAMPLI	ES & T	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
07/05/10	7.00	Dry Dry			· ☆ - ☆ - ☆ - ☆ - ☆ - ☆ - ☆ - ☆ - ☆ - ☆	becoming extremely closely occasional bioturbation and poo grey sand below 11.00m	id 70°- 90°, w 13.00m ons of brown	8.00-8.45 8.00 9.00-9.45 9.45 10.00 11.00-10.45 10.00 11.45 12.00-12.45 12.00 13.10 13.20 13.30 13.45	D28 U29 D30 D31 U32 D33 D34 U35 D36	N27 34 blows N20 32 blows N24 31 blows V - Failed V - Failed		
				× ×× ××	-	- i		- 14.00-14.45	D37			
C	hisellin To		Hours	Water A	Added (m)	GENERAL REMAN	RKS					
						1						
Issue M	No. 03					Driller SW					TAGS	ASSESSMENT OF METROPOLIS, & METROPOLISMENT, OF COLUMN
	03	'				SW					1403	Contraction of the owner

Borehole No

BH03

B UKAS

8 Warple London V	Way V3 ORF e: 020 88	311 288	0 Fax: 0	20 8811 28	INVESTIGATIONS 0 8811 2881 k					A S AMANT 01	Borehole No BH03	
Project				Extens	ion					I		
Job No			ite Star		07/05/10		Co-Ordina	ites		Fi	Final Depth	
)/2254	Da	te Com	pleted	12/05/10	5.49		0174.8 N 17	7326.6		38.70m	
Client R	EO (P	owe	rstatio	on) Ltd			Method/ Plant Used		rcussio	n Sh	eet 3 of 6	
PRO	DGRE			1		TRATA		SAMPLI	ES & 1	TESTS	Field	nant/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Records	Instrument/
10/05/10	7.50	ı ↓ Ţ				becoming slightly sandy belo with rare bioturbation and po and dark grey fine sand below		14.00 15.00-15.40 15.45 16.00-16.45 16.00 17.00-17.45 17.45 18.00-18.45 18.00 19.00-19.45 19.45	U38 D39 D40 U41 D42 D43 U44 D45	N24 43 blows N29 40 blows N27 45 blows	2, 3 / 4, 6, 7, 7 2, 5 / 6, 6, 8, 9 2, 4 / 5, 6, 8, 8	
						CENEDAL DEMA		20.00-20.45 20.00 20.00 21.00-21.45	D46 U47	N37 47 blows	2, 4 / 5, 11, 11, 10	
C From	hiselling To		Iours	Water A From	dded (m)	GENERAL REMAI	RKS					
			-									
Issue N	No. 03		1		1	Driller					AGS	



8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Proj

From

Issue No. 03

Job No			te Start		07/05/10		Co-Ordinat				inal Depth
	0/2254	Da	te Com	pleted	12/05/10	5.49	E 530	174.8 N17	7326.6	,	38.70m
Client F	REO (P	owe	rstatio	n) Ltd	l		Method/ Plant Used	Cable Per	rcussio		heet 4 of 6
PR	OGRES	S			ST	RATA		SAMPLE	ES & 1	TESTS	
Date Casing And Casing Casing			Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	
				× × × × × × × × × ×	becoming very closely fissur dustings of silt and fine sand on surfaces at 21.00m with a band of weak orangish MUDSTONE between 21.33m with a medium gravel size p	21.10 21.20 21.30 21.45	D48	V - Faile V - Faile V - Faile	d		
					┿ ┿ ┿ ┿ ┿ ┿ ┿ ┿	21.45m		22.00-22.45	D49	N31	3, 6 / 6, 6, 8, 11
					┶╶┿	becoming extremely closely thinly bedded with rare bioturb	fissured and ation below	23.00-23.45	U50	59 blows	5
					× + - -	23.00m		23.45	D51		
					· * * * * * * * * * * * * *			24.00-24.45	D52	N36	1, 5 / 9, 10, 8, 9
					→ → × + × + × + ×	with no fissures and occasion	nal	25.00-25.45	U53	75 blows	5

Borehole No

BH03

Instrument/ Backfill

AGS

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UKAS OULINY MUCALINY 001

	10	110413	Tiom	10						
C m	hiselling (n To	ı) Hours	Water A	dded (m) To	GENERAL REMARKS					
			*			28.00-28.45	D57			
				-	becoming very stiff with occasional pockets of grey sand at 27.00m with a band of light brown sand between 27.03m and 27.05m	27.00-27.45 27.10 27.20 27.30	U56	71 blows V - Failed V - Failed V - Failed		
				-		- 26.00-26.45 - 26.00	D55	N41	3, 5 / 8, 10, 11, 12	
					with no fissures and occasional bioturbation below 25.00m	25.45	D54			
						25.00-25.45	U53	75 blows		
				-		24.00-24.45	D52	N36	1, 5 / 9, 10, 8, 9	
				-	becoming extremely closely fissured and thinly bedded with rare bioturbation below 23.00m	23.45	D51			

Driller

SW

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project Northern Line Extension

Job No)/225		ate Start		07/05/10		Co-Ordina				nal Depth	
)/225	4 D	ate Com	pleted	12/05/10	5.49		174.8 N17	7326.6		38.70m	
	EO (Powe	erstatio	n) Ltd	l		Method/ Plant Used	Cable Per	rcussio	n Sh	eet 5 of 6	
PRC	Client REO (Powerstation) I PROGRESS Date Date Date Date Date Date Date Date				ST	'RATA		SAMPLI	ES & 1	TESTS		ent/
Date	Casing	Water		Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
0/05/10 1/05/10	7.50	Dry				with fossilized wood at 28.20 becoming extremely fissured bioturbation and occasional pyr pyritised wood fragments and p brownish grey sand below 31.00)m	(m) 28.00 29.00-29.45 29.45 30.00-30.45 30.00 31.00-31.45 31.45	N0 U58 D59 D60 U61 D62	Result N42 84 blows N51 65 blows	3, 7 / 9, 10, 11, 12 3, 7 / 12, 12, 12, 15	In
								32.00-32.45 32.00 33.00-33.45 33.45 33.45 34.00-34.45 34.00	D63 U64 D65 D66	N47 96 blows N42/	3, 6 / 7, 12, 13, 15	
CI	hisellin To		Hours	$\begin{array}{c} x & -x \\ -x & -x \\ \hline x & -x \\ \hline \end{array}$ Water <i>A</i> From	Added (m)	GENERAL REMAN	RKS	35.00-35.45	U67	91 blows		
Issue N	^{lo.} 03	3				Driller					AGS	



Borehole No

BH03

8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Project



PROGRESSSTRATASAMPLES & TESTSDate $\frac{50}{8}$ $\frac{5}{8}$ Level (mOD)LegendDepth (Thickness)Strata DescriptionDepth (m)Type ResultTest Result $a = 10^{-10}$ $\frac{50}{8}$ $\frac{5}{8}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $a = 10^{-10}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $\frac{100}{1000}$ $a = 10^{-10}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $a = 10^{-10}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $a = 10^{-10}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $a = 10^{-10}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{10000}{10000}$ $\frac{1000}{10000}$ $a = 10^{-10}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $\frac{1000}{10000}$ $a = 100000000000000000000000000000000000$	0 No 10/2254	Date Started Date Completed		Ground Level (mOD) 5.49	Method/	174.8 N17		Sheet		
Date B Evel (mOD) Legend (mOD) Depth (<i>fhickness</i>) Strata Description Depth (m) Type (m) Test Result 0				РАТА	Plant Used				6 of 6	1
$11/05/10 38.00 Dry \\ 12/05/10 38.00 Dry \\ 12/05/10 38.00 Dry \\ 12/05/10 38.00 Dry \\ 12/05/10 38.00 Dry \\ 38.00 Dry \\ 38.00 Dry \\ 37.70 \frac{-33.21}{-\infty} \frac{-38.70}{-33.21} \frac{-38.70}{-\infty} \frac{-38.70}{-38.70} \dots \text{ becoming very closely fissures are predominantly 0-20° and 70°- 90°, planar and smooth.} \\ \hline \begin{tabular}{c} & & & & & & & & & & & & & & & & & & &$			Depth						Field	Instrument/
$1/05/10 38.00 Dry \\ 2/05/10 Arr \\ $	Casi at	(mOD) Legend				(m)	No	Result	Records	Instr
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	5/10 38.00 37. 5/01 38.00 D) Water	37.10 (1.60)	and sand below 35.00m. Fissur predominantly 0-20° and 70°-9 smooth. Very stiff, dark grey silty CLA flint gravel and cobbles. (HARWICH FORMATION) Very stiff, thinly to thickly lam grey silty CLAY with frequent light grey fine to medium sand. (HARWICH FORMATION / L GROUP?) with a rare subangular fine to gravel size fragment of brown s 38.14m and 38.20m with a band of claystone betv and 38.70m End of Borehole	es are 20°, planar and Y with black inated dark laminations of AMBETH o medium hell between ween 38.60m	35.20 35.30 35.45 36.00-36.45 36.00 37.50 37.50 38.00-38.45 38.10 38.20 38.30	D68 D69 D70 U71	V - Failed V - Failed N50/ 0.225 83 blows V250+kPa V250+kPa	4, 9 / 13, 16, 21	

			80_Fax: 02 ultants.co.u	20 8811 28 uk	81		R	UK	AS LINET	Borehole No BH04		
Project N	-			Extensi	ion							
Job No 1()/2254		ate Star ate Com		26/04/10 27/04/10		Co-Ordinat E 5307	t es 703.4 N 17	77270.5		nal Depth 40.00m	
Client R	EO (I	Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Pe	rcussio		Sheet 1 of 6	
PRC	OGRE	ESS			ST	'RATA		SAMPL	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
26/04/10		Dry	4.14		(0.35) - 0.35	Turf over brown sandy gravelly (MADE GROUND)		-				
					(0.60)	Brown sandy CLAY with brick (MADE GROUND)	fragments.	0.50	B01			
			3.54	12	- 0.95			- 1.00	B02			
26/04/10		Dry			-	Brown sandy clayey subangular subrounded fine to coarse flint (RIVER TERRACE DEPOSIT	GRAVEL.	1.20-1.70 1.20	B03	N32	2, 3 / 5, 7, 9, 11	
					-			- 2.00-2.50 - 2.00	B04	N45	6,9/10,11,11,13	
					(4.50)			3.00-3.50	B05	N24	3, 4 / 6, 5, 6, 7	
					- - - - - - - -			4.00-4.50	B06	N37	3, 5 / 6, 8, 10, 13	
					- - - -			- - 5.00-5.45 - 5.00	B07	N20	2, 4 / 6, 5, 5, 4	
			-0.96		- 5.45	Stiff, brown silty CLAY. (LONDON CLAY)		5.45 5.50-5.95	D08 U09	40 blows		
26/04/10	6.10	Dry			- - - -	becoming grey below 5.50m		- 6.00 - 6.00-6.50	D10 D11			
					- 6.50 - 6.50 -	D12	N12	1, 2 / 3, 3, 3, 3				
C	Chiselling (m) Water Added (m) rom To Hours From To 1.30 5.45				dded (m)	GENERAL REMAI	RKS		1	1	1	
From					То	1. An inspection pit has I 2. 0200m casing used fr ground level. 3. Water seepage encoun 4. Slight water seepage e 5. A vibrating wire pieze 6. Borehole backfilled w	and excavated to om ground level tered at 31.40m l ncountered at 37 meter installed a	to 32.90m dept below ground le .90m below gro t 32.00m depth	h and the evel, risin ound level	n reduced to g to 29.26n l.	o Ø150m to 34.20m belo n after 20 minutes.	
Issue N						and 31.00m and with ber						



Project

Job No

Client

Northern Line Extension

Varple Way ndon W3 ORF	T SITE INV 1 2880_Fax: 020 8811 2 consultants.co.uk					Borehole BH	
oject Norther	n Line Exten	sion				•	
b No	Date Started	26/04/10	Ground Level (mOD)	Co-Ordinate	S	Final	Depth
10/2254	Date Completed	27/04/10	4.49	E 5307	03.4 N 177270.5		40.0
ient REO (Po	owerstation) Lto	1		Method/ Plant Used	Cable Percussion	Sheet	2 c
DDOCDES	s	STI	рата		CAMDLEC & TEC	те	

Borehole No

BH04

40.00m

Client REO (Powerstation	on) Ltd	Method. Plant Us		Percussio		eet 2 of 6
PROGRESS	ST	RATA	SAMP	LES & T	TESTS	ent/
Date $\begin{bmatrix} u \\ u \\ c \\$	Legend Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records
		becoming locally thinly laminated, sligh micaceous with closely spaced laminations light brown and greenish grey fine sand at 7.50m	- 7.50-7.9 of 7.80 - 7.90 - 8.00	5 U13 D14	60 blows V188kPa V208kPa	
			8.50-8.9. 8.50		N20	2, 3 / 4, 5, 5, 6
		becoming slightly sandy, locally thinly laminated with very closely to closely spac laminations of light brown fine sand at 9.50	- 9.50-9.9. 9.55 ed 9.65 m 9.85 - 10.00 - 10.50-10.	D17	64 blows V - Failed V - Failed V180kPa	
		with rare closely to medium spaced	10.50		N21 68 blows V188kPa	2, 2 / 4, 5, 6, 6
		with rare closely to medium spaced laminations of light brown sand and rare pockets of dark grey fine silty sand at 11.50 with rare bioturbation below 11.80m	0m 11.75 12.00 12.50-12. 12.50	D20 95 D21	V220kPa N26	3, 4 / 5, 6, 7, 8
			13.50-13.	95 U22 D23	76 blows	
Chiselling (m)	Water Added (m)	GENERAL REMARKS				
From To Hours	From To					
Issue No. 03		Driller SW				AGS

8 Warple London V Telephon E-mail: s	Way V3 ORF e: 020 88 i@concep	11 2880	0 Fax: 0	20 8811 28		SATIONS		B	UK	AS LINE UIT	Borehole No BH04	
Job No	orthe	Da	te Star		ion 26/04/10 27/04/10		Co-Ordinat E 530	es 703.4 N 17	7270 5		nal Depth 40.00m	
Client R	EO (P	-		n) Ltd			Method/ Plant Used	Cable Per		Sh		
PRO	OGRES	SS			ST	TRATA		SAMPLE	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Tucton mont/
					- - - - - - -			14.50-14.95 14.50	D24	N32	4, 5 / 7, 8, 8, 9	
						becoming extremely closely grey with rare parts of silty sand nodules at 15.50m	fissured and	15.50-15.95	U25	84 blows		
						nodules at 15.50m	-) F)	- 16.00	D26			
								16.50 16.50	D27	N35	3, 5 / 7, 9, 9, 10	
						harming any light high h		- 17.50-17.95	U28	92 blows		
					(25.25)	becoming generally thinly la slightly silty with occasional bi 17.50m with a band of very weak light claystone between 17.80m and		17.85	D29	V192kPa		
26/04/10 6.10 Dry							- 18.50-18.95 18.50	D30	N35	4, 6 / 8, 8, 9, 10		
							- 19.50-19.95	U31	100 blows			
							20.00	D32				
							20.50-20.95	D33	N37	4, 5 / 8, 9, 10, 10		
				Water A	Added (m)	GENERAL REMAN	RKS		1	1	1	
			From	To								
Issue N	No. 03					Driller					AGS	



8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Project	t										
		ern	Line E	xtens	ion						
Job No			Date Start		26/04/10	. ,	Co-Ordina	tes		F	inal Depth
1	0/225	4 I	Date Com	pleted	27/04/10	4.49	E 530	703.4 N 17	7270.5	;	40.00m
Client		n					Method/ Plant Used	Cable Per	auccio		heet 4 of 6
			verstatio	n) Lta			r lant Useu	Cable Fei	cussio		4 01 0
PRO	DGRI	ESS			ST	TRATA		SAMPLE	ES & 1	TESTS	
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Resul	
27/04/10 27/04/10	6.10	20.11 Dry				becoming thinly to thickly la slightly sandy with frequent bio 21.50m with occasional pockets of lij sand between 21.50m and 21.7 becoming grey, slightly sand frequent pockets of light grey si pockets of dark grey dine sand occasional bioturbation below 2	ght brown Om y with and and rare with	21.50-21.90 21.70 21.85 21.95 22.50-22.95 22.50 23.50-23.95 24.00 24.50-24.95 24.50	U34 D35 D36 U37 D38 D39	100 blow V - Faile V - Faile N41 100 blow N50	d d 5, 6 / 8, 10, 11, 12

No. 03				Driller				AGS
10	110015	FIOII	10	-				
				GENERAL REMARKS				
					27.95	D44		
				becoming very closely fissured and sandy with pockets of light brownish grey sand at 27.50m	-	D44		
					27.50-27.90	U43	100 blows	
					- -			
					26.50		N50/ 0.295	5, 8 / 10, 12, 14, 14
					-	D42		
					26.00	D41		
					25.50-25.95	U40	100 blows	
			-		- -			
					24.50-24.95 24.50	D39	N50	6, 7 / 9, 13, 13, 15
				occasionai bioturbation below 23.50m	24.00	D38		
				becoming grey, slightly sandy with frequent pockets of light grey sand and rare pockets of dark grey dine sand with	-			
					- 23.50-23.95	U37	100 blows	
					- - -			
	To	Ve	To Hours From	x x x x <t< td=""><td>To Hours From To</td><td>image: second second</td><td>Image: Second second</td><td>Image: Second products of light grey shad and rare process of dight grey dim and with requent pockets of light grey dim and with pockets of light brownish grey shad and rare pockets of light brownish grey shad at 27.50-27.90 U40 100 blows Image: Dim term Image: Dim term Image: Dim term Image: Dim term Image: Dim term</td></t<>	To Hours From To	image: second	Image: Second	Image: Second products of light grey shad and rare process of dight grey dim and with requent pockets of light grey dim and with pockets of light brownish grey shad and rare pockets of light brownish grey shad at 27.50-27.90 U40 100 blows Image: Dim term Image: Dim term Image: Dim term Image: Dim term Image: Dim term

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project Northern Line Extensio

Ň	orth	ern]	Line I	Extens	ion							
Job No			ate Star		26/04/10	Ground Level (mOD)	Co-Ordinat	es		Fir	nal Depth	
	0/225	4 Da	ate Con	pleted	27/04/10	4.49	E 5307	703.4 N 17	7270.5		40.00m	
Client R	EO (Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Per	cussio	n Sho	eet 5 of 6	
PRO)GRI	ESS			ST	RATA		SAMPLE	ES & T	TESTS		l l
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
								28.50-28.95 28.50	D45	N50/ 0.265	5, 7 / 10, 13, 16, 11	
		Ţ			r 	becoming thinly to thickly la silty with rare tabular pyrite not 29.50m	minated and Jules at	29.50-29.95		100 blows		
								30.00	D47			
			-26.2		30.70			30.50-30.95	D48	N50/ 0.25	7, 10 / 12, 15, 16, 7	
					(0.70)	Stiff, grey silty fine sandy CLA (LAMBETH GROUP)	Y.	- - 				
27/04/10 27/04/10	6.10 6.10	29.20	-26.91		31.40	Stiff, grey silty sandy shelly CL (LAMBETH GROUP)	AY.	31.40 31.50-31.95 31.60	D49 U50	100 blows V200kPa		
						with occasional layers of grey sand between 31.80m and 32.9	y silty fine	32.00 32.00-32.50	D51 B52			
27/04/10	6.10	29.10					-	32.50-32.95 32.50	D53	N50/ 0.205	8, 12 / 15, 19, 16	
							-	33.00-33.40	B54			
					-	with coarse gravel sized frag- strong grey slightly clayey shell LIMESTONE between 33.40m	y/organic(?)	33.50-33.95 33.50	D55	N75/ 0.045	25, 50 /	
27/04/10	34.00	33.80			-	becoming brown mottled blue 33.80m and 38.70m becoming very stiff and brow bluish grey at 34.00m	-	33.80-34.00 34.00-34.35 34.40	B56 U57 D58	100 blows		
27/04/10	24.20	D						- 35.00-35.95	D59			
27/04/10		Dry		Watar	ddad (==)	GENERAL REMAR	DKS		537			
From	hisellin To		Hours	Water A From	Added (m)	- GENERAL KEMAR	(172)					
33.40	33.8		.00.00	1 10/11	10	1						
Issue N	No. 03	;			1	Driller SW					AGS	antal di Statione a Natara di Statione a



BH04

Borehole No

Instrument/ Backfill



Borehole No

BH04

Job No

Client

8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2 E-mail: si@conceptconsultants.co.uk Project

Northern Line Extens

Varple Way ndon W3 ORF	T SITE INV 1 2880_Fax: 020 8811 2 consultants.co.uk		ATIONS		UKAS UKAS UKAS	Borehole N BH04	
oject Norther	n Line Extens	sion					
b No	Date Started	26/04/10	Ground Level (mOD)	Co-Ordinat	tes	Final Depth	-
10/2254	Date Completed	27/04/10	4.49	E 5307	703.4 N 177270.5	40.00r	n
ient REO (Po	owerstation) Ltd	1		Method/ Plant Used	Cable Percussion	Sheet 6 of	6
PROGRES	S	ST	RATA		SAMPLES & TES	TS	

Borehole No

PRO	OGRI	ESS			ST	TRATA	SAMPL	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
					(8.50)		35.00		N50/ 0.25	8, 10 / 13, 15, 15, 7	
							- 36.00-36.45 -	U60	100 blows		
							- 36.50 -	D61			
							- 37.00-37.45 - 37.00	D62	N50/ 0.225	9, 12 / 14, 16, 20	
27/04/10 27/04/10	34.20 34.20	37.80		* * * * * * * * * *			- 38.00-38.40 -	U63	100 blows		
				× · · · · · · · · · · · · · · · · · · ·			38.45	D64			
27/04/10	34.20	38.80					- 39.00-39.45 - 39.00	D65	N50/ 0.19	11, 12 / 15, 20, 15	
			-35.41				- 39.50-39.85 	U66 D67	100 blows		
27/04/10	34.20	39.30	-35.51	× ×	40.00	Stiff, blue mottled brown silty CLAY. (LAMBETH GROUP) End of Borehole					
							-				
					-						
					- - -		- - - -				
С	hisellin	Ig (m)	·	Water A	Added (m)	GENERAL REMARKS	-				
From	То		Hours	From	To						
Issue 1	No. 03	3				Driller SW				AGS	

8 Warple London V Telephon	Way V3 ORF e: 020 8	3811 288		20 8811 28		SATIONS		R	UK	AS ANNT 01	Borehole No BH05
Project N		ern]	Line F	Extens	ion						
Job No 1()/225		ate Star ate Com		06/05/10 10/05/10		Co-Ordinat E 5309	es 920.7 N 17	77502.0		nal Depth 35.10m
Client R	EO (Powe	erstatio	n) Ltd			Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 1 of 6
PRO)GRF	ESS			ST	TRATA		SAMPL	ES & 1	TESTS	
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records
06/05/10		Dry	4.19		0.20	Soft, brown to dark brown sand flint gravel and occasional brick	y CLAY with k fragments.	0.25	ES01		
					-	(MADE GROUND) Firm, brown and greyish brown sandy CLAY with brick fragme subrounded fine to medium flin (MADE GROUND)	ents. Gravel is	0.50	ES02 B04		
06/05/10		Dry			- - (1.80) -	becoming brown to reddish b subrounded fine to medium occ coarse gravel below 0.85m becoming dark brown locally yellowish brown slightly sandy gravelly with occasional pocket	asionally y mottled slightly	- 1.00 - 1.00 - 1.20-1.65	ES05 B06 U07	32 blows	
			2.39		2.00	carbonaceous material at 1.00n	n	1.70 1.70-2.15 1.70 2.00	D08 D09 ES10	N12	2, 2 / 2, 3, 3, 4
06/05/10	2.20	2.00	2.19	0.0000000000000000000000000000000000000	2.20	Firm, brown sandy CLAY with flint gravel. (ALLUVIUM) Medium dense to dense, brown brown and orangish brown sand to rounded fine to coarse GRA ¹ (RIVER TERRACE DEPOSIT	to yellowish ly subrounded VEL.	2.00-2.20 2.20-2.70 2.20	B11 B12	N39/ 0.255	5, 7 / 9, 9, 10, 11
06/05/10	3.20	Dry			-	becoming brown slightly silty subangular to well rounded fine with rare clods of soft brown cl- 3.20m	to coarse	- 3.20-3.70 - 3.20	B13	N50/ 0.255	8, 10 / 13, 15, 15, 7
06/05/10	4.20	4.10			- - - - - -			4.20-4.70 4.20	B14	N50/ 0.25	7, 11 / 13, 16, 13, 8
06/05/10	5.20	4.90		0.0.0 0.0.0 0.0.0 0.0.0 0.0.0	(5.70)			5.20-5.70 5.20	B15	N30	4, 7 / 8, 7, 7, 8
06/05/10	6.20	Ţ				becoming brown and light br	own at 6.20m	6.20-6.70 6.20	B16	N22	3, 4 / 5, 5, 6, 6
С	hiselling	g (m)		Water A	dded (m)	GENERAL REMAI	RKS				
From	To	Ť.	Hours	From 2.20	To 6.20	rising to 19.92m after 20 20 minutes. 4. Bailing water from bo	om ground level vel. ttered at 6.20m de rising to 26.84m a minutes. Water rehole between 1	to 8.50m depth epth, rising to 5 after 30 minute seepage encour 3.18m and 29.3	and then 5.80m afte s. Water s ntered at 3 30m and a	reduced to r 20 minute eepage end 3.75m dep t 31.80m d	Ø150m at 27.60m up to es. Slight water seepage countered at 29.80m depth, th, rising to 20.89m after lepth.
Issue N	^{√0.} 03				1	5. Ø50 monitoring well i level. Drollørorehole backfilled w to 0.50m depth. Concrete					



Issue No. 03

8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Project

	0/225		Date Star Date Cor		06/05/10 10/05/10			tes 920.7 N17	7502.0)	nal Depth 35.10m
Client R	EO (Pov	verstati	on) Ltd	l		Method/ Plant Used	Cable Per	rcussio	n Sh	eet 2 of 6
PRO	OGRI	ESS			ST	TRATA		SAMPLI	ES & 1	FESTS	
Date	Casing	Water	Level (mOD)) Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records
06/05/10	7.20	6.30)	0000 0000 0000 0000	}			7.20-7.70	B17	N19	2, 4 / 5, 4, 5, 5
06/05/10 07/05/10 07/05/10	7.70 7.70 8.00	6.51 5.58 Dry	-3.5	0000	7.90	Stiff to very stiff, very closely f brownish grey silty CLAY. (LONDON CLAY)	fissured grey to	8.00-8.45	U18	48 blows	
					- - - - -			- 8.50 8.50-9.00	D19 B20		
								9.00-9.45 9.00	D21	N19	2, 3 / 4, 4, 5, 6
						becoming extremely closely occasional pockets of light brow sand and rare bioturbation at 10	fissured with wnish grey 0.00m	- 10.00-10.45	U22	52 blows	
								10.50 11.00-11.45 11.00	D23	N22	3, 4 / 5, 5, 6, 6
						with a claystone band betwee 11.90m	en 11.70m and	12.00-12.45	U25	54 blows	
								12.50	D26		
								13.00-13.45	D27	N26	3, 4 / 6, 6, 7, 7
						with a claystone band betwee 13.85m	en 13.60m and	- - 14.00-14.45	U28	74 blows	
C	hisellin	g (m)		Water A	Added (m)	GENERAL REMAI	RKS				
From	То		Hours	From	То						

Driller

BN

Borehole No

BH05

Backfill

AGS

UKAS

®

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project Northern Line Extension Job No 06/05/10 Ground Level (mOD) C Date Started **10/2254** Date Completed 10/05/10 4.39 Client **REO (Powerstation) Ltd** PROGRESS STRATA Water Level (mOD) Depth Casing Date Strata Description Legend (Thicknes ... becoming extremely closely fiss occasional bioturbation at 14.00m <u>× -</u>* ... becoming slight sandy and slight micaceous with rare pockets of ligh and dark grey silty sand and occasic bioturbation at 16.00m ... becoming light brown clayey SA sandy CLAY at 16.40m (19.45) ... with rare pyrite nodules at 20.00 <u>× ___</u> 4 Chiselling (m) Water Added (m) GENERAL REMARK From То Hours From То Issue No. 03 Driller BN



Borehole No

BH05

Co-Ordina E 53(0920.7 N17	7502.0		nal Depth 35.10m	
Method/ Plant Used	Cable Per	rcussio	n Sho	eet 3 of 6	
	SAMPLE	ES & 1	TESTS		lent/ l
l	Depth (m)	Type No	Test Result	Field Records	Instrument Backfill
ssured with n	14.50	D29			
	15.00-15.45	D30	N34	4, 6 / 8, 8, 9, 9	
htly ght brown sional	- - 16.00-16.45 - 16.00	U31	74 blows V212kPa		
AND /	16.50	D32			
	- 17.00-17.45 17.00	D33	N37	4, 5 / 7, 9, 10, 11	
	- - - 18.00-18.45 -	U34	100 blows		
	18.50	D35			
	- 19.00-19.45	D36			
00m	20.00-20.45	U37	86 blows V192kPa		
	20.50	D38			
	- 21.00-21.45	D39			

AGS

Project Northern Line Extension

Norther	rn Line	Extens	ion							
Job No	Date Star		06/05/10	Ground Level (mOD)	Co-Ordinat	tes		Fi	nal Depth	
10/2254	Date Con	npleted	10/05/10	4.39	E 530	920.7 N 17	7502.0)	35.10m	
Client REO (Po	owerstati	on) Ltd	l		Method/ Plant Used	Cable Pe	rcussio		eet 4 of 6	
PROGRES	S		ST	RATA		SAMPLI	ES & 1	TESTS		ent/
Date Cassing	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
07/05/10 8.50	₹ <u>−22.9</u> ₹ <u>−23.4</u>		27.35	becoming very closely fissur slightly sandy CLAY with occa of light brown fine sand at 24.0 becoming sandy with a pyriti fragment below 24.30m becoming brownish grey with bioturbation below 26.95m Very stiff, fissured grey to dark CLAY with shells and shell frag (LAMBETH GROUP) with a band of cemented she 27.60m and 27.80m	ed grey Isional pockets 0m Ised wood h occasional r grey silty gments.	(m) 21.00 21.00 22.00-22.45 22.50 23.00-23.45 23.00 24.50 24.00-24.45 24.00 24.50 24.50 24.50 24.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 25.50 26.90 26.90 27.40 27.40 27.40 27.40 27.40 27.40 27.40 27.90	No U40 D41 D42 U43 D44 D45 U46 D47 U48 D49 U50 D51 U52 D53 U56 D57 B58	Result N37 90 blows N42 100 blows V252kPa V248kPa V248kPa N43 100 blows 96 blows 96 blows V - Failed 100 blows V - Failed 100 blows V72kPa 100 blows P100kPa	4, 6 / 7, 9, 10, 11 5, 7 / 9, 10, 11, 12 4, 7 / 9, 11, 11, 12	
Chiselling (Added (m)	GENERAL REMAI	RKS					
From To	Hours	From	То	4						
27.60 27.80 27.90 28.10	00.30.00 00.45.00									
Issue No. 03				Driller BN					AGS=	anna y aproximit. National (Carlos Print)

Borehole No

BH05

8 Warple London V Telephon	Way V3 ORF ie: 020 8	3811 288		20 8811 2		SATIONS		B	URAN	A S	Borehole No BH05	
Project	t			Extens	ion							
Job No 1	0/225		te Star ite Com		06/05/10 10/05/10		Co-Ordinat E 530	tes 920.7 N 17	7502.0		nal Depth 35.10m	
Client R	EO (Powe	rstatio	on) Ltd		1	Method/ Plant Used	Cable Per	cussio	n Sh	eet 5 of 6	
PRO	OGRI	ESS			ST	TRATA	•	SAMPLE	ES & 1	TESTS		int/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
07/05/10	28.10	Dry		× ×		Very stiff, fissured grey to dark CLAY.	grey silty	- 28.10-28.50 - 28.10	U59	100 blows PP200kPa		
					- (0.95) -	(LAMBETH GROUP) with a band of cemented she 27.90m and 28.10m becoming thinly to thickly in	nterlaminated	- 28.55 28.55-28.90	D60 U61	100 blows		
			-24.36		- 28.75	slightly sandy CLAY and light SAND at 28.10m Verv stiff. fissured grev to dark	grey silty	28.95 28.95-29.15	D62 U63	100 blows		
07/05/10 10/05/10	29.20 29.20	Dry 13.18			(1.05)	CLÁY with shells and shell fra (LAMBETH GROUP) with a band of siltstone betw and 29.80m	-	- 29.50	D64			
10/05/10	29.80	₹ ¶	-25.41	× × × ·	29.80	Dark brown to greyish brown s medium SAND with occasiona	ilty fine to	- 30.00	B65			
10/05/10	30.20	20.10		× ·	-	Information (ILAMBETH GROUP) becoming grey slightly clayer silty at 30.20m		- 30.20-30.65 - 30.20-30.70 - 30.20	D66 B67	N50/ 0.23	4, 8 / 12, 13, 20, 5	
				× · . · . · · · · · · · · · · · · · · ·	- (1.60)			- - -				
10/05/10	31.20	20.00	-27.01		31.40			- 31.20-31.65 31.20-31.70 31.20	D68 B69	N47	5, 7 / 10, 11, 13, 13	
10/05/10	31.60	31.50			- -	Stiff to very stiff, fissured grey mottled brown to reddish brown (LAMBETH GROUP)		- 31.70-31.95	U70	100 blows		
10/05/10	31.60	Dry				becoming reddish brown mo grey and friable at 32.00m	ttled bluish	- 32.00 - 32.00-32.45 - 32.00-32.50	D71 U73 B75	100 blows		
					(2.35)			32.50 32.50-32.85	D74 U76	100 blows		
				× × ×	-			32.90 32.90-33.35	D77 U78	100 blows		
								- 33.40 - 33.40-33.70	D79 U80	100 blows		
10/05/10	31.60	4	-29.36	× × · · · · · · · · · · · · · · · · · ·	33.75	Dark brown to greyish brown s medium SAND.	ilty fine to	33.75 33.75-34.25 33.75-34.25	D81 U82 B83	100 blows	No Recovery	
10/05/10	31.60	20.30		×	(0.80)	(LAMBETH GROUP)		34.25 34.25	D84	N50/ 0.228	7, 7 / 11, 16, 19, 4	
			-30.16	× × ×	- 34.55 - (0.55)	Very stiff, grey silty CLAY wit fragments. (LAMBETH GROUP)	h shell	- 34.75-35.05 -	U85	100 blows		
	hisallin	a (m)		Watar	ddad (m)	GENERAL REMA	DVS					
From	hisellin To		Iours	From	Added (m) To							
29.20 29.30	29.3 29.8		.30.00 .45.00			1						
Issue 1	No. 03					Driller						



Project

Northern Line Extension

IN	orthe	ern I	Line E	xtens	ion							
Job No			nte Start		06/05/10		Co-Ordinat				al Depth	
	0/2254	4 Da	te Com	pleted	10/05/10	4.39		920.7 N 17	7502.0		35.10m	
Client R	EO (I	Powe	rstatio	n) Ltd	l		Method/ Plant Used	Cable Pe	rcussion	She	6 of 6	
PRO	OGRE	SS			ST	RATA		SAMPLI	ES & T	ESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	⊡ ∐Backfill
0/05/10	31.60	20.55	-30.71	<u>× ×</u>	35.10	End of Borehole		35.10	D86			
C	hiselling	g (m)		Water A		GENERAL REMAI	RKS					
From	То	H	lours	From	То	_						
Issue N	No. 03					Driller BN					AGS=	

Borehole No

BH05

B UKAS

8 Warple London V Telephon E-mail: s	Way V3 ORF e: 020 8 si@conc	3811 288		20 8811 2		SATIONS		B	SURANCE UK	AS ANY MANY D1	Borehole No BH06	
Project N		ern 1	Line E	Extens	ion							
Job No			ate Star		28/04/10		Co-Ordinat	tes		Fi	nal Depth	
10	0/225	4 Da	ate Com	pleted	30/04/10	4.54	E 5312	238.4 N 17	77554.7	,	37.00m	
Client R	EO (Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Pe	rcussio		eet 1 of 6	
	OGRI					TRATA		SAMPL	ES & 1	TESTS		ont/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
28/04/10		Dry	4.34		0.20	Asphalt.		-				K
			4.23		0.20	Brown sandy GRAVEL. (Type (MADE GROUND)	1)	-				
			4.23		<u> </u>	Brown to orangish brown grave	elly sandy	- 0.50	B01			
						CLAY with brick fragments an pieces. (MADE GROUND)	d rare pottery	-				
					-	(MADE GROUND)		- 1.00	B02			
28/04/10		Dry			-			1.20-1.35 1.20	B03	N7	0, 1 / 1, 2, 2, 2	
					(2.04)			1.35-1.70	B04			
								-				
					-			- 2.00-2.45	U05	60 blows		
					-			- 2.00-2.45	005	00 010 00		
			2.19		2.35			-				
				0000		Medium dense to dense, yellow orangish brown sandy subangul subrounded fine to coarse flint	ar to	- 2.50 - 2.70	D06 D07			
				.000		with occasional cobbles.		2.70	D07			
28/04/10	3.00	2.50		0.000	<u> </u> -	(RIVER TERRACE DEPOSIT	5)	- 3.00-3.50 - 3.00	B08	N31	3, 5 / 6, 7, 9, 9	
				00002	-			-		1.01	5, 5, 6, 7, 7, 7	
				0.00				-				
				0000	 -			-				
28/04/10	4.00	3.70		Po son	-			- 4.00-4.50	B09			
20/04/10	4.00	5.70		0 0. 0 0 0 0 0 0	-			4.00		N50/ 0.28	5, 8 / 10, 12, 15, 13	
				0000	Ē			-				
				0.00	Į			-				
				0:00	(4.95)			-				
28/04/10	5.00	4.50		0.000	-			- 5.00-5.50 - 5.00	B10	N31	4, 4 / 6, 7, 8, 10	
				00.00				-				
		4		0.000	[[-				
		Ţ		000	-			-				
				000	-			- 6.00-6.50	B11			
		1		0.0.0 0.000				- 6.00		N23	2, 3 / 5, 5, 6, 7	
28/04/10	6.30	Ţ		0 / 0/				-				
				0,00	-			-				
				0000	-			-				
	1 · 1··			0002	<u>E</u>	CENEDAL DEMAN	DVS	- 7.00-7.30	B12			
C From	hisellin To		Hours	Water A From	Added (m)	GENERAL REMAN 1. An inspection pit has h 2. Ø200m casing used fr		1.20m below	ground lev	el, prior to	boring commencing.	
FIOIII	10		iouis	2.35	7.00	27.00m below ground let	vel.					0
				2.33	,.00	3. Water seepage encount encountered at 24.300m	tered at 6.30m d depth, rising to 2	epth, rising to 5 1.29m after 20	.65m afte minutes.	r 20 minute Slight wate	es. Water seepage er seepage encountered	at
						29.45m depth. 5. Ø50 monitoring well i	installed at 37.00	m depth, slotted	l between	24.00m an	d 37.00m below ground	d
						level. 6. Borehole backfilled w	ith pea shingle fr	om 37.00m to	24.00m, a	nd with be	ntonite pellets from 24.0	<u>00n</u>
Issue N	No. 03					to 0.50m depth. Concrete Driller BN	e with lockable sl	ореоск cover 1	instatted fr	om 0.30m	to ground level	



Project

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Northern Line Extension	

Job No		Da	ate Star		28/04/10		Co-Ordina	tes		Fi	nal Depth	
	0/225	4 Da	ate Com	pleted	30/04/10	4.54	E 531	238.4 N 17	7554.7	7	37.00m	
Client R	EO (Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Per	rcussio	n Sh	2 of 6	
PRO)GRI				ST	TRATA		SAMPLE	ES & 1	FESTS		l 1
Date	Casing	Water	Level (mOD)		Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
			-2.76	0000 000 × ×	7.30	Stiff to very stiff, fissured brow	n eilty CLAV	7.00	B13	N12	2, 4 / 3, 3, 3, 3	
28/04/10 29/04/10	7.50 7.30	5.60 7.30				(LONDON CLAY) becoming grey below 7.50m		-				
29/04/10	7.60	Dry						8.00-8.45	U14	52 blows		
						with rare pockets of dark gre and rare bioturbation below 8.5	y fine sand Om	8.50	D15			
						with a band of claystone betw and 9.20m	ween 9.00m	9.00-9.45	B16	N17	No Recovery 10, 4 / 4, 4, 5, 4	
					- - - - - - - - - - - - - - - - - - -	becoming extremely closely occasional pyrite nodules and r	fissured with	- 10.00-10.45	U17	60 blows		
					- - -	bioturbation below 10.00m	are	10.50	D18			
						with a band of claystone betw and 10.90m	ween 10.60m	- - 11.00-11.45 - 11.00	D19	N21	2, 4 / 4, 5, 6, 6	
						becoming very closely fissur micaceous below 12.00m. Fissu predominantly 0 -10° and 70 -	ires are	- 12.00-12.45 - 12.10 - 12.20	U20	62 blows V - Failed V - Failed		
						and smooth. with no fissures below 12.30 with a medium gravel size p 12.37m	m yrite nodule at	12.50	D21			I
								13.00		N28	2, 4 / 5, 7, 8, 8	
					-			- 14.00-14.45	U23	80 blows		
C. From	hisellin To		Hours	Water A	Added (m)	GENERAL REMAI	RKS					
Incre >	Ja					Driller		I				
Issue No. 03						BN					AGS=	NUMBER OF STREET, POINT

Borehole No

BH06

B UKAS

8 Warple London V Telephon	Way V3 ORF	11 288	30_Fax: 02	20 8811 28		SATIONS		B	U K	AS	Borehole No BH06	
Project				Extens	ion							
Job No 1(0/2254		ite Star ite Com		28/04/10 30/04/10		Co-Ordinat E 5312	zes 238.4 N 17	7554.7		nal Depth 37.00m	
Client R	EO (P	owe	rstatio	on) Ltd			Method/ Plant Used	Cable Per	rcussio		eet 3 of 6	
PRO	OGRES	SS			ST	TRATA	1	SAMPLE	ES & T	TESTS		int/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
						becoming extremely closely i occasional bioturbation and poor brownish grey sand below 14.00 with rare fragments of fossili 14.50m	ckets of light 0m	14.50	D24			
								- 15.00-15.45 - 15.00	D25	N33	3, 5 / 7, 9, 8, 9	
					(16.70)	becoming slighty sandy and s fissures below 16.00m with a band of frequent fine t gravel size pockets of light brox between 16.00m and 16.09m	o coarse	16.00-16.45 16.30 16.50	U26 D27	74 blows V120kPa		
						becoming slightly micaceous pyrite nodules below 17.00m	with rare	17.00-17.45	D28	N33	4, 5 / 6, 8, 9, 10	
					2 - - - - - - - - - - - - -			- 18.00-18.45 - - - - - - - - - - - - - - - - - - -	U29 D30	72 blows		
								- 19.00-19.45 - 19.00	D31	N36	4, 5 / 7, 9, 9, 11	
						becoming very closely fissure frequent pockets of light brown below 20.00m. Fissures are 0 - 1 90°, planar and smooth.	ed with fine sand 10° and 70°-	- - 20.00-20.45 - - 20.50	U32 D33	80 blows		
								20.50-20.95	D35 U34 D35	90 blows		
	hiselling	(m)		Water A	Added (m)	GENERAL REMAI	RKS	21.00	000	1	1	
From	To	_	lours	From	To							
Issue N	No. 03					Driller					AGS	



Project

Job No

Client

Date

PROGRESS

Northern Line E

Warple Indon V	Way V3 ORF e: 020 8	3811 28	SITE 80_Fax: 02 ultants.co.u	20 8811 28		SATIONS		B	U K	AS ATTENT	Borehole BH
oject N		ern]	Line E	xtens	ion						
b No		Da	ate Start	ed	28/04/10	Ground Level (mOD)	Co-Ordinat	es		Fi	nal Depth
1	0/225	4 Da	ate Comj	pleted	30/04/10	4.54	E 5312	238.4 N 17	7554.7	,	37.0
lient R	EO (Powe	erstatio	n) Ltd			Method/ Plant Used	Cable Per	rcussio		eet 4 c
PRO	OGRE	ESS			ST	TRATA		SAMPLE	ES & T	ESTS	
ate	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Record
		2 ⊻_			- - - - - - -			21.00-21.45 21.10 21.20 21.30 21.50 21.50-21.95		100 blows V - Failed V - Failed V - Failed 92 blows	

Borehole No

BH06

37.00m

4 of 6

Field

Records

nt

Instrume Backfill

	~						-			
29/04/10	7.60	Ţ		┛┺┅┱╓╝┺╵┙┺╵┙┺╵╸ ┙┶┍┙┺╵┙┺╵┙┺╵┺┙┺┙┺ ┙┺╵┱┺╵┙┺╵┙┺╵┙┺╵┙┺╵┙┺╵┙┺		becoming extremely closely fissured with occasional pyrite nodules and rare pyritised wood fragments at 22.00m	21.00-21.45 21.10 21.20 21.30 21.50 21.50-21.95 22.00-22.45 22.50 22.50-22.95 23.00 -23.00-23.45	5 D37 U38 D39 U40 5 D41 U42 D43	100 blows V - Failed V - Failed 92 blows 100 blows 92 blows	
			10.44			becoming very stiff with no fissures below 23.50m	23.50 23.50-23.95 23.60 23.70 24.00	5 D45 U46 D47	96 blows V - Failed V - Failed	
		₽	-19.40		24.00	Stiff, very closely fissured dark greyish brown slightly sandy silty CLAY. Fissures are predominantly 0-10° planar and smooth with frequent fine to medium gravel size pockets	24.00-24.45 24.10 24.20 24.30	5 U48	100 blows V - Failed V - Failed V - Failed	
29/04/10 29/04/10	7.60 7.60	21.00 20.40	-19.90	b	24.50	(HARWICH FORMATION - SWANSCOMBE MEMBER?) with a band of frequent medium to coarse sand size black oxidised glauconite between	24.50 24.50-25.95 24.60 - 24.70 - 24.80		100 blows V - Failed V - Failed V - Failed	
				× · · · · · · · · · · · · · · · · · · ·	- (1.00)	24.17m and 24.26m with frequent subrounded to rounded fine to coarse black flint at 24.27m Firm, dark grey locally greyish brown very	- 25.00 - 25.00-25.45 - 25.10 - 25.20	5 D51 U52	100 blows V - Failed V - Failed	
29/04/10	7.60	20.10	-20.90		25.50	sandy CLAY with frequent subaround receives subrounded fine to coarse gravel size cream and light brown bivalve, gastropod shells and shell fragments.	25.30 25.50 25.50-25.85 25.90	5 D53 U54 D55	V - Failed 100 blows	
29/04/10	7.60	19.70			(0.90)	(HARWICH FORMATION - SWANSCOMBE MEMBER?) Soft to firm, thinly interlaminated dark grey	25.90-26.05 26.00 26.00-26.40	5 U56 D57 D58	100 blows	
29/04/10	26.40	21.30	-21.80		26.40	SLT and light grey silty fine to medium SAND and occasionally grey CLAY. (LAMBETH GROUP) with frequent subangular to angular fine to	26.40-26.75		100 blows	
29/04/10 29/04/10	26.80 27.00	21.6022.30			-	medium gravel size fragments of cream and light brown bivalve at 24.70m becoming thinly to thickly laminated dark grey CLAY and dark grey SILT with	26.80 26.80-27.05 27.10	D62	100 blows	
29/04/10	27.00	27.00			-	occasional fine to medium sand below 25.00m with rare subangular fine to medium gravel size fragments of cream and light brown	27.10-27.35 27.40 27.40-27.70	D64	100 blows 100 blows	
29/04/10	27.00	27.50			-	shells between 25.00m and 25.07m Stiff to very stiff, grey silty CLAY with occasional shell fragments and occasional bands of compacted shells.	27.75 27.75-28.15	5 D66 U67	100 blows	
C	hisellin	g (m)			dded (m)	GENERAL REMARKS				
From	То	I	Iours	From	То					
26.05	26.4	26.40 01.00								
Issue N	^{No.} 03					Driller BN				AGS

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk										AS LITY ZMENT	Borehole No BH06		
Project N		ern]	Line E	xtens	ion								
Job No		D	ate Star	ted	28/04/10	Ground Level (mOD)	Co-Ordina	tes		Fi	inal Depth		
1	0/225	4 D	ate Com	pleted	30/04/10		E 531238.4 N 17				37.00m		
Client R	EO (Powe	erstatio	n) Ltd		1	Method/ Plant Used				Sheet 5 of 6		
PRO	OGRI	ESS			ST	RATA	1	SAMPLI	ES & T	TESTS			
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records		
29/04/10 30/04/10	27.00 27.00	27.95 27.95		* * *	-	(LAMBETH GROUP) with a band of cemented she 26.05m and 26.40m	lls between	28.20 28.20-28.60	D68 U69	100 blows	5		
30/04/10	27.00	Dry			- - -	Stiff to very stiff, brown mottle reddish brown occasionally mo greyish blue silty CLAY. (LAMBETH GROUP)	d red to ttled blue to	- 28.65 28.65-29.00	D70 U71	100 blows	5		
						becoming very stiff to hard, g brown below 28.00m	grey mottled	- 29.05 - 29.05-29.40	D72 U73	100 blows	5		
30/04/10	27.00	₹	-		(5.75)	becoming brown mottled gree grey below 29.30m	y to bluish	29.45 29.45-29.75	D74 U75	100 blows	5		
								29.80 29.80-30.25	D76 U77	100 blows	5		
						becoming grey to bluish grey 30.30m and 32.15m	between	30.30 30.30-30.75	D78 U79	100 blows	5		
								30.80 30.80-31.20	D80 U81	100 blows	3		
								31.25 31.25-31.65	D82 U83	100 blows	3		
						becoming extremely closely 31.50m with a band of shell fragmen		31.70 31.70-32.00		100 blows	5		
			-27.61	× × ×	32.15	Very stiff to hard dark grey silt	y CLAY with	32.05 32.05-32.45	D86 U87	100 blows	5		
30/04/10 30/04/10	27.00 27.00	32.40 Dry	-28.16		(0.55) 32.70	partings of light grey silt, layer of white and occasionally grey silty clay with beds of shells. (LAMBETH GROUP)		32.50 32.50-32.75 32.80	D88 U89 D90	100 blows	5		
50/01/10	27.00	DI			(0.60)	(LAMBETH GROUP)	AY with rare calcareous nodules. AMBETH GROUP) with a band of limestone between 33.0m		D92 D93	100 blows			
			-28.76		33.30	and 33.30m Very stiff, fissured grey mottled brown to yellowish brown silty (LAMBETH GROUP)		- 33.30-33.65		100 blows	5		
					- - - -	(LAWIDE III OKOUP)		- 33.70 - 33.70-34.05 - 34.00 - 34.10.34.50	D97	100 blows			
								-34.10-34.50					
30/04/10	27.00	34.40			(2.50)	becoming mottled brown to r and light grey below 34.60m	eddish brown	34.55-34.90 34.55 34.95	U100 D99 D101	100 blows	5		
ſ	hisellin	g (m)		Water A	dded (m)	GENERAL REMAI	RKS	L	I	1	I		
From	То	Ť	Hours	From	To	-							
Issue 1	No. 03	,				Driller					AGS		



Project

Northern Line Extension

STE QUALITY CD.	Borehole No
	BH06

Borehole No

Job No 1(0/225		te Star te Com		28/04/10 30/04/10		Co-Ordinat E 5312	tes 238.4 N 17	7554.7		nal Depth 37.00m	
Client			rstatio				Method/ Plant Used	Cable Pe		Sh	eet 6 of 6	
PRO	OGRE	ESS			ST	TRATA		SAMPLI	ES & T	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
30/04/10	27.00	35.80	<u>-31.26</u> -31.46		35.80 36.00 (1.00) 37.00	Grey clayey fine to medium SA (LAMBETH GROUP) Very stiff to hard, fissured grey CLAY. (LAMBETH GROUP) End of Borehole GENERAL REMAI	/ slightly silty	36.00-36.45	D102	N50/ 0.11	11, 13 / 26, 24	
From	To		lours	From	To							
Issue N	No. 03	 ;			1	Driller BN					AGS=	

8 Warple London V Telephon	Way /3 ORF e: 020 8	3811 28		020 8811 28		SATIONS		R		A S	Borehole No BH07	
Project	-			Extens	ion							
Job No 1()/225		ate Star ate Com		20/04/10 23/04/10		Co-Ordinat E 531	tes 187.8 N17	78024.3	Fi	nal Depth 31.00m	
Client R	EO (Powe	erstatio	on) Ltd			Method/ Plant Used	Cable Pe	rcussion		eet 1 of 5	
PRO)GRF	ESS			ST	TRATA	1	SAMPL	ES & T	ESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
20/04/10		Dry	3.15		0.10 - - - -	Concrete paving over yellow co (MADE GROUND) Greyish brown gravelly sandy C brick and concrete fragments, o staining and rare pockets of bla carbonaceous material. Gravel i	CLAY, with ccasional iron ck	0.10 0.20 0.20 0.50 0.50	ES01 B02 ES03 B04		Roots encountered to 1.80m depth	
20/04/10		Dry			(2.00)	fine to coarse flint. (MADE GROUND) with boulder sized brick and fragments to 0.20m with clicker fragments below becoming brown clayey grav with occasional brick, concrete fragments between 0.90m and 1 with large pockets of reddish below 1.25m	v 0.60m elly SAND and glass 1.25m	1.00 1.20 1.20-1.65 1.20 1.20	ES05 B06 ES07 D08 B09	N4	1, 2 / 1, 1, 1, 1	
			1.15	000	2.10	becoming grey mottled brown with occasional fine brick fragn 1.80m Medium dense, yellowish brown slightly silty sandy subrounded rounded fine to coarse flint GR. rare sandstone fragments.	n to brown to well	2.00-2.45	D19 B20	N49	2, 4 / 7, 14, 17, 11	
20/04/10	3.00	2.50				(RIVER TERRAČE DEPOSIT	S)	3.00-3.45 3.00 3.00	D21 B22	N25	2, 2 / 4, 5, 7, 9	
20/04/10	4.00	3.50						4.00-4.45 4.00 4.00	D23 B24	N15	2, 4 / 5, 6, 2, 2	
20/04/10	5.00	4.50			(5.10)	becoming orangish brown an well rounded below 5.00m	d angular to	- - - - - - - - - - - - - - - - - - -	D25 B26	N24	2, 3 / 3, 5, 8, 8	
20/04/10	6.00	5.50				with rare to occasional cobble 6.00m	es below	- 6.00-6.45 - 6.00 - 6.00	D27 B28	N23	2, 3 / 4, 6, 6, 7	
20/04/10 21/04/10	6.50 6.50	5.30 5.30			- - -			- - - -				
21/04/10	7.00	Dry		0000	-	1		7.00-7.45	D29			
	hisellin		-		Added (m)	GENERAL REMAN		0 1.20m below o	round lev	el, prior to	boring commencing	
From	То		Hours	From 3.45	To 7.20	2. Ø200m casing used fro ground level. 3. Water seepage encoun 4. Ø50 monitoring well in level. 5. Borehole backfilled wi to 0.50m depth. Concrete	tered at 19.00m nstalled at 31.00 ith pea shingle fr	to 8.50m depth below ground lo m depth, slotted rom 31.00m to 2	and then r evel, rising between 27.00m, an	reduced to g to 15.62n 27.00m an ad with ber	Ø150m to 29.50m below n after 20 minutes. Id 31.00m below ground ntonite pellets from 27.0	l
Issue N	^{lo.} 03					Driller					AGS ===	





BH07

Project		-								- 1		
	orthe						0.0.5					
Job No 1(0/2254		te Start te Comi		20/04/10 23/04/10	. ,	Co-Ordinat		0074 7		nal Depth	
Client			a com	picicu	20,01/10	3.25	E 531 Method/	187.8 N 17	8024.3		31.00m	
R	EO (Po		rstatio	n) Ltd			Plant Used	Cable Per	cussio		2 of 5	
PRO	OGRES	S			ST	TRATA		SAMPLI	ES & 1	TESTS		ient/
Date	Casing	Water	(mod)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
			-3.95	000	7.20			7.00	B30	N17	2, 2 / 3, 4, 5, 5	
					-	Firm to stiff, very closely fissur slightly sandy silty CLAY. (LONDON CLAY)	ed grey	7.50	B31			
					-	with occasional pockets of lig grey sand and pockets of dark g	ght brownish	- - 8.00-8.45 -	U32	32 blows		
					-	below 8.00m	icy sity suit	8.45	D33			
						with frequent to occasional c fragments below 9.00m becoming slightly micaceous bioturbation below 9.00m	laystone	- - 9.00-9.45 - 9.00 -	D34	N21	2, 3 / 4, 5, 6, 6	
					- - - - -	bioturbation below 9.00m			U35	40 blows		
					-			10.45	D36			
					- - - - - - -			- - 11.00-11.45 - 11.00	D37	N21	2, 3 / 4, 5, 5, 7	
					- - - - - - - - -	becoming extremely closely 12.00m	fissured below	- 12.00-12.45	U38	42 blows		
								12.45	D39			
								- 13.00-13.45 - 13.00	D40	N47	2, 2 / 4, 4, 7, 32	
								- - - - 14.00-14.45	U41	51 blows		
C	hiselling (m)		Water A	Added (m)	GENERAL REMAI	RKS					
From	То	H	ours	From	То							
Issue N	No. 03	<u> </u>				Driller					AGS=	

8 Warple London V Telephon E-mail: s	Way V3 ORF e: 020 8 i@conce	811 288 eptconsi	30_Fax: 0. ultants.co.i	20 8811 20 uk	381	SATIONS		B	UK	AS ANNT 2MMNT 01	Borehole No BH07	
N Job No			Line E ate Star	Extens	ion 20/04/10	Ground Level (mOD)	Co-Ordinat	tos		Fi	nal Depth	
	0/2254				23/04/10			187.8 N 17	8024.3		31.00m	
Client R	EO	Powe	rstatio	on) Ltd			Method/ Plant Used	Cable Per		Sh	eet 3 of 5	
	OGRE			.ii) 2.tu		RATA		SAMPLI	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
					- - - - - - -	becoming stiff and extremely closely fissured below 14.00m. - 20° and 70° - 90°, planar, sm occasionally polished. with a medium gravel size pa lignite nodule at 14.28m		- 14.10 - 14.20 - 14.30 - 14.45	D42	V - Failed V - Failed V - Failed		
		٩ Ţ			- - - - - - - - -			- 15.00-15.45 - 15.00 - 15.00	D43	N26	2, 4 / 4, 7, 7, 8	
					- - -			- 16.00-16.45	U44	59 blows		
					- - - -			16.45	D45			
					- - - - - - - -	with occasional bioturbation pockets of of dark grey silt at 1	and rare 7.00m	- - 17.00-17.45 - 17.00 - -	D46	N38	3, 6 / 8, 9, 9, 12	
					(21.00)	becoming slightly silty and s frequent bioturbation below 18.		- - 18.00-18.45 - 18.10 - 18.20 - 18.30 - 18.45 	U47 D48	56 blows V - Failed V - Failed V - Failed		
21/04/10	8.50	Ţ			- - - - -			- - - 19.00-19.45 - -	D49			
2/04/10 2/04/10	8.50 8.50 20.00	15.62 6.91 Dry			- - - - - - - - - -	with occasional bioturbation pockets of dark grey sand below	and frequent	- 20.00-20.45	U50	65 blows		
					- - - - -	pockets of dark grey sand below	20.00m	20.45 20.50-20.95 20.95	D51 U52 D53	43 blows		
C	hiselling	g (m)		Water A	dded (m)	GENERAL REMAI	RKS	L				
From	To		Hours	From	To							
Issue N	No. 03					Driller					AGS	



CONCEPT SITE INVESTIGATIONS

Project

N

8 Warple London Telephor	e Way W3 ORF ne: 020 88 [,]	11 28	SITE	20 8811 2		SATIONS		B	Mill	CAS MINT 01]	Borehole No BH07
Projec												
		rn	Line E	xtens	sion							
Job No			ate Start		20/04/10		Co-Ordinat	tes		H	Final	Depth
1	0/2254	D	ate Com	pleted	23/04/10	3.25	E 531	187.8 N 17	8024.3	;		31.00m
Client F		owe	erstatio	n) Ltc	I		Method/ Plant Used	Cable Pe	rcussio		sheet	4 of 5
PR	OGRES	SS			ST	TRATA		SAMPL	ES & 1	TESTS	5	
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Resul		Field Records
					-	with no fissures between 20. 22.00m	95m and	21.00-21.45	U54	38 blow	/S	
						with a band of very closely f between 21.50m and 21.64m	issures	21.45 21.50-21.95 21.60 21.70 21.80	D55 U56	37 blow V - Faile V - Faile V - Faile	ed ed	
					- - - -	becoming slightly sandy belo with frequent bioturbation be		- 21.95 22.00-22.45	D57 U58	39 blow	's	
								22.45 22.50-22.95 22.70 22.80	D59 U60	22 blow V - Faile V - Faile	ed	
					- - - -			22.90 22.95 23.00-23.45	D61 U62	V - Faile 40 blow	ed	
								23.45 23.50-23.95	D63 U64	45 blow	's	
				t	†			F				

.. wit occasional bioturbation below 24.00m

... becoming silty CLAY with no sand below 24.50m

... with rare pyrite nodules and occasional pockets of dark grey sand below 26.50m

Borehole No

nt Instrume

D65 U66

D67 U68

D69 U70

D73 U74

D75 U76

45 blows

39 blows V - Failed V - Failed V - Failed

47 blows

55 blows

46 blows

45 blows

23.95 _24.00-24.45

24.45 24.50-24.95 24.60 24.70 24.80 24.95 -25.00-25.45

25.95 26.00-26.45

26.45 26.50-26.95

25.45 D71 25.50-25.95 U72

Job No		D	Line E ate Start ate Com	ed	20/04/10 23/04/10	Ground Level (mOD) 3.25		tes 187.8 N17	8024.3		nal Deptl 3	h 1.00m
Client		Powe	erstatio	n) Ltd			Method/ Plant Used	Cable Pe		Sh	eet	5 of 5
PR	OGRI	ESS			ST	RATA		SAMPLI	ES & 1	TESTS		
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descripti	on	Depth (m)	Type No	Test Result		Field
			-24.95	 	28.20	Very dense, dark brownish gre	y and	- 28.00-28.45	U82	57 blows		
					-	Very dense, dark brownish gre occasionally greenish grey fine SAND with rare flint cobbles. (LAMBETH GROUP)	to medium	28.45 28.50-28.95	D83 U84	29 blows		
					-			28.95 29.00-29.45	D85 U86	75 blows		
22/04/10	29.00	Dry 8.54			-			29.45	D87			
23/04/10	29.00	8.54			(2.80)	with a band of cemented silt 29.50m and 31.00m	stone between	- - -				
					-			-				
					-			- - -				
23/04/10	29.50	Dry	-27.75		31.00			31.00	D88			
					-	End of Borehole		31.00		N60/ 0.075	60 /	
					-			- - -				
					-			- - -				
					-			- -				
								- - -				
					- 			-				
								- - -				
					- -			- - -				
					-			-				
					- -			 - -				
							DL/G	-				
From	To To		Hours	Water A From	Added (m)	GENERAL REMA	RKS					
29.45	31.0	_	2.00.00			-						

CONCEPT SITE INVESTIGATIONS

					with rare pockets of dark grey sand below 27.50m	26.95 27.00-27.45 27.45 27.50-27.95 27.95	D77 U78 D79 U80 D81	36 blows 47 blows	
C	hiselling (1	n)	Water Ad	lded (m)	GENERAL REMARKS				
From	То	Hours	From	То					
Issue N	No. 03				Driller BN				AGS temporer a surprise to a



Borehole No

Project

STR QUALITY	da,	Borehole No
(R)		BH08

Job No			ate Star		04/05/10	Ground Level (mOD)	Co-Ordinat	es		Fi	nal Depth	
1(0/2254	D	ate Com	pleted	05/05/10	3.86	E 5313	388.7 N 17	8144.5	;	34.30m	
Client R	EO (I	Pow	erstatio	on) Ltd	l		Method/ Plant Used	Cable Pe	rcussio		eet 1 of 5	
PRO	OGRE	SS			ST	RATA		SAMPL	ES & 1	TESTS		nt/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument
4/05/10		Dry	3.79		0.08	Asphalt. Brown sandy GRAVEL. (Type	1)	0.25	ES01			
			3.66		0.20	(MADE GROUND) Firm, brown mottled yellowish	/	- 0.50	ES02			
			3.31		0.55	gravelly CLAY with brick frag brick cobbles. (MADE GROUND)		0.50	B03			
			2.96		0.90	Firm, brown to greyish brown s CLAY with shell, brick and po	andy gravelly	- 1.00	ES04 B05			
						fragments. (MADE GROUND)		1.00 1.20-1.65	U06	48 blows		
			2.21		(0.75) 1.65	Firm, brown to reddish brown v CLAY with brick and pottery fi (MADE GROUND)		- 1.70	D07			
				0-00	-	Medium dense, greyish brown r reddish brown very clayey subr	nottled ounded fine to	1.70 1.70-1.90 1.70	B08	N26	3, 5 / 7, 6, 6, 7	
		o : -	1.70			coarse flint GRAVEL. (RIVER TERRACE DEPOSIT	Λ	1.90-2.20 2.20-2.70	B09 B10		, , , , , ,	
04/05/10	2.20	2.10		0.000	}	Medium dense to dense, yellow orangish brown sandy subround fine to coarse flint GRAVEL.	ish brown to ed to rounded	2.20	BIU	N16	2, 2 / 3, 4, 4, 5	
04/05/10	2.70	Dry		000	ן ≰	(RIVER TERRACE DEPOSIT	S)	2.70-3.20	B11	N16	2, 3 / 4, 3, 4, 5	
				°0 ÷ 0	1 1					NIO	2, 3 / 7, 3, 7, 3	
4/05/10	3.20	3.00		0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0				- 3.20-3.70 - 3.20	B12	N20	2, 4 / 5, 4, 5, 6	
				000				-		1120	2, 1, 2, 1, 2, 0	
04/05/10	3.70	Dry		.0 . 0 .0 . 0	<u></u> ≰			- 3.70-4.20 - 3.70	B13	N50/	5,7/9,11,14,16	
				0.00	Ł I			-		0.29	- , - , , , , , -	
04/05/10	4.20	3.90		00.00	Ł I			4.20-4.70	B14	N33/	8, 11 / 13, 20	
				0.000	ŁΙ			-		0.145		
04/05/10	4.70	4.50		0 1. 0	(5.30)			4.70-5.20	B15	N45	6, 8 / 10, 10, 12, 13	
				.000				-				
				0000				-				
				0000 000				-				
04/05/10	5.70	5.50		0 0 0 0 0 0 0 0	£			- 5.70-6.20 - 5.70	B16	N37	4,7/9,8,9,11	
		Ţ	Į	0 / 0	ŧ			- 5.75			., , , , , , , , , , , , , , , , , , ,	
				°0.5°0 ?0.0	Ę			-				
				°, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,				-				
04/05/10	6.70	1	Ľ	0.00				6.70-7.20	B17	N12.1	25/7709	
		_	- 	00.00				6.70		N31	3, 5 / 7, 7, 9, 8	
С	hiselling	(m)		Water A	Added (m)	GENERAL REMAI		1.00 1.1				_
From	То		Hours	From	То	1. An inspection pit has h 2. Ø200m casing used fro 30.10m depth.	and excavated to om ground level	to 7.65m depth	and then	reduced to	Ø150m at 28.75m to	
				1.90	6.30	30.10m depth. 3. Water seepage encoun encountered at 28.05m, r to 16.44m after 20 minut 4. Borehole blowing bett 5. A vibrating wire piezo 6. Borehole backfilled w	ising to 25.62m a es. veen 33.60m and meter installed a	after 30 minutes 31.10m depth. t 22.00m depth	s. Water s	eepage enc	countered at 33.60m, risi	C
						and 21.00m and with ber						<u> </u>

8 Warple London V Telephon	Way V3 ORF e: 020 88	811 28	80 Fax: 02	20 8811 2		SATIONS		R	UK	A S AMENT	Borehole No BH08	
Project			ultants.co.u		ion				0	01		
)/2254		ate Start ate Com		04/05/10 05/05/10			t es 388.7 N 17	8144.5		nal Depth 34.30m	
Client R	EO (F	Powe	erstatio	n) Ltd			Method/ Plant Used	Cable Per	rcussio		2 of 5	
PRO	OGRE	SS			ST	TRATA		SAMPLI	ES & 1	TESTS		int/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
04/05/10	7.50	7.40	-3.34	° 0 ° 0 × × × × × × × × × × × × × × × × × × ×	7.20	Stiff to very stiff, fissured brow greyish brown silty CLAY. (LONDON CLAY) becoming greyish brown to g 7.40m		7.30	D18 U19	38 blows		
								8.00 8.00-8.50	D20 B21			
04/05/10 7.65 Dry								8.50-8.95 8.50	D22	N17	2, 3 / 3, 4, 5, 5	
								- - - 9.50-9.95 - -	U23	48 blows		
								- 10.00 - 10.00	D24			
								- 10.50-10.95 - 10.50 	D25	N24	3, 4 / 5, 6, 6, 7	
						becoming extremely fissured occasional bioturbation and rare cemented silt and rare pyrite no	e pockets of	11.50-11.95	U26	58 blows		
						11.50m with a band of claystone betw and 12.40m		12.00	D27			
						und 12.7011		12.50-12.95	D28	N26	3, 4 / 5, 6, 7, 8	
					- - - - -	becoming very closely fissur pyrite nodules below 13.50m. F randomly orientated with slight	issures are	13.50-13.95 13.65 13.80 14.00	U29 D30	64 blows V - Failed V130+kPa		
C	hiselling	; (m)		Water A	Added (m)	GENERAL REMAN	RKS					
From	То		Hours	From	То	_						
Issue N	No. 03					Driller						



Project Northern Line Extension

	orthe	ern 1	Line E	xtens	ion							
Job No		.	ate Start		04/05/10	Ground Level (mOD)	Co-Ordina	tes		F	inal Depth	
10	0/2254	4 Da	ate Com	pleted	05/05/10	3.86	E 531	388.7 N 17	8144.5	5	34.30m	
Client R	EO (I	Powe	erstatio	n) Ltd	l		Method/ Plant Used	Cable Per	rcussio	n SI	heet 3 of 5	
PRO	OGRE	SS			ST	RATA		SAMPLE	ES & 1	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
04/05/10 05/05/10	7.65	B y Dry Dry				with a band of claystone betv and 14.95m becoming extremely closely occasional pockets of light dark 17.00m fissures becoming subvertica subhorizontal with unpolished s 18.00m with rare bioturbation below	fissured with grey sand at and urfaces below 18.50m	14.50-14.95 14.50 14.50 15.00-15.45 15.50 15.50-15.95 16.00 16.00-16.45 16.50 16.50-16.95 17.00 17.00-17.45 17.50 17.50-17.95 18.00 18.00-18.45 18.15 18.50 18.50 18.50 19.00 19.00-19.45 19.50 19.50 19.50-19.95 20.00 20.00-20.45 20.50 20.50 20.50 21.00	D31 U32 D33 U34 D35 U36 D37 U38 D39 U40 D41 U42 D43 U44 D45 U46 D47 U48 D45 U46 D47 U48 D49 U50 D51 U52 D53 U54 D55	N64/ 0.055 84 blows 76 blows 80 blows 92 blows 92 blows 94 blows 92 blows 92 blows 94 blows 96 blows 100 blow 96 blows 94 blows 94 blows 94 blows	5, 11 / 14, 50 5 5 5 5 5 5 5 5 5 5	
C From	hiselling To		Hours	Water A	Added (m)	GENERAL REMAI	RKS					
Issue 1	No. 03					Driller SW					AGS=	

Borehole No

BH08

8 Warple London \ Telephor	e Way W3 ORF ne: 020 8	811 28		20 8811 28		SATIONS		B	UK	AS MININ D1	Borehole No BH08	
Project	t											
		ern l	Line F	Extens	ion							
Job No 1) 0/2254		ate Star		04/05/10 05/05/10		Co-Ordina				nal Depth	
Client				ipieteu	05/05/10	3.86		388.7 N 17	8144.5		34.30m	
		Powe	rstatio	on) Ltd			Method/ Plant Used	Cable Per	rcussio	n Sh	4 of 5	
PR	OGRE	SS		-	ST	RATA	I	SAMPLE	ES & 1	TESTS		nt/
Date	Casing	Water	Level	Lagand	Depth	Strata Descriptio		Depth	Туре	Test	Field Records	Instrument/
Date	Car	Ň	(mOD)	Legend	(Thickness)	Suata Descriptio	511	(m)	No	Result		
					-			- 21.00-21.45	U56	100 blows V - Failed V - Failed		
					.	with pockets of brownish gre	v and dark	- 21.30 - 21.50	D57			
				× *	-	grey sand and rare bioturbation	at 21.40m	21.50-21.95	U58	100 blows		
				$\begin{array}{c} x \\ -x \\ x \\ -x \end{array}$	-			-	D.50			
				× *	-			22.00	D59 U60	90 blows		
					.			-				
					_			- 22.50 22.50-22.95	D61 U62	92 blows		
					-			- 22.30-22.93	0.02	92 biows		
					-			- 23.00	D63			
				×	-			23.00-23.45	U64	100 blows		
					-			-				
				×_*	-	becoming extremely closely	to verv	- 23.50 - 23.50-23.95	D65 U66	94 blows		
					-	closely fissured below 23.50m. randomly orientated and smooth	Fissures are	23.65 23.80		V - Failed V - Failed		
					-	with a smooth polished shear 23.55m	surface at	24.00	D67	0(1)		
					-	23.55111		24.00-24.45	U68	96 blows		
				$\overline{\times}$				- 24.50	D69			
				× *	-			24.50-24.95		100 blows		
					-			-				
				× *	-			- 25.00 - 25.00-25.45	D71 U72	100 blows		
					-			-				
		9			-			25.50	D73			
		2 ⊻			-			25.50-25.80	U74	100 blows		
								25.85 25.85-26.30	D75 U76	100 blows		
				× *	-			_				
								26.25 26.25-26.65	D77 U78	100 blows		
					.			-				
					-			26.70 26.70-27.15	D79 U80	100 blows		
					-			-				
					-			27.20	D81			
						with frequent bioturbation, ra grey fine sand and rare pyritise	tre partings of d lignite below	27.20-27.60	U82	100 blows V - Failed		
					.	27.20m		27.50 27.65	D83	V - Failed		
			-23.97		27.83	becoming very closely fissur silty sand sandy below 27.65m	ed, slightly	- 27.65-28.10 - 27.80	U84	100 blows V - Failed		
			-24.14		- 28.00	with a band of well rounded	medium flint	- 27.95		V - Failed		
C	Thiselling	g (m)		Water A	dded (m)	GENERAL REMAI	RKS					
From	To	I	Hours	From	То	_						
Issue]	No	-	1		1	Driller						
15500	03					SW					AGS	-



Project

Job No

Client

PROGRESS

Northern Line

Varple ndon V lephor	Way V3 ORF ie: 020 8	8811 28	SITE 80_Fax: 02 sultants.co.u	20 8811 2		ATIONS		B	UK QUAN		Borehole No BH08
oject N		ern	Line E	Extens	ion						
b No		D	ate Start	ted	04/05/10	Ground Level (mOD)	Co-Ordina	tes		Fi	nal Depth
1	0/225	4 D	ate Com	pleted	05/05/10	3.86	E 531	388.7 N 17	8144.5		34.30m
ient R	EO (Powe	erstatio	n) Ltd	l		Method/ Plant Used	Cable Per	rcussion		eet 5 of 5
PRO	OGRI	ESS			ST	RATA		SAMPLE	ES & T	ESTS	
ite	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records
5/10 5/10	7.65 7.65	28.00		× × · · · · · · · · · · · · · · · · · ·	×	gravel at 27.80m Greyish brown thickly laminate SAND with rare shell fragments		28.15 28.15-28.40	D85 U86	100 blows	

Borehole No

nt ackfill

Issue No. 03

	0 010				~ ~ ~		SAME	Lba	LOID		1 <u>0</u>
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrumer Backfill
05/05/10 05/05/10	7.65 7.65	28.00	-	× ×	-	gravel at 27.80m	28.15	D85 U86	100 blows		
05/05/10	7.65	28.25			-	Greyish brown thickly laminated clayey SAND with rare shell fragments. Laminae infilled with up to 1mm grey sand. (HARWICH FORMATION?)	28.45	D87 U88	100 blows		
05/05/10	28.85	28.20		× × × × × × × × × × × × × × × × × × ×	-	with a band of well rounded medium flint gravel at 28.00m	28.75	D89 U90	100 blows		
					(1.80)	Stiff, dark grey slighty sandy silty CLAY with frequent shell fragments (oysters) (LAMBETH GROUP)		Dot			
				× × ×	-	with a band of cemented shells between 28.75m and 28.85m with a band of siltstone between 29.25m	29.25	D91			
			-25.94	× × ×	29.80	and 29.80m	29.80	D93			
05/05/10	29.90	29.80	-23.94		-	Stiff, fissured grey mottled reddish brown and blue sandy CLAY. (LAMBETH GROUP)	29.90-30.30	U94	100 blows		
				<u> </u>	-	(LAMBETH OKOUT)	30.35	D95			
					-		30.50-31.00	B96			
					-		-				
05/05/10	30.10	Dry			-		31.00-31.45	D97	N50/ 0.25	8, 9 / 12, 14, 14, 10	
					-		-		0.20		
					-		F				
					- (3.80)		-				
					-		32.00-32.45	U98	100 blows		
					-		32.50	D99			
					-		-				
					-		- 33.00-33.45 - 33.00	D100	N50/ 0.215	10, 13 / 15, 18, 17	
		3			-		33.60-34.00	B101			
		₹	-29.74	× · · ·	33.60	Dense to very dense, brown silty SAND.	55.00-54.00	BIUI			
				· . · .× . ·× · . · .	(0.70)	(THANET SAND)	- 34.00-34.30	D102			
05/05/10	20.10	Des	20.44	· · ·× · ·× · · ·			34.00		N50/ 0.245	4, 8 / 11, 14, 17, 8	
05/05/10	30.10	Dry	-30.44	· . · . × . ·	34.30	End of Borehole	ł				
					-		-				
					-		-				
C	hisellin	ıg (m)		Water A	dded (m)	GENERAL REMARKS					
From	То	1	Hours	From	То						
28.75 29.25	28.8 29.8		0.15.00 1.30.00								
Issue 1	No. 03	3				Driller SW				AGS	in in Billionaire i MBBLIG MEIREAN

8 Warple London V Telephon	Way V3 ORF e: 020 8	3811 288	SITE 30_Fax: 02 ultants.co.u	20 8811 28		SATIONS		B		A S	Borehole No BH09	
Project			Line E		ion							
Job No		Da	ate Start	ed	26/04/10 05/05/10		Co-Ordinat E 531:	tes 592.0 N 17	78135.8		nal Depth 31.50m	
Client R	EO (Powe	rstatio	n) Ltd		1	Method/ Plant Used	Cable Pe	rcussior		eet 1 of 5	
PRO	OGRI	ESS			ST	TRATA	1	SAMPL	ES & T	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	X Instrument/
26/04/10	-	Dry	3.75		0.20	Asphalt over reinforced concret (MADE GROUND) Brown clayey SAND with brick		0.30	ES01 B02			
					- (1.00)	fragments. (MADE GROUND) Brown, sandy CLAY with occa fragments and rare cobbles.	sional brick	0.50 0.50	ES03 B04			
			2.65		- 1.30	(MADE GROUND)		- - 1.20 - 1.20	ES05 B06			
26/04/10	1.50	Dry			-	Dark yellowish brown sandy su subrounded fine to coarse flint (RIVER TERRACE DEPOSIT	GRĂVEL.	1.50 1.50 1.50-1.95 1.50-2.00 1.50	ES05 B06 B07 B08	N16	2, 2 / 3, 4, 4, 5	
								- 2.50-2.95 - 2.50-3.00 - 2.50	B09 B10	N19	2, 3 / 4, 4, 5, 6	
26/04/10 27/04/02	3.00 3.00 3.50	2.40 Dry 3.20				becoming orangish brown an rounded fine to medium with ra fragments below 3.50m	d angular to re sandstone	- - - - - - - - - - - - - - - - - - -	B11 B12	N22	3, 3 / 4, 5, 6, 7	
27/04/10	4.50	4.30			(5.30)			4.50-4.95 4.50-5.00 4.50	B13 B14	N29	3, 3 / 6, 7, 7, 9	
27/04/01 27/04/10	5.30 5.50	⊉ 5.20				becoming angular to well rot coarse below 5.50m	inded fine to	5.50-5.95 5.50 5.50 5.50 5.50	B15 B16 B17	N31	3, 4 / 5, 8, 8, 10	
			-2.65	0.000	6.60			- - - 6.50-6.95 - 6.50 - 6.60	B18 B19 B20			
					-	Firm to stiff, fissured brown to g silty CLAY. (LONDON CLAY)	greyish brown	- 7.00-7.45		50 blows		
C From	hisellin To		Hours	Water A From 1.50	added (m) To 5.30	GENERAL REMAI 1. An inspection pit has 1 2. Ø200m casing used fr 31.00m below ground ler 3. Water seepage encoun at 24.50m below ground 4. Bailing water between 5. Ø50 monitoring well i level.	nand excavated to om ground level vel. tered at 5.30m and level, rising to 20 26.50m and 27.5	nd was sealed o 0.07m after 20 95m. Borehole	off at 6.70r minutes. blowing b	n depth. W etween 31	Vater seepage encount	ered



26 50m to 25 00m non chingle from 25 00m to 22 00m	and with hantanita nallata from 22	00m to
AV. AND M. C. AND DOG SHIPPING DADD & AND DADD		
	ANTITIAL ANTICIDE ANTICIDE TANDA ANTITIAL ANTITIAL ANTIT	26.50m to 25.00m, pea shingle from 25.00m to 22.00m, and with bentonite pellets from 22 Driller depth. Concrete with lockable stopcock cover installed from 0.50m to ground level. BN

Project

Northern Line Extension

N	orthe	ern 1	Line Exte	nsion							
Job No			ate Started	26/04/10		Co-Ordina	tes		Fi	nal Depth	
1()/2254	Da	ate Complete	d 05/05/10	3.95	E 531	592.0 N 17	8135.8	3	31.50m	
Client R	EO (P	owe	erstation) L	td		Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 2 of 5	
PRC	OGRE	SS		S	FRATA	•	SAMPLI	ES & 1	TESTS		nt/
Date	Casing	Water	Level (mOD) Lege	nd Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
				× × × × × × × ×	with a band of claystone at 7 becoming grey below 7.40m	.30m	7.45	D22			
27/04/10	7.50	Dry					- 8.00-8.45 - 8.00	D23	N21	3, 4 / 5, 5, 5, 6	
			יאן אן א	<pre></pre>	becoming extremely closely fissured and slightly silty below Fissures are subvertical to subh moderately polished surfaces.	7 9.00m.	- 9.00-9.45 - 9.05 - 9.28	U24	40 blows V - Failed V - Failed		
					becoming extremely closely rare bioturbation and rare tabul	fissured with ar claystone	- 10.00-10.45	U25	35 blows		
			אן אין אן אן אין אין אן אין אין אין אין אין אין אין אין אין אין		fragments below 10.00m		10.45 11.00-11.45 11.00	D26	N24	4, 4 / 5, 6, 6, 7	
					fissure surfaces becoming pol occasionally undulating below	ished and 12.00m	12.00-12.45 12.10 12.20 12.45	U28 D29	38 blows V - Failed V - Failed		I
							- 13.00-13.45 - 13.00	D30	N28	4, 5 / 6, 6, 7, 9	
			× - ×	← <u>+</u>			- 14.00-14.45	U31	36 blows		
Cl From	hiselling To	_	Wat Hours From	er Added (m) n To	GENERAL REMAI	RKS			<u>.</u>		
Issue N	No. 03				Driller BN					AGS	NAMES & BUTCH

Borehole No

BH09

UKAS UKAS UKAS

8 Warple London V Telephon	Way V3 ORF e: 020 8	3811 28		20 8811 28		SATIONS		B	UK	AS ANNY D1	Borehole No BH09	
Project N		ern]	Line F	Extens	ion					ľ		
Job No)/225		ate Star		26/04/10		Co-Ordina				nal Depth	
	J/ 223	4 Da	ate Com	pleted	05/05/10	3.95		592.0 N 17	8135.8		31.50m	
Client R	EO (Powe	erstatio	n) Ltd			Method/ Plant Used	Cable Per	rcussio		eet 3 of 5	
PRO)GRI	ESS			ST	TRATA		SAMPLI	ES & 1	TESTS		nt/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
					-			14.45	D32			
					- - - - -			- 15.00-15.45	U33	38 blows		
27/04/10 28/04/10	7.50 7.50	Dry Dry			(17.95)			15.45 15.50-15.95	D34 U35	41 blows		
					- - - -			15.95 16.00-16.45	D36 U37 D38	34 blows		
					- - - -	becoming very closely fissure occasional bioturbation and rare dark grey sand and rare pyrite r 16.50m	ed with e pockets of nodules below	16.45 16.50-16.95 16.95	U39 D40	35 blows		
					-			17.00-17.45 17.45 17.50-17.95	U41 D42 U43	31 blows 33 blows		
					- - - -	becoming stiff and sandy wit bioturbation and no fissures bel	h frequent ow 17.50m	- 17.60 - 17.70 - 17.80 - 17.95 - 18.00-18.45	D44 U45	V - Failed V - Failed V - Failed 32 blows		
					-			- 18.45 18.50-18.95	D46 U47	32 blows		
					- - - - -			18.95 19.00-19.45	D48 U49	29 blows		
					-	with occasional pockets and	partings of	19.45 19.50-19.95 19.60 19.80	D50 U51	34 blows V - Failed V - Failed		
		2 ⊻_			- - - -	grey sand and a subhorizontal (fine grey sand with occasional t nodules between 19.70m and 19	30°) band of	19.95 20.00-20.45	D52 U53	30 blows		
					-			20.45 20.50-20.95 20.95	D54 U55 D56	29 blows		
C	hisellin	g (m)		Water A	dded (m)	GENERAL REMAI	RKS	L		I	1	
From	To		Hours	From	To							
Issue N	No. 03					Driller BN					AGS	



CONCEPT SITE INVESTIGATIONS

8 Warple Way

London W3 ORF Telephone: 020 8811 2880 Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

Project

Borehole No	da,	STRQUALITA
BH09	UKAS	(R)
	001	

Northern Line Extension Date Started Job No 26/04/10 Ground Level (mOD) Co-Ordinates **Final Depth 10/2254** | Date Completed 05/05/10 3.95 E 531592.0 N 178135.8 31.50m Client Method/ Sheet Cable Percussion 4 of 5 **REO (Powerstation) Ltd** Plant Used PROGRESS STRATA SAMPLES & TESTS Field Water Depth Level Type No asin Depth Test Date Strata Description Records Legend (mOD) (Thickne (m) Result U57 21.00-21.45 26 blows 21.45 21.50-21.95 D58 U59 32 blows becoming extremely closely fissured and sandy with frequent pockets of grey sand and occasional pyrite nodules and rare pyritised wood fragments and a fossilised shark tooth 21.95 _22.00-22.45 D60 U61 39 blows below 21.50m D62 U63 22.45 22.50-22.95 42 blows 22.95 D64 U65 40 blows becoming very closely fissured below 23.00m 23.45 D66 23.50-23.95 23.60 U67 7 blows - Failed ... becoming closely fissured below 23.50 ... with a 45° polished slightly undulating shear surface at 23.65 23.80 - Failed 23.95 D68 24.00-24.45 U69 49 blows 24.10 - Failed 24.30 - Failed becoming very stiff with no fissures below × — × _ × _ × _ × _ × 24.20m 24.45 24.50-24.95 D70 U71 Ý 28/04/10 24.50 .. becoming sandy below 24.25m -20.60 > 24.55 30 blows 24.65 - Failed Stiff, greyish brown thinly laminated slightly sandy CLAY. Laminae infilled with up to 24.80 - Failed 1mm of grey fine sand. (HARWICH FORMATION?) 24.95 D72 U73 _25.00-25.45 41 blows ... becoming silty with frequent partings of light brown sand and with tabular pyrite nodule at 24.55m 25.45 25.50-25.75 D74 U75 ... becoming very stiff and slightly silty below 24.80m 75 blows 28/04/10 25.50 Dry 29/04/10 25.50 18.00 (2.25) 25.75 D76 . with a band of cemented shells between 9/04/10 25.70m and 26.30m ... with a band of siltstone between 26.30m 26.50 D77 and 26.80m -22.85 26.8 Very stiff to hard, fissured reddish brown mottled bluish grey slightly silty CLAY. (LAMBETH GROUP) U78 27.00-27.45 41 blows 27.45 27.50-27.95 D79 U80 53 blows 27.95 D81 29/04/10 27.50 Dry GENERAL REMARKS Water Added (m) Chiselling (m) From То То Hours From 25.75 26.80 02.20.00 Issue No. 03 Driller BN

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project **Northern Line Extension** Date Started 26/04/10 Ground Level (mOD) C Job No **10/2254** | Date Completed 05/05/10 3.95 Client **REO** (Powerstation) Ltd PROGRESS STRATA Water Depth Level Date Strata Description Casi Legend (mOD) (Thickne 05/05/10 27.50 19.30 .. becoming blue to bluish grey mo reddish brown and olive/greenish b below 28.60m (4.40)05/05/10 29.00 Dry -27.25 31.2 Dark reddish brown to greyish brow • .× . fine to medium SAND. (LAMBETH GROUP) 05/05/10 31.00 Dry -27.55 31.50 End of Borehole GENERAL REMARK Chiselling (m) Water Added (m) То From То From Hours Driller Issue No. 03 BN



Borehole No

BH09

Co-Ordinat				nal Depth	
	592.0 N 17	78135.8		31.50m	
Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 5 of 5	
	SAMPL	ES & T	TESTS		ent/
L	Depth (m)	Type No	Test Result	Field Records	Instrument Backfill
	28.00-28.45	U82	85 blows		
	28.45 28.50-28.95	D83 U84	78 blows		
ottled brown	28.95 29.00-29.30	D85 U86	100 blows		
	29.45 29.50-29.85 	D87 U88	100 blows		
	29.95 30.00-30.36	D89 U90	98 blows		
	30.45	D91			
	31.00-31.45 31.00	D92	N52	4, 5 / 11, 12, 12, 17	
own silty	-				
	-				
	-				
	-				
	- 				
	-				
	- - - -				
	-				
	- -				
KS					
				AGS	unite in Industriality 4

CONCEPT SITE INVESTIGATIONS

8 Warple Way London W3 ORF Telephone: 020 8811 2880 Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk

		proon	ountainto.oo.u	iiv.							
Project N		ern	Line E	Xtens	sion					·	
Job No	,	D	Date Start	ted	11/05/10	Ground Level (mOD)	Co-Ordinat	tes		F	inal Depth
1	0/2254	4 D	Date Com	pleted	12/05/10			522.1 N17	7927.8		31.00m
Client R	EO (I	Pow	erstatio	n) Ltd			Method/ Plant Used	Cable Per	rcussio		neet 1 of 5
PR(OGRE	SS			ST	RATA		SAMPLE	T & 25	TESTS	1
Date	Casing	Water	Level (mOD)	Legend	Depth	Strata Descriptio	on	Depth (m)	Type No	Test Result	Field Records
11/05/10		Dry	3.34	$\frac{\sqrt{1}}{\sqrt{1}} \cdot \frac{\sqrt{1}}{\sqrt{1}}$		Turf over dark brown to grey si CLAY. (TOPSOIL)	lty sandy	0.10	ES01		Roots of live appearance to 0.20m depth
						Medium dense, brown to dark b gravelly SAND with bick fragn brick cobbles. (MADE GROUND)		0.50	ES02 B03		
					(1.30)			- 1.00 - 1.00 - 1.20-1.70 - 1.20	ES04 B05 B06	N6	1, 0 / 1, 2, 1, 2
			2.04		- 1.60	Soft to firm, brown to dark brow		1.70-21.50	U07	36 blows	,
			1.54		(0.50)	CLAY with occasional flint gra (MADE GROUND?)	ivel.	2.00	ES08		
					- 2.35	Medium dense, brown occasion orangish brown sandy clayey G (RIVER TERRACE DEPOSIT	RÁVEL.	2.20 2.20-2.70 2.20	D09 B10	N35	2, 4 / 5, 9, 10, 11
				0000 0000	- - -	Medium dense to dense, orangis brown sandy subangular to subr coarse flint GRAVEL. (RIVER TERRACE DEPOSIT	rounded fine to	- - - -			
11/05/10	3.20	3.00				with lenses of brown sandy c 3.30m and 3.60m	lay between	3.20-3.70 3.20	B11	N17	4, 4 / 3, 4, 5, 5
			0.04	0		Medium dense to dense, orangis brown fine to coarse SAND wit subangular to subrounded fine t	th occasional				

Issue N	No. 03	3				Driller BN				AGS mental
From	To	<u> </u>	ours	Water A From 2.35	dded (m) To 7.35	GENERAL REMARKS 1. An inspection pit has hand excavated t 2. Ø200m casing used from ground level 31.00m below ground level. 3. Water seepage encountered at 6.80m d encountered at 23.10m depth, rising to 11 4. Ø50 monitoring well installed at 31.00 level. 5. Borehole backfilled with pea shingle f to 0.50m depth. Concrete with lockable s	lepth, rising to 8.27m after 20 0m depth, slott rom 31.00m to	6.19m afte minutes. ed between 0 23.00m, a	r 20 minute 23.00m an nd with ber	es. Water seepage d 31.00m below ground ntonite pellets from 23.00r
							L			
11/05/10	6.80	Ţ					- - - - -			
11/05/10	6.20	6.00 <u>1</u>			(3.25)		- - - - - - - - - - - - - - - - - - -	B14	N32	3, 5 / 6, 8, 8, 10
11/05/10	5.20	4.70		0.0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	- - - - -	(RIVER TERRACE DEPOSITS)	5.20-5.70 5.20	B13	N42	5, 7 / 9, 10, 11, 12
11/05/10	4.20	Dry	-0.40		4.10	gravel. (RIVER TERRACE DEPOSITS) Medium dense to dense, orangish brown to brown sandy subangular to subrounded fine to coarse flint GRAVEL.	4.20-4.70 4.20	B12	N30	3, 5 / 7, 7, 7, 9
		-	0.04	0.0.01	3.60	with lenses of brown sandy clay between 3.30m and 3.60m Medium dense to dense, orangish brown to brown fine to coarse SAND with occasional subangular to subrounded fine to coarse flint	-			
11/05/10	3.20	3.00			_ (1.25)	Medium dense to dense, orangish brown to brown sandy subangular to subrounded fine to coarse flint GRAVEL. (RIVER TERRACE DEPOSITS)	- - - - - - - - - - - - - - - - - - -	B11	N17	4, 4 / 3, 4, 5, 5
					2.10	Medium dense, brown occasionally mottled orangish brown sandy clayey GRAVEL. (RIVER TERRACE DEPOSITS)	2.20 2.20-2.70 2.20	D09 B10	N35	2, 4 / 5, 9, 10, 11
					(0.50)	Soft to firm, brown to dark brown silty sandy CLAY with occasional flint gravel. (MADE GROUND?)	1.70-21.50 2.00	U07 ES08	36 blows	
			2.04	1XXXXXI	1.60		[1107	2611	

CONCEPT SITE INVESTIGATIONS 8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk Project Northern Line Extensio

Job No			ate Started	11/05/10		Co-Ordinat	tes		Fi	nal Depth	
1(0/2254	Da	ate Completed	12/05/10	3.64	E 531:	522.1 N 17	7927.8	3	31.00m	
Client R	EO (P	owe	erstation) Lt	d		Method/ Plant Used	Cable Pe	rcussio	n Sh	eet 2 of 5	
	OGRE				TRATA		SAMPLI	FS & 1	FSTS		t/
	Casing	Water	Level	Depth			Depth	Туре	Test	Field Records	Instrument/
Date	Cas	Wa	(mOD) Legen	· 1	Strata Descriptio	on	(m)	No	Result	Records	Inst
1/05/10	7.20	6.20	-3.71	2-			7.20-7.35	B15	N11	4, 3 / 2, 3, 3, 3	
					Firm to stiff, fissured brown silt (LONDON CLAY)	y CLAY.	7.35-7.70	B16			
					(LONDON CLAY) becoming stiff, grey to greyis below 7.40m	h brown					
1/05/10	7.60	Dry		-1-			8.00-8.45	D17	N16	2, 2 / 3, 4, 4, 5	
							-		1110	2,2,2,3,1,1,5	
							E				
							-				
							9.00-9.45	U18	38 blows		
							Ē				
			×				- 9.50	D19			
			×	-1			-				
								D20			
				7			10.00-10.45	D20	N22	2, 3 / 5, 5, 6, 6	
							-				
							Ē				
							-				
					becoming extremely closely	ficcured and	- 11.00-11.30	U21	100 blows		
					grey with rare pyrite nodules be	low 11.00m	- - 11.35	D22			
					with occasional orangish brow fragments at 11.25m with a band of claystone betw		-				
					and 11.50m	veen 11.50m	-				
				-1-			12.00-12.45	D23			
				- <u>}</u>			12.00		N24	3, 4 / 5, 6, 6, 7	
				-1- -7-			-				
							Ľ				
				<u> </u>			- 13.00-13.45	U24	60 blows		
				<u>+</u>	becoming extremely closely fissured, slightly silty with rare	to very closely	13.15		V - Failed		
					brown fine sand and rare biotur 13.00m. Fissures are randomly	bation below	13.30	D25	V - Failed		
					with unpolished smooth surface	5.	13.50	1023			
				-1			- 14.00-14.45	D26			
C From	hiselling To	-	Hours From	Added (m)	GENERAL REMAN	(KS					
10111	10			10							
Issue N											



Borehole No

BH10

nt Instrume



Borehole No

BH10

Issue No. 03

Project

Job No			Date Star		11/05/10	· · · · ·	Co-Ordinat				nal Depth	
1	0/225	4 I	Date Con	ipleted	12/05/10	3.64	E 531	522.1 N 17	7927.8	;	31.00m	
Client R	EO (Pow	verstatio	on) Ltd			Method/ Plant Used	Cable Per	cussio	n She	eet 3 of 5	
PR	OGRI	ESS			ST	RATA		SAMPLE	ES & T	TESTS		ent/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/
1/05/10 2/05/10	7.60	Dry				becoming very closely fissure occasional pockets of light grey 15.00m with grey silty fine sand lens becoming very stiff extremel very closely fissured and slight sand with occasional bioturbatio 17.50m with frequent bioturbation be and 17.65m with a lignite fragment at 17	es at 17.40m y closely to ly silty slightly on below etween 17.55m	14.00 14.00 15.00-15.45 15.50-15.95 16.00 16.00-16.45 16.50 16.50-16.95 17.00 17.00-17.45 17.50 17.50 17.50 17.80 18.00 18.00-18.45 18.50 18.50-18.95 19.00 19.00-19.35	U27 D28 U29 D30 U31 D32 U33 D34 U35 D36 U37 D38 U39 D40 U41 D42 U43	N32 68 blows 74 blows 80 blows 78 blows 86 blows V - Failed 90 blows V - Failed 90 blows 98 blows 98 blows	4, 6 / 6, 7, 9, 10	
								- 19.40 - 19.40-19.85 -	D44 U45	82 blows		
						with a 45° polished slightly u shear surface at 19.95m with a fissure infilled with gr 20.10m with a pyrite nodule at 20.20	ey fine sand at	19.90 19.90-20.35 20.05 20.15 20.40 20.40-20.85	D46 U47 D48 U49	92 blows V - Failed V - Failed 100 blows		
								- 20.90 - 20.90-21.35	D50 U51	100 blows		
	hisellin	g (m)		Water A	Added (m)	GENERAL REMAI	RKS					
From	To		Hours	From	To							

Driller

BN

Borehole No

BH10

AGS

B VAS

8 Warple London V Telephon E-mail: s	e Way W3 ORF ne: 020 8 si@conce	3811 28	380_Fax: 0.	20 8811 28		ATIONS			B)	AS UNIVE DOI	Borehole No BH10		
Project N		ern	Line E	Extensi	ion								
Job No			ate Star	ted	11/05/10	Ground Level (mOD)	Co-Ordinat	tes		Fi	nal Depth		
10	0/225	4 D	ate Com	pleted	12/05/10	3.64	E 531522.1 N 177927.8				31.00m		
Client R	EO (Pow	erstatio	n) Ltd		•	Method/ Plant Used	Cable	Percussio		eet 4 of 5		
	DGRE		T	n) <u></u>		RATA		SAMP	LES & T	TESTS	1	nt/	
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Descriptio	on	Depth (m)		Test Result	Field Records	Instrument/ Backfill	
12/05/10 12/05/10 12/05/10	7.60 23.60 24.00	17.80 18.30	-19.16		(0.90)	with a 45° polished striated s 22.35m with a pyrite nodule at 22.65 with frequent bioturbation at Stiff, very thinly bedded dark g sandy CLAY with frequent me gravel size pockets of brown cli- medium sand. (HARWICH FORMATION) with a medium gravel size lig at 22.80m with a subrounded medium to 22.86m with frequent coarse sand siz glauconite between 22.89m and with a band of dark brown cl subrounded coarse black flint C between 23.00m and 23.05m becoming stiff, dark grey silt with occasional pockets of grey 23.60m Firm, dark grey thinly laminate sandy CLAY. Laminae infilled Imm of grey fine sand. (LAMBETH GROUP) with frequent cream shell fra (oysters) between 23.78m and 2.	shear surface at 22.72m reyish brown dium to coarse ayey fine to gnite fragment black flint at te oxidished d 22.95m layey JRAVEL y very sandy sand below d silty very with up to gments 23.84m	(III) 21.40 21.40-21. 21.85 21.85-22. 22.30 22.30-22. 22.45 22.60 22.80-23. 22.95 23.10 23.10-23. 23.60-23. 23.60 23.95-24. 24.10 24.20 24.40 24.80 25.00-25.	80 D52 U53 25 D54 U55 25 D56 U57 05 D58 U59 06 B61 90 U62 35 D63 U64 60 D65 U67 75 U68 D69 D69	I00 blows 100 blows 100 blows V - Failed V - Failed V - Failed 100 blows V - Failed 100 blows V - Failed 100 blows V - Failed 100 blows V - Failed			
12/05/10	25.80	17.10	-22.21	× · × · ×	25.85	occasional tabular pyrite nodule 23.88m becoming firm to stiff, thinly laminated, slightly sandy and sl below 23.95m	to thickly	25.80-26. 25.90 26.00 26.10	1	100 blows V18 (2)kPa V18 (2)kPa V18 (2)kPa V6 (0)kPa	a		
12/05/10 12/05/10	26.20 26.60	16.50 16.50		× × × × × × × × × × × × × × × × × × ×	(0.85)	with a tabular pyrite nodule : becoming very stiff, thickly brownish grey silty CLAY belo with a medium gravel size sh	laminated w 24.65m	26.20 26.20-26. 26.30 26.40		100 blows PP250+kPa PP140+kPa	a		
12/05/10	27.50	16.00	-23.06		26.70	at 24.76m becoming slightly clayey bet and 26.70m with a band of light yellowisi occasionally clayey fine to met between 25.80m and 25.86m Soft to firm, light brownish grey (LAMBETH GROUP) becoming brownish green be and 26.70m	h grey dium SAND y sandy SILT. tween 25.90m	26.60 26.60-27.1 27.10 27.10-27. 27.50-27. 27.50-28. 27.50-28.	50 D76 B77 95 D78	100 blows N44	4, 6 / 8, 10, 12, 14		
				×	-	becoming stiff, light brownis grey and orangish brown below becoming stiff grey SILT bel	26.40m	-			, , , , , , , , , , , , , , , , , , , ,		
C	hisellin	g (m)		Water A	dded (m)	GENERAL REMAI	RKS						
From 24.80	To		Hours	From	То	-							
24.80 25.40	25.30 25.70		1.30.00										

Issue No. 0	3		Driller



AGS

BN

CONCEPT SITE INVESTIGATIONS

Project N		ern	Line E	xtens	ion							
Job No			ate Start		11/05/10	Ground Level (mOD)	Co-Ordinat	tes		Fi	nal Depth	
10	0/225	4 D	ate Com	pleted	12/05/10	3.64	E 531:	522.1 N 17	7927.8		31.00m	
Client R	EO (Powe	erstatio	n) Ltd		1	Method/ Plant Used	Cable Per	rcussion		eet 5 of 5	
PRO	OGRE	ESS			ST	RATA	1	SAMPLI	ES & T	ESTS		nt/
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	on	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
12/05/10		15.60			(3.00)	Medium dense to dense, greyisl SAND locally glauconitic. (THANET SAND) with a pocket of grey silt at 2		28.50-28.95 28.50-29.00 28.50	D80 B81	N50/ 0.28	3, 7 / 7, 12, 17, 14	
12/05/10	29.50	15.30	-26.06	× · · · · · · · · · · · · · · · · · · ·	29.70	Dense to very dense, grey silty (THANET SAND)	SAND.	29.50 29.50-30.00 29.80	D82 B83	N33	3, 5 / 7, 7, 9, 10	
12/05/10	31.00	15.50	-27.36	× · · · · · · · · · · · · · · · · · · ·	(1.30)			- 30.50-31.00 - 30.50	B84	N28	No Recovery 2, 4 / 6, 6, 8, 8	
C	hisellin, To		Hours	Water A From	Added (m)	End of Borehole GENERAL REMAI	RKS					
Issue N	^{No.} 03	;				Driller BN					AGS=	

Borehole No

BH10

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UKAS QUALITY MICHIGANIT 001

Northern Line Extension Reference Design

7. GROUNDWATER MONITORING RESULTS

10/2254

Borehole	Depth of Installation	Date of Installation	Туре	Тор	Bottom	Date & Time	Depth (mbgl)	Depth (mOD)	Remarks
BH05	35.10	10/05/2010	SP	33.10	35.10	10/05/2010 11:00:00	20.51	-16.12	
	35.10	10/05/2010	SP	33.10	35.10	11/05/2010 08:00:00	20.00	-15.61	
	35.10	10/05/2010	SP	33.10	35.10	12/05/2010 12:10:00	19.70	-15.31	
	35.10	10/05/2010	SP	33.10	35.10	13/05/2010 14:00:00	19.17	-14.78	
	35.10	10/05/2010	SP	33.10	35.10	17/05/2010 10:00:00	19.10	-14.71	
	35.10	10/05/2010	SP	33.10	35.10	18/05/2010 10:10:00	19.08	-14.69	
	35.10	10/05/2010	SP	33.10	35.10	19/05/2010 12:40:00	19.11	-14.72	
	35.10	10/05/2010	SP	33.10	35.10	20/05/2010 10:00:00	19.09	-14.7	
	35.10	10/05/2010	SP	33.10	35.10	21/05/2010 16:05:00	19.10	-14.71	
	35.10	10/05/2010	SP	33.10	35.10	27/05/2010 16:30:00	19.05	-14.66	
	35.10	10/05/2010	SP	33.10	35.10	04/06/2010 11:35:00	18.97	-14.58	
	35.10	10/05/2010	SP	33.10	35.10	15/06/2010 17:10:00	19.07	-14.68	
	35.10	10/05/2010	SP	33.10	35.10	15/06/2010 17:50:00	19.78	-15.39	Diver removed
	35.10	10/05/2010	SP	33.10	35.10	28/06/2010 13:45:00	19.07	-14.68	
BH06	37.00	30/04/2010	SP	24.00	37.00	30/04/2010 16:50:00	29.28	-24.74	
	37.00	30/04/2010	SP	24.00	37.00	04/05/2010 14:45:00	12.96	-8.42	
	37.00	30/04/2010	SP	24.00	37.00	05/05/2010 12:18:00	12.95	-8.41	
	37.00	30/04/2010	SP	24.00	37.00	06/05/2010 16:40:00	12.96	-8.42	
	37.00	30/04/2010	SP	24.00	37.00	07/05/2010 10:20:00	12.96	-8.42	
	37.00	30/04/2010	SP	24.00	37.00	10/05/2010 15:10:00	12.93	-8.39	
	37.00	30/04/2010	SP	24.00	37.00	11/05/2010 08:50:00	12.94	-8.4	
	37.00	30/04/2010	SP	24.00	37.00	12/05/2010 12:50:00	12.93	-8.39	
	37.00	30/04/2010	SP	24.00	37.00	13/05/2010 14:00:00	12.92	-8.38	
	37.00	30/04/2010	SP	24.00	37.00	17/05/2010 10:50:00	12.93	-8.39	
	37.00	30/04/2010	SP	24.00	37.00	18/05/2010 09:55:00	12.95	-8.41	
	37.00	30/04/2010	SP	24.00	37.00	19/05/2010 12:25:00	12.94	-8.4	
	37.00	30/04/2010	SP	24.00	37.00	20/05/2010 09:45:00	12.93	-8.39	
	37.00	30/04/2010	SP	24.00	37.00	21/05/2010 15:50:00	12.94	-8.4	
	37.00	30/04/2010	SP	24.00	37.00	27/05/2010 17:45:00	12.97	-8.43	
	37.00	30/04/2010	SP	24.00	37.00	04/06/2010 13:45:00	12.96	-8.42	
	37.00	30/04/2010	SP	24.00	37.00	15/06/2010 14:10:00	12.97	-8.43	
	37.00	30/04/2010	SP	24.00	37.00	15/06/2010 14:45:00	13.46	-8.92	Diver removed
	37.00	30/04/2010	SP	24.00	37.00	28/06/2010 14:35:00	13.01	-8.47	
BH07	31.00	23/04/2010	SP	27.00	31.00	23/04/2010 17:00:00	10.70	-7.45	
	31.00	23/04/2010	SP	27.00	31.00	26/04/2010 11:00:00	10.42	-7.17	
	31.00	23/04/2010	SP	27.00	31.00	27/04/2010 17:00:00	10.30	-7.05	
	31.00	23/04/2010	SP	27.00	31.00	28/04/2010 08:00:00	10.19	-6.94	
	31.00	23/04/2010	SP	27.00	31.00	29/04/2010 14:00:00	10.01	-6.76	

GENERAL REMARKS

CONCEPT SITE INVESTIGATIONS

AGS=

GROUNDWATER MONITORING

8 Warple Way London W3 ORF Telephone: 020 8811 2880_Fax: 020 8811 2881 E-mail: si@conceptconsultants.co.uk



Project: Northern Line Extension Client: REO (Powerstation) Ltd

Job No: 10/2254

Borehole	Depth of Installation	Date of Installation	Туре	Тор	Bottom	Date & Time	Depth (mbgl)	Depth (mOD)	Remarks
BH07	31.00	23/04/2010	SP	27.00	31.00	30/04/2010 16:35:00	9.91	-6.66	
	31.00	23/04/2010	SP	27.00	31.00	04/05/2010 15:11:00	9.47	-6.22	
	31.00	23/04/2010	SP	27.00	31.00	05/05/2010 12:01:00	9.40	-6.15	
	31.00	23/04/2010	SP	27.00	31.00	06/05/2010 16:10:00	9.35	-6.1	
	31.00	23/04/2010	SP	27.00	31.00	07/05/2010 10:00:00	9.28	-6.03	
	31.00	23/04/2010	SP	27.00	31.00	10/05/2010 14:20:00	9.20	-5.95	
	31.00	23/04/2010	SP	27.00	31.00	11/05/2010 08:10:00	9.18	-5.93	
	31.00	23/04/2010	SP	27.00	31.00	12/05/2010 12:25:00	9.17	-5.92	
	31.00	23/04/2010	SP	27.00	31.00	13/05/2010 15:05:00	9.16	-5.91	
	31.00	23/04/2010	SP	27.00	31.00	17/05/2010 10:10:00	9.14	-5.89	
	31.00	23/04/2010	SP	27.00	31.00	18/05/2010 09:25:00	9.12	-5.87	
	31.00	23/04/2010	SP	27.00	31.00	19/05/2010 11:40:00	9.15	-5.9	
	31.00	23/04/2010	SP	27.00	31.00	20/05/2010 09:10:00	9.15	-5.9	
	31.00	23/04/2010	SP	27.00	31.00	21/05/2010 15:10:00	9.14	-5.89	
	31.00	23/04/2010	SP	27.00	31.00	27/05/2010 16:45:00	9.13	-5.88	
	31.00	23/04/2010	SP	27.00	31.00	04/06/2010 14:02:00	9.08	-5.83	
	31.00	23/04/2010	SP	27.00	31.00	15/06/2010 15:10:00	9.90	-6.65	
	31.00	23/04/2010	SP	27.00	31.00	15/06/2010 15:30:00	10.56	-7.31	Diver removed
	31.00	23/04/2010	SP	27.00	31.00	28/06/2010 15:10:00	9.92	-6.67	
BH09	25.00	05/05/2010	SP	22.00	25.00	05/05/2010 17:00:00	10.52	-6.57	
	25.00	05/05/2010	SP	22.00	25.00	06/05/2010 16:25:00	10.48	-6.53	
	25.00	05/05/2010	SP	22.00	25.00	13/05/2010 15:35:00	10.39	-6.44	
	25.00	05/05/2010	SP	22.00	25.00	04/06/2010 15:35:00	10.34	-6.39	
	25.00	05/05/2010	SP	22.00	25.00	15/06/2010 16:00:00	10.35	-6.4	
	25.00	05/05/2010	SP	22.00	25.00	15/06/2010 16:20:00	11.55	-7.6	Diver removed
	25.00	05/05/2010	SP	22.00	25.00	28/06/2010 16:10:00	10.37	-6.42	
BH10	31.00	13/05/2010	SP	23.00	31.00	13/05/2010 11:35:00	10.78	-7.14	
	31.00	13/05/2010	SP	23.00	31.00	17/05/2010 10:35:00	10.55	-6.91	
	31.00	13/05/2010	SP	23.00	31.00	18/05/2010 09:45:00	10.52	-6.88	
	31.00	13/05/2010	SP	23.00	31.00	19/05/2010 12:10:00	10.50	-6.86	
	31.00	13/05/2010	SP	23.00	31.00	20/05/2010 09:25:00	10.47	-6.83	
	31.00	13/05/2010	SP	23.00	31.00	21/05/2010 10:42:00	10.17	-6.78	
	31.00	13/05/2010	SP	23.00	31.00	27/05/2010 17:25:00	10.38	-6.74	
	31.00	13/05/2010	SP	23.00	31.00	04/06/2010 16:00:00	10.07	-6.43	
	31.00	13/05/2010	SP	23.00	31.00	15/06/2010 16:30:00	10.07	-6.43	
	31.00	13/05/2010	SP	23.00	31.00	15/06/2010 17:00:00	11.33	-7.69	Diver removed
	31.00	13/05/2010	SP	23.00	31.00	28/06/2010 16:45:00	10.08	-6.44	

GENERAL REMARKS



GROUNDWATER MONITORING

Project: Northern Line Extension

Client: REO (Powerstation) Ltd

Job No: 10/2254

CONCEPT SITE INVESTIGATIONS

Vibrating Wire Piezometer: BH02

Installed depth(Instrument Num k factor kPa		25.0 314307 -0.147379888 per digit		Ground Level (mOD) Range kPa Date Installed: 19/05/2010		1.66 518	
Date	Time	Microseconds	Digits (B units)	Pressure kPa	Reduced Level (mOD)	Head (m)	Remarks
19/05/2010	09:00	3270	9352.0	0.00	0.00	0.00	Base reading
19/05/2010	10:00	3476	8276.4	158.52	-7.17	16.17	After Installation
20/05/2010	08:10	3486	8229.0	165.51	-6.46	16.88	
21/05/2010	14:00	3491	8205.4	168.98	-6.10	17.24	
27/05/2010	16:00	3496	8182.0	172.44	-5.75	17.59	
04/06/2010	11:20	3499	8167.9	174.51	-5.54	17.80	
15/06/2010	13:10	3500	8163.3	175.20	-5.47	17.87	
28/06/2010	13:00	3500	8163.3	175.20	-5.47	17.87	

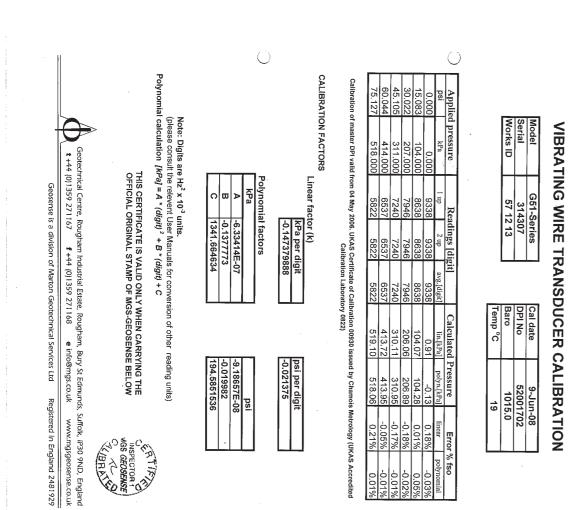
Note: For ease of entry, using mini readout CLP04, the reading of 0.03389 has beeen entered as 3389

Vibrating Wire Piezometer: BH01

Installed depth(mbgl): Instrument Number k factor kPa		20.0 314312 -0.146072618 per digit		Ground Level Range Date Installed:	(mOD) kPa 21/05/2010	4.08 518		
Date	Time	Microseconds	Digits (B units)	Pressure kPa	Reduced Level (mOD)	Head (m)	Remarks	
21/05/2010	10:50	3256	9432.6	0.00	0.00	0.00	Base reading	
21/05/2010	12:00	3454	8382.1	153.44	-0.27	15.65	After Installation	
27/05/2010	18:00	3430	8499.9	136.25	-2.02	13.90		
04/06/2010	10:20	3436	8470.2	140.58	-1.58	14.34		
15/06/2010	12:55	3437	8465.3	141.30	-1.51	14.41		
28/06/2010	13:00	3441	8445.6	144.17	-1.21	14.71		

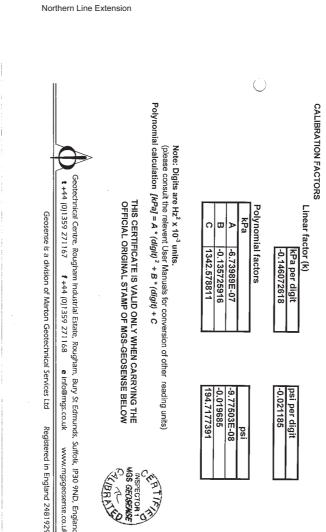
Note: For ease of entry, using mini readout CLP04, the reading of 0.03389 has beeen entered as 3389

Northern Line Extension





10/2254



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10, 10,	60.044	45.105	30.022	15.1	0.	psi)
	044 414.000	105 311.000		083 104.000		kPa	Applied pressure	
	000 6624			000 8745	0.000 9449	1 up		
	24 6624	34 7334		45 8745	49 9449	2 up	Readings [digit]	
	6624	7334	8045	8745	9449	avg.[digit]	git]	
	413.71	310.00	206.14	103.89	1.05	lin.[kPa]	Calculated Pressure	
	413.96	310.91	207.04	104.11	-0.07	polyn.[kPa]	Pressure	
	-0.06%	-0.19%	-0.17%	-0.02%	0.20%	linear	Error % fso	
	-0.01%	-0.02%	0.01%	0.02%	-0.01%	polynomial	% fso	

Model	G51-Series
Serial	314312
Works ID	57 12 18

DPI No

52001702 1015.0

VIBRATING WIRE TRANSDUCER CALIBRATION

t+44 [0]1359 271167 f+44 [0]1359 271168 e info@mgs.co.uk www.mgsgeosense.co.uk Geosense is a division of Marton Geotechnical Services Ltd Registered in England 2481929	nits. Iser Manuals for conversion of other reading units) it) ² + B * (<i>digit</i>) + C ICATE IS VALID ONLY WHEN CARRYING THE RIGINAL STAMP OF MGS-GEOSENSE BELOW	Linear racuor (x) Ipsi per digit KPa polynomial factors psi kPa -6.09886E-07 -8.84097E-08 C 1247.484439 -0.019047 180.925952 -0.925952		VIBRATING WIRE TRANSDUCER CALIBRATION Model G51-Series Serial 314309 Works ID 57 12 15 Baro 1015.0 Temp °C 19	GEÓSENSE	Vibrating Wire Pie Installed depth(m): Instrument Number kactor kPa <u>Date Time</u> <u>13/05/2010 13:30</u> <u>14/05/2010 08:32</u> <u>17/05/2010 11:30</u> <u>18/05/2010 11:30</u> <u>18/05/2010 11:30</u> <u>21/05/2010 11:30</u> <u>18/05/2010 11:30</u> <u>18/05/2010 11:30</u> <u>18/05/2010 11:30</u> <u>28/06/2010 11:31</u> Note: For ease of entry Nothern Line Extension	25.0 314305 -0.140190363 Microseconds 3313 3417 3495 3495 3495 3495 3498 3501 3504 3506 3506 3516 3516 3515	Digits (B units) 9 per digit 0 pilto.8 8564.7 8465.3 8186.6 8172.6 8158.6 8144.6 8135.3 8116.8 8098.3 8089.1 8093.7	Ground Level Range Date Installed: Pressure kPa 0.00 76.57 90.50 129.56 131.53 133.49 135.45 136.75 139.35 141.94 143.23 142.58 of 0.03389 has bee
	Vibrating Wire Piezome Installed depth(m): Instrument Number k factor kPa		PT SITE INVESTIGATIONS Ground Level (mOD) Range kPa Date Installed: 28/04/20	4.49 518 010					

Date	Time	Microseconds	Digits (B units)	Pressure kPa	Reduced Level (mOD)	Head (m)	Remarks
28/04/2010	15:40	3352	8900.0	0.00	0.00	0.00	Base reading
30/04/2010	14:00	3570	7846.3	160.21	-11.17	16.34	After Installation
04/05/2010	11:45	3574	7828.7	162.88	-10.90	16.61	
05/05/2010	09:30	3573	7833.1	162.21	-10.96	16.55	
06/05/2010	07:50	3572	7837.5	161.54	-11.03	16.48	
07/05/2010	09:45	3571	7841.9	160.87	-11.10	16.41	
10/05/2010	13:35	3571	7841.9	160.87	-11.10	16.41	
11/05/2010	07:45	3571	7841.9	160.87	-11.10	16.41	
12/05/2010	12:05	3571	7841.9	160.87	-11.10	16.41	
13/05/2010	15:50	3571	7841.9	160.87	-11.10	16.41	
17/05/2010	08:55	3574	7828.7	162.88	-10.90	16.61	
18/05/2010	09:15	3574	7828.7	162.88	-10.90	16.61	
19/05/2010	11:20	3574	7828.7	162.88	-10.90	16.61	
20/05/2010	08:45	3574	7828.7	162.88	-10.90	16.61	
21/05/2010	14:40	3574	7828.7	162.88	-10.90	16.61	
27/05/2010	15:10	3571	7841.9	160.87	-11.10	16.41	
04/06/2010	11:40	3572	7837.5	161.54	-11.03	16.48	
15/06/2010	18:10	3573	7833.1	162.21	-10.96	16.55	
28/06/2010	13:20	3572	7837.5	161.54	-11.03	16.48	

Note: For ease of entry, using mini readout CLP04, the reading of 0.03389 has beeen entered as 3389

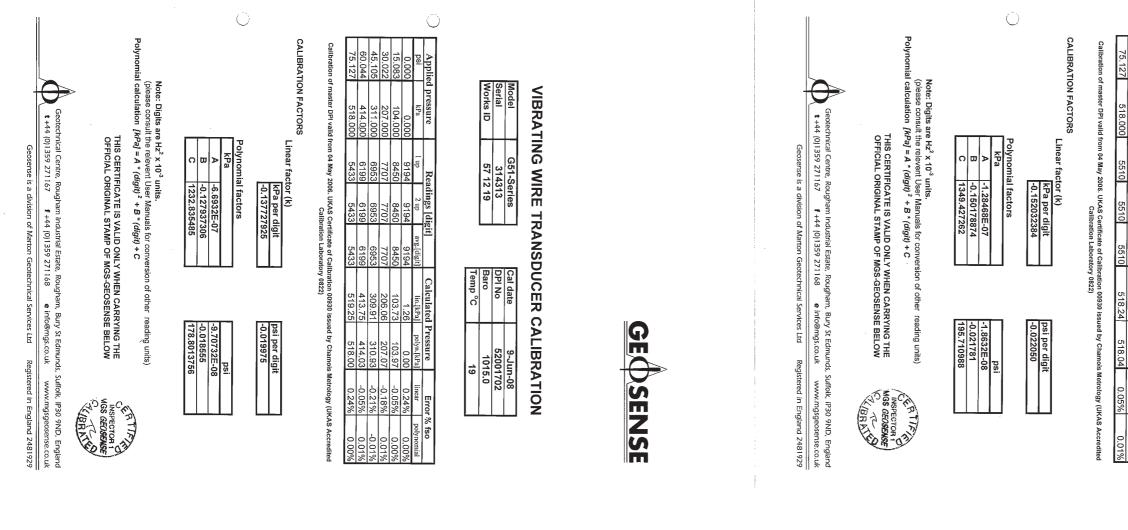
ITE INVESTIGATIONS

vel	(mOD)		5.49	
	kPa		518	
led:		12/05/2010		

kPa	Reduced Level (mOD)	Head (m)	Remarks
	0.00	0.00	Base reading
'	-11.70	7.81	After Installation
)	-10.28	9.23	
ô	-6.29	13.22	
3	-6.09	13.42	
9	-5.89	13.62	
5	-5.69	13.82	
5	-5.56	13.95	
5	-5.30	14.21	
4	-5.03	14.48	
3	-4.90	14.61	
8	-4.97	14.54	

0.03389 has beeen entered as 3389

10/2254



CONCEPT SITE INVESTIGATIONS

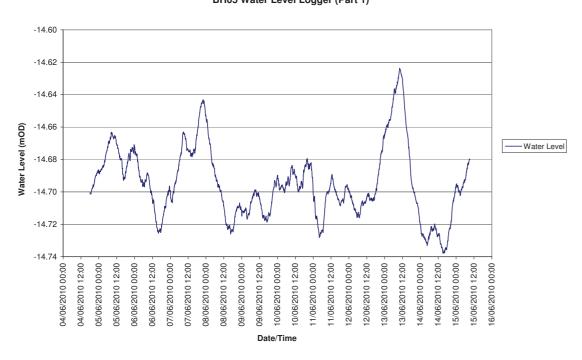
Vibrating Wire Piezometer: BH08

Installed depth(22.0 314313		Ground Level Range	(mOD) kPa	3.86 518	
k factor kPa		-0.137727925	per digit	Date Installed:	N G	010	
Date	Time	Microseconds	Digits (B units)	Pressure kPa	Reduced Level (mOD)	Head (m)	Remarks
06/05/2010	10:50	3298	9193.9	0.00	0.00	0.00	Base reading
10/05/2010	14:45	3469	8309.8	121.76	-5.72	12.42	After Installation
11/05/2010	08:20	3470	8305.0	122.42	-5.65	12.49	
12/05/2010	12:30	3470	8305.0	122.42	-5.65	12.49	
13/05/2010	15:20	3470	8305.0	122.42	-5.65	12.49	
14/05/2010	09:00	3471	8300.2	123.08	-5.59	12.55	
17/05/2010	10:15	3472	8295.5	123.74	-5.52	12.62	
18/05/2010	09:25	3472	8295.5	123.74	-5.52	12.62	
19/05/2010	11:35	3472	8295.5	123.74	-5.52	12.62	
20/05/2010	08:55	3472	8295.5	123.74	-5.52	12.62	
21/05/2010	14:55	3472	8295.5	123.74	-5.52	12.62	
27/05/2010	16:55	3469	8309.8	121.76	-5.72	12.42	
04/06/2010	15:10	3470	8305.0	122.42	-5.65	12.49	
15/06/2010	15:45	3470	8305.0	122.42	-5.65	12.49	
28/06/2010	15:50	3468	8314.6	121.10	-5.79	12.35	

Note: For ease of entry, using mini readout CLP04, the reading of 0.03389 has beeen entered as 3389

Northern Line Extension

BH05 Water Lev	el Logger (Part 1)

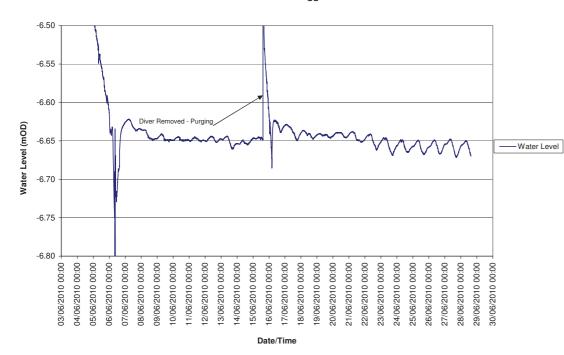


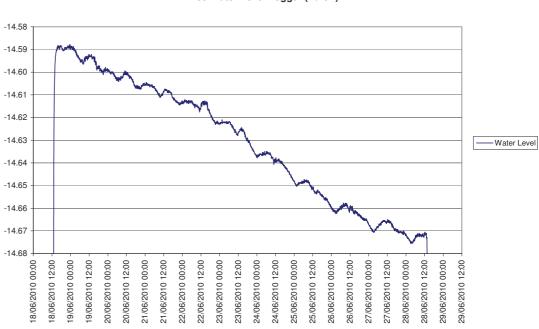
	50	45	30	10	0	g)
	60.044	45.105	30.022	15.083	0.000	<u>\$</u> .	Applied pressure	
	414.000	311.000	207.000	104.000	0.000	kPa	ressure	
	6196	6875	7558	8234	8918	1 up	Rea	
	6196	6875	7558	8234	8918	2 up	Readings [digit]	
	6196	6875	7558	8234	8918	avg.[digit]	çit]	
	413.95	310.72	206.88	104.10	0.11	lin.[kPa]	Calculated Pressure	
	413.99	310.88	207.04	104.14	-0.09	polyn.[kPa]	Pressure	
	-0 01%	-0.05%	-0.02%	0.02%	0.02%	linear	Error % fso	
0.00.0	%00.0	-0.02%	0.01%	0.03%	-0.02%	polynomial	% fso	

19	Temp °C		
1015.0	Baro	57 12 17	Works ID
52001702	DPI No	314311	Serial
9-Jun-08	Cal date	G51-Series	Model
VIBRATING WIRE TRANSDUCER CALIBRATION	ANSDUCER C	ING WIRE TR	VIBRAT



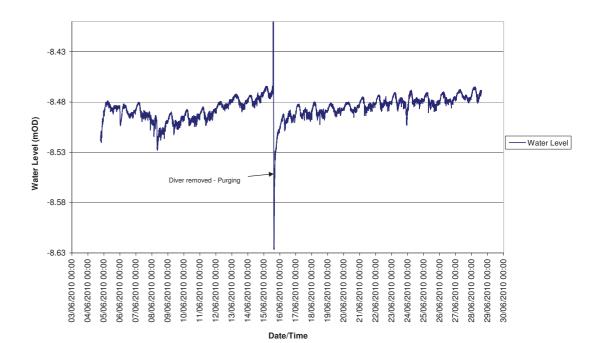
BH07 Water Level Logger

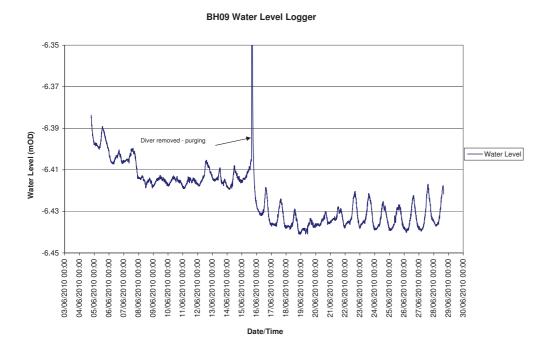




Date/Time

BH06 Water Level Logger





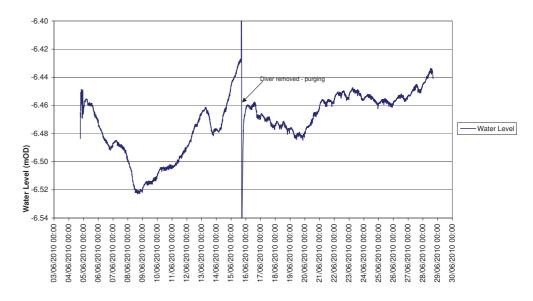
BH05 Water Level Logger (Part 2)

(mod)

Level (

Na

BH10 Water Level Logger



Date/Time

Northern Line Extension Reference Design

10/2254

8. SPLIT AND DESCRIBE UNDISTURBED SAMPLE LOGS

CONCEPT SITE INVESTIGATIONS

Stete Name Northerm Line Extension Job No. 10/2234 Carried out for REO (Provestation) Ld Date Date	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	GATION		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	sultants co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	TIGATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	onsultants.co.
Internation (kit) Date Determined (kit) Determined (kit) Internation (kit) Date Date Date Internation (kit) Date Date Date Internation (kit) Internation (kit) Internation (kit) Date Internation (kit) Internation (kit) Internation (kit) Date Internation (kit) Internation (kit) Internation (kit)			Job No. 10	0/2254 H	OLE TYPE	BH01	Site Name	Northern Line Extension	Job No. 10/	2254 H	НОГЕ ТҮРЕ	BH01
(16.10m) (16.20m) (16		REO (Powerstation) Ltd	Date	Ľ.	hotograph		Carried out fo		Date		Photograph	
 (15.10m) (15.20m) (15.20m) (15.30m) (15.30m)<			and the second s					SHIT: OPER IOHA				
 (15.10m) (15.20m) (15.20m) (15.30m) (15.30m)<		15.00m - 15.45m						21.00m - 21.42m				
brown fine to medium sand below 15.05m with a thin lamination of brown silty fine to medium sand at 15.10m		Stiff, very closely fissured dark brownis grey silty CLAY. Fissures are 0-10° and 80°-90°, planar, smooth.	ž	250+kPa 250+kPa 250+kPa ets of	(15.10m) (15.20m) (15.30m)			Very stiff, greyish brown very closely fissured slightly silty CLAY. Fissures randomly orientated with smooth pol surfaces and occasional infilled with 1mm of brown and grey sand.		ailed (21 ailed (21 ailed (21	10m) 20m) 30m)	
		or own inte to meaturn sand perow 15.05 with a thin lamination of brown silty fi at 15.10m	om ne to mediu	um sand								

London W3 ORF Image: endormediating: endormediat	Unit 8, Warple Mews		CITON		el: 020 8811 2880	0
Job No. Jo/2254 HOLE TYPE Date Photograph	London W3 0RF				mail: si@conceptc	onsultants.co.ul
Date	Site Name	Northern Line Extension	Job No.	10/2254	НОГЕ ТҮРЕ	BH01
	Carried out for	REO (Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews	POOLTO SITISTIC I TO SOCO	CITOS		Tel: 020 8811 2880	
London W3 0RF				ax. vzv oo I zoo mail: si@conceptc	onsultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH01
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



31.00m - 31.35m	Stiff to very stiff, extremely closely fissured PP250+kPa (31.10m) dark brownish grey silty slightly sandy PP250+kPa (31.20m) CLAY. Sand is fine to medium. Fissures are 0-20°, planar and smooth to rough.	becoming very sandy between 31.00m and 31.13m	with frequent tubes (≺2mm Ø) unfilled with grey silt between 31.24m and 31.35m		
27.00m - 27.45m	Very stiff, greyish brown extremely closely V failed (27.10m) to very closely fissured slightly slity CLAY V failed (27.20m) with occasional bioturbation. Fissures are V failed (27.30m) predominately subvertical and subhorizontal with polished smooth	Surraces. with numitional frommate (Evenant) of 97 4Em			

co.uk	2				
consultants.	BH02				
email: si@conceptconsultants.co.uk	НОLЕ ТҮРЕ	Photograph			23.60m) 23.75m)
	Job No. 10/2254				V failed (23.60m) V failed (23.75m)
	Job No	Date			
	Northern Line Extension	REO (Powerstation) Ltd	International and internation	23.50m - 23.85m	Very stiff, greyish brown extremely closely fissured slightly sandy slightly slity CLAY with occasional bioturbation. Fissures are smooth, unpolished and rarely infilled with up to 1mm greyish brown sand.
	Site Name	Carried out for			
3 nK					
COLISICIALITIS. CI	BH02				
email: si@conceptconsultants.co.uk	HOLE TYPE	Photograph			80m)
112	Job No. 10/2254 HOLE TYPE				V failed (7.80m) brown
	Job No.	Date			h and silt on rangish br
					c grevis c 0-10° bccasion d and ets of c
-	Northern Line Extension	REO (Powerstation) Ltd		7.50m - 7.95m	Stiff, very closely fissured dark greyish V fai brown slity CLAY.Fissures are 0-10° and 50°-90°, planar, smooth with occasional dustings of fine to medium sand and sitt on 0-10° fissures. with coarse gravel size pockets of orangish brown staining on fissures at 7.77m

Unit 8, Warple Mews		CITON		Tel: 020 8811 2880	~ ~
London W3 0RF				mail: si@conceptc	onsultants.co.ul
Site Name	Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH02
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

 THGATIONS
 Tel: 020 8811 2880 Fax: 020 8811 2881

 Job No.
 10/2254
 HOLE TYPE
 BH03

 Date
 Photograph
 Photograph

CONCEPT SITE INVESTIGATIONS

 Unit 8. Warple Mews
 CONCEPT

 London W3 ORF
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 Site Name
 Northern Line Extension

 Carried out for
 REO (Powerstation) Ltd

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	147			100	1000

13.0m - 13.40m	Stiff, very closely fissured dark brownish V failed (13.10m) grey silty CLAY.Fissures are 0-10° and V failed (13.20m) 70°-90°, planar, smooth with occasional V failed (13.30m) thin laminations and dustings of brown silt and fine to medium sand.	with a thin lamination of orangish brown fine to medium sand at 13.05m and at 13.28m	becoming orangish brown silty fine to medium SAND between 13.38m and 13.40m	
33.50m - 33.95m	Very stiff, greyish brown thinly to thickly V falled (33.60m) laminated slightly sandy slith CLAY V falled (33.70m) with occasional lignite fragments and V falled (33.80m) occasional bioturbation. Laminae are smooth and occasionally infilled with up to 1mm light brown sand.	becoming thinly laminated with frequent sand infill and sandy below 33.70m	with a pocket of thinly laminated light brown slit/fine sand (50x70mm) at 33.88m	

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	SATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	sultants.co.uk	Unit 8, Warple Mews London W3 0RF		IGATIONS	Tel: 020 Fax: 020 email: si	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	isultants.co.ul
	Northern Line Extension	Job No. 10/2254	2254 HC	HOLE TYPE	BH03	Site Name	Northern Line Extension	Job No. 10/2254	54 HOL	HOLE TYPE	BH03
Carried out for REO (Powerstation) Ltd	rstation) Ltd	Date	4	Photograph		Carried out for	r REO (Powerstation) Ltd	Date	Phot	Photograph	
							She2-rotz cont		and the second sec		
21	21.0m - 21.45m						27.0m - 27.45m				
Sti Pre Fin	Stiff, very closely fissured dark greyish brown slity CLAY. Fissures are predominately 0-10° and 80°-90°, planar, smooth with rare thin dustings of slit and fine sand on fissures.		V failed (21.10m) V failed (21.20m) V failed (21.30m)	(m) (m)			Very stiff, greyish brown slightly sandy slightly slity CLAY with occasional pockets of grey sand (20x20mm) and occasional bioturbation.	y V failed (27.10m) ckets V failed (27.20m) nal V failed (27.30m)	ed (27.10 ed (27.20 ed (27.30	(m) (m)	
v me	with a medium gravel size pocket of light brown fine to medium sand at 21.15m	ght brown fi.	ne to				with a band of light brown sand between 27.03m and 27.05m	veen 27.03m an	q		
bet v	with a band of weak orangish brown MUDSTONE between 21.33m and 21.37m	AUDSTONE									
21.	with a medium gravel size pocket of grey pyrite at 21.38m	rey pyrite at	÷								

Utill o, waiple Mews		CITOS		Tel: 020 8811 2880	
London W3 0RF				mail: si@concepto	onsultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH03
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews	SOCITATION SITE INVERTICATION	CITOS		Tel: 020 8811 2880	0.5
London W3 0RF				ax. vzv oo 1 zoo 1 email: si@conceptconsultants.co.uk	onsultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH03
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



38.UM - 38.45M	Very stiff, thinly to thickly laminated dark PP250+kPa(38.10m) grey slity CLAY with frequent laminations PP250+kPa(38.20m) of light grey fine to medium sand PP250+kPa(38.30m)	with laminations are highly deformed possible drilling disturbance between 38.00m and 38.13m	with rare subangular fine to medium gravel size	fragments of brown shell between 38.14m and 38.20m		
35.0m - 35.45m	Stiff, very closely fissured dark brownish V failed (35.10m) grey slity CLAY. Fissures are V failed (35.20m) predominately 0-20° and 70°-90°, planar, V failed (35.30m) smooth with occasional thin laminations of light brown still and fine A medium scord	with a thin lamination of light brown fine to medium sand	at 35.09m	with a thin lamination of light brown silt at 35.13m and 35.17m		

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	GATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	sultants.co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	IGRTIONS	Tel: 020 8811 Fax: 020 8811 email: si@cono	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk
Site Name	Northern Line Extension	Job No. 10/2254 HOLE TYPE	'2254 H	JLE TYPE	BH04	Site Name	Northern Line Extension	Job No. 10/2254 HOLE TYPE	54 HOLE TYF	E BH04
Carried out for	REO (Powerstation) Ltd	Date	<u> </u>	Photograph		Carried out for	r REO (Powerstation) Ltd	Date	Photograph	٩
	7.50m - 7.95m Grey locally thinly laminated slightly micaeceous CLAY with closely spaced laminations of light brown and greenish grey fine sand.			(m 08 00 00			9.50m - 9.95m Grey slightly sandy locally thinly laminated CLAY with very closely to closely spaced laminations of light brown fine sand (up to 12mm thick)	UMO.	V failed (9.55m) V failed (9.55m) V 180kPa (9.65m)	

London W3 0RF Job No. Site Name Northern Line Extension Job No. Carried out for REO (Powerstation) Ltd Date	Job No. 10/2254	nsion Job No. 10/2254 Date	nsion Job No. 10/2254 HOLE TYPE Date Photograph					aA. UZU 0011 200	
nsion	Job No. 10/2254 HOLE TYPE Date Photograph	Job No. J0/2254 HOLE TYPE Date Photograph	Job No. Job So. I0/2254 HOLE TYPE Date Photograph	London W3 0RF				mail: si@concept	consultants co u
Date		Date	Date	Site Name		Job No.	10/2254	ноге түре	
				Carried out for	REO (Powerstation) Ltd	Date		Photograph	

London W3 ORF London W3 ORF Site Name Northern Line Extension Job No. 10/2254 HOLE TYPE BH04 Carried out for REO (Powerstation) Ltd Date Date Photograph Photograph	Unit 8, Warple Mews		CITOS		el: 020 8811 288	~ ~
Job No. 10/2254 HOLE TYPE Date Date Photograph	London W3 0RF				ax. vzv oo I zoo mail: si@conceptc	onsultants.co.ul
Date	Site Name	Northern Line Extension	Job No.	10/2254	ноге түре	
	Carried out for	REO (Powerstation) Ltd	Date		Photograph	

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17.50m - 17.95m	Grey generally laminated slightly silty V192kPa (17.85m) CLAY with occasional bioturbation.	with a band (20mm thick) of very weak light brown claystone at 17 80m			
11.50m - 11.95m	Grey slightly sandy locally thinly V188kPa (11.60m) laminated CLAY with closely to medium V220kPa (11.75m) spaced laminations of light brown fine	said and rate pockets of dark grey line slity sand.	with rare bioturbation below 11.80m		

Unit 8, Warple Mews London W3 0RF		GATIONS	Tel: 0 Fax: 0. email:	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	iltants.co.uk	Unit 8, Warple Mews London W3 0RF		LIGATIONS	Tel: 020 8811 26 Fax: 020 8811 26 email: si@concel	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk
Site Name	Northern Line Extension	Job No. 10/2254 HOLE TYPE	254 HO	LE TYPE	BH04	Site Name	Northern Line Extension	Job No. 10/2254	4 HOLE TYPE	BH04
Carried out for	REO (Powerstation) Ltd	Date	Å	Photograph		Carried out for	REO (Powerstation) Ltd	Date	Photograph	
	NorThere Piel2259	NOETHERN LINE EXT PO[2254 BH 04 2450-24 90,					Mile His			
	21.50m - 21.90m						29.50m - 29.95m			
	Grey slightly sandy thinly to thickly V Failed (2) laminated CLAY with occasional V Failed (2) bioturbation with frequent bioturbation between 21.50m and 21.55m	V Fa V Fa 21.50m and 2	V Failed (21.70m) V Failed (21.85m) n and 21.55m	.70m) .85m)			Grey thinly to thickly laminated slightly sandy silty CLAY with occasional pockets of light brown fine sand between laminae with occasional bioturbation, rare pyrite nodules (15x20mm & 55x70mm)	htty sandy slity ght brown fine onal 5x20mm &		
	with occasional pockets of light brown sand (50x40mm) between 21.50m and 21.70m	wn sand (50x [,]	(40mm)							

Site Name Northern Line Exte	nsion	Job No. 10/2254 HOLE TYPE Date Photograph	0/2254	HOLE TYPE BH04 Photograph	BH04
Carried out for REO (Pow	(Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews		OITODI		Tel: 020 8811 2880 Fax: 020 8811 2881	0.5
London W3 0RF				mail: si@conceptc	consultants.co.
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH05
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

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	540,11	C. Sport		Valor	
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	SHALL.		280		

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16.00m - 16.45m Grey slightly sandy slightly micaceous V212kPa (16.00m) CLAY with rare pockets of light brown sand (5x10mm) and dark grey silty sand	(10x15mm) and rare bioturbation. with occasional pockets of dark grey and grey fine sand (20x20mm) below 16.15m	
		- 1
31.50m Dark grey locally thinly laminated V200kPa (31.60m) shelly CLAY.	becoming slightly clayey SANU below 31.85m	

HOLE TYPE BH05	
2254	Photograph
CONCEPT SITE INVESTIGATIONS Extension Job No. 10/	Date
Northern Line Extension	-
London W3 0RF Site Name	5
btconsultants co.uk BH05	
IGATIONS 14: 202 8811 2880 Fax: 020 8811 2880 email: si@concepticonsultants.co.uk Job No. 10/2254 HOLE TYPE BH05	Photograph
CONCEPT SITE INVESTIGATIONS Northern Line Extension Job No. 10/	
rn Line I	REO (Powerstation) Ltd

-		CITO		el: 020 8811 2880	0,
London W3 0RF				rax. ∪∠∪ oo 11 ∠oo 1 email: si@conceptconsultants.co.uk	eonsultants.co.uk
Site Name	Site Name Northern Line Extension	oh No.	10/2254	Job No. 10/2254 HOLE TYPE	BH05
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	GRTIO		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	0 1 consultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH05
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



RTHERN LINE EXT. 12254 HOS

Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH05
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

26.90m - 27.35m	Brownish grey sandy CLAY with V80kPa (26.90m) occasional pockets of light brown fine sand V72kPa (27.05m) (10x15mm) with occasional bioturbation.	becoming grey below 27.05m	with a band of very weak calcareous sandy mudstone(?) and rare shell fragments at 27.30m
26.00m - 26.40m	Very closely fissured slightly sandy grey V failed (26.15m) CLAY generally thinly laminated with V failed (26.25m) occasional pockets of light brown fine sand (10x10mm)	becoming sandy below 26.30	

Northern Line Extension Job No. 10/ REO (Powerstation) Ltd Date Date	Job No. 10/2254 HOLE TYPE Date Photograph	HOLE TYPE BH05 Photograph	Site Name)	email: si@conceptconsultants.co.uk
	Photo	graph		Northern Line Extension	Job No. 10/2254 HOLE TYPE	4 HOLE TYPE	BH05
NORTHERN LINE E			Carried out for	r REO (Powerstation) Ltd	Date	Photograph	
Diffus 28440-2840	the			NorthEREN DI 24354	VOCTHERN LINE EXT 1012259 Bit 05 28 40-28 50.		
27.40m - 27.60m				28.10m - 28.50m			
shelly CLAY.	PP100kPa (27.40m)	40m		Thinly to thickly laminated dark grey silty sandy CLAY and light grey silty SAND.		PP200kPa (28.10m)	

London W3 ORF emails 402001 conseptions outline Site Name Northern Line Extension Job No. 10/2254 HOLE TYPE BH06 Carried out for REO (Powerstation) Ltd Date Photograph Photograph	Unit o, warpie mews				22C 1120 2211 222	
Job No. 10/2254 HOLE TYPE Date Photograph	London W3 0RF				mail: si@concept	consultants.co.uk
Date	Site Name		Job No.	10/2254	ноге түре	
	Carried out for	REO (Powerstation) Ltd	Date		Photograph	

London W3 0RF Control with the Extension		Tel: 020 8811 288	0.
Site Name Northern Line Extension		email: si@conceptconsultants.co.uk	onsultants.co.ul
Correlation and for Democration) 1 to	Job No. 10/2254 HOLE TYPE	4 HOLE TYPE	BH06
	Date	Photograph	

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16.0m - 16.45m	Stiff, dark greyish brown slightly sandy slity … V120kPa (16.30m) CLAY with occasional coarse sand to fine gravel size tubes infilled with white slit.	with abundant fine to coarse gravel size pockets of light brown fine to medium sand between 16.00ma and 16.09m	with a medium gravel size pocket of dark grey silt at 16.26m	with a medium gravel size pocket of grey pyrite at 16.41m	
12.0m - 12.30m	Very stiff to stiff, very closely fissured dark V failed (12.10m) greyish brown slightly micaceous sity V failed (12.20m) CLAY. Fissures are predominantly 0-10° and 70°-90°, planar, smooth.	12.30m - 12.42m	Stiff, dark greyish slightly micaceous silty sandy CLAY with frequent coarse sand size tubes infilled with silt.	with a medium gravel size nodule of light grey pyritised silt at 12.37m	

Unit 8, Warple Mews		JOCITO 2	Tel: 020 8811 288		Unit 8, Warple Mews		JOOITO	Tel:	20 8811 2880	
London W3 0RF			Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	consultants.co.uk	London W3 0RF			email	Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	ltants.co.uk
Site Name N	Northern Line Extension	Job No. 10/2254	4 HOLE TYPE	BH06	Site Name	Northern Line Extension	Job No. 10/2254		HOLE TYPE	BH06
Carried out for R	REO (Powerstation) Ltd	Date	Photograph		Carried out for	REO (Powerstation) Ltd	Date	È	Photograph	
	20.0m - 20.45m					23.50m - 23.95m				
	Stiff, very closely fissured dark greyish brown slity CLAY with frequent medium gravel size pocket of light brown fine to medium sand . Fissures are 0-10° and 70°-90°, planar, smooth.	V failed (20.10m) V failed (20.20m) V failed (20.30m)	V failed (20.10m) V failed (20.20m) V failed (20.30m)			Very stiff, dark brownish grey slity CLAY V failed (23 with frequent fine to medium gravel size V failed (23 pockets of light brown fine to medium sand and abundant coarse sand to fine gravel size tubes infilled with white silt	, V fa , V fa and V fa and and abundant fo	V failed (23.60m) V failed (23.70m) V failed ant failed ant forams at	(m0, (m0,	
	with a medium gravel size pocket of light grey tine to medium sand at 20.03m	ight grey tine to				23.57/M homing your alonaly financed hoteo	00 E0 m			
	with abundant coarse sand to fine gravel size tubes infilled with white silt between 20.08m and 20.11m	avel size tubes nd 20.11m				becoming very closely rissured between 23.55m and 23.61m. Fissures are 0-30°, planar, smooth.	en zo.oom e oth.	and		
	with a coarse gravel size pocket of brown clayey fine	own clayey fine				becoming very thinly bedded with dustings of light brown fine to medium sand between 23.66m and 23.80m	tings of light nd 23.80m	t brown		
	with a medium gravel size pocket of grey pyritised silt at 20.26m	grey pyritised sil	t at			with a thin lamination of light brown silt and fine to medium sand with abundant fine gravel size tubes infilled with white silt at 23.70m	t and fine to size tubes ir	, nfilled		
						with a medium gravel size pocket of light brown fine sand at 23.84m	ght brown fii	e		

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	TIGATIO		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	onsultants co.uk	Unit 8, Warple Mews London W3 0RF	sw
Site Name	Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH06	 Site Name	Ŷ
Carried out for	REO (Powerstation) Ltd	Date		Photograph		 Carried out for	REC
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Site Name	Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH06
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Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptcons

CONCEPT SITE INVESTIGATIONS

24.50m - 24.92m	Soft to firm, thinly interlaminated dark grey V failed (24.60m) SILT / light grey silty fine to medium SAND V failed (24.80m) and occasional grey CLAY V failed (24.80m)	with laminations of slightly clayey sandy SILT between 24.50m and 24.60m	with a lamination of light brown fine to medium sand between 24.60m and 24.62m	with thin laminations of dark grey clay between 24.63m and 24.68m	with a thin lamination with frequent subangular to angular fine to medium gravel size fragments of cream and light brown bivalve shell at 24.70m
24.00m - 24.27m	Stiff, very closely fissured dark greyish V failed (24.10m) brown slightly sandy slity CLAY with V failed (24.20m) frequent medium gravel size pocket of light V failed (24.30m) brown fine to medium sand . Fissures are	predominately 0-10°, planar, rough. with abundant medium to coarse sand size black oxidised glauconite and fine to coarse gravel size tube	infilled with white silt between 24.17m and 24.26m with frequent subrounded to rounded fine to coarse	gravel of black flint at 24.27m 24.27m - 24.45m	Stiff, dark grey locally greyish brown very sandy CLAY with abundant subangular to subrouded fine to coarse gravel size cream to light brown bivalve and gastropod shells and shell fragments.

Unit 8, Warple Mews CONCEPT SITE INVESTIGATIONS London W3 ORF		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	nsultants.co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	isultants.co.uk
Northern Line Extension	Job No. 10/2254	HOLE TYPE	BH06	Site Name	Northern Line Extension Job	Job No. 10/2254	HOLE TYPE	BH07
REO (Powerstation) Ltd	Date	Photograph		Carried out for	REO (Powerstation) Ltd Date	e	Photograph	
25.00m - 25.41m					14.00m - 14.40m			
Firm, thinly to thickly interlaminated dark grey CLAY and dark grey SILT and occasional light greyish brown fine to medium SAND.	k V failed (25.10m) V failed (25.20m) V failed (25.30m)	(25.10m) (25.20m) (25.30m)			Stiff, very closely fissured dark greyish brown slightly micaceous slity CLAY. Fissures are 70°-90°, planar, smooth and occasionally polished.	V failed (14.10m) V failed (14.20m) V failed (14.30m)	14.10m) 14.20m) 14.30m)	
with rare subangular fine to medium gravel size fragments of cream and light brown shells between 25.00m and 25.07m	gravel size Ills between 25.0	m0			with a medium gravel size fragment of partially pyritised lignite at 14.28m	rtially pyritise	σ	
with frequent thin laminations of light grey silt between 25.15m and 25.25m	grey silt betweer	-						
with predominantly thinly laminated dark grey CLAY with occasional dustings of light brown silt on laminae between 25.34m and 25.41m	ark grey CLAY w n laminae betwe	ith en						

Northern Line Extension Job No. 10/2254 r REO (Powerstation) Ltd Date	Unit 8, Warple Mews	CONCEPT SITE INVESTIGATIONS	IGATIO		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@concentronusultants coutk	0 1 consultants co uk
Date	Site Name	Northern Line Extension	Job No.	10/2254	HOLE TYPE	BH07
	Carried out for	REO (Powerstation) Ltd	Date		Photograph	
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London W3 0RF Site Name Northern Line Extension Job No. 10/2254 HOLE TYPE BH07 Carried out for REO (Powerstation) Ltd Date Photograph	Unit 8, Warple Mews		CITOS		el: 020 8811 2880	
Job No. 10/2254 HOLE TYPE Date Photograph	London W3 0RF		2112		ax. vzv oo 1 200 mail: si@conceptc	onsultants.co.uk
Date	Site Name	Northern Line Extension	Job No.	10/2254	ноге түре	BH07
	Carried out for	REO (Powerstation) Ltd	Date		Photograph	

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21.50m - 21.94m	Stiff, dark brownish grey slity sandy CLAY V failed (21.60m) with frequent coarse sand to fine gravel V failed (21.70m) size tubes infilled with white slit / fine sand V failed (21.80m)	becoming very closely fissured between 21.50m and 21.64m. Fissures are 0 -10° and 80°- 90°, planar, smooth.	with a coarse gravel size patch of very dark grey staining on 80° fissures surface at 21.56m	with abundant coarse sand to fine gravel size tubes infilled with white slit between 21.69m and 21.83m	with a coarse gravel size pocket of dark brown fine to medium sand at 21.81m	
18.00m - 18.42m	Stiff locally very stiff, very closely fissured V failed (18.10m) dark brownish grey slightly sandy CLAY V failed (18.20m) with frequent coarse sand to fine gravel V failed (18.30m) size tubes infilled with white slit. Fissures	are u -zu ⁻ and au - ອບ , planar, smootn. with frequent fine to medium gravel size pockets of light	brown fine to medium sand between 18.36m and 18.42m			

Unit 8, Warple Mews		CITO?		Tel: 020 8811 2880 Fax: 020 8811 2881		Unit 8, Warple Mews			Tel: 020 8811 2880 Fax: 020 8811 2881	
				all: si@conceptcc	nsultants co.uk	London W3 0RF			email: si@conceptco	sultants co.uk
	nsion	ö	10/2254 H	HOLE TYPE	BH07	Site Name	Northern Line Extension	No. 10/2254	10/2254 HOLE TYPE	BH07
Carried out for F	REO (Powerstation) Ltd	Date	-	Photograph		Carried out for	REO (Powerstation) Ltd Date		Photograph	
		The second is a								
	22.50m - 22.95m						24.50m - 24.87m			
	Stiff, very closely fissured dark brownish grey slity sandy CLAY with frequent coarse sand to fine gravel size tubes infilled with white silt. Fissures are 0 -20° and 70°-90°, planar, smooth.	sh \ aarse \ ith \ 90°,	V failed (22.70m) V failed (22.80m) V failed (22.90m)	. 70m) . 80m) . 90m)			Stiff, very closely fissured dark brownish grey silty CLAY. Fissures are 0 - 10° and 80°- 90°, planar, smooth and occasionally polished.	V failed (24.60m) V failed (24.70m) V failed (24.80m)	24.60m) 24.70m) 24.80m)	
	with frequent 0 -10° fissures, planar, smooth between 22.50ma and 22.55m	smooth b	etween				with occasional medium gravel size pockets of light brown fine to medium sand at 24.52m	ts of light		
	with abundant coarse sand size tubes infilled with white and light brown fine sand between 22.60m and 22.66m	s infilled v 0m and 2	vith white 2.66m				with thin impersistent laminae of light brown fine to medium sand at 24.58m with a medium crevel size nodule of crev nurite at	wn fine to		
	with a fine gravel size fragments of black lignite at 22.81m	lack lignit	e at				win a medium graverate nource of grey pyme at 24.73m	האוונפ מו		

Unit 6, warple Mews		CIFCC		el: 020 8811 288	01
London W3 0RF				email: si@conceptconsultants.co.uk	onsultants.co.uk
Site Name	Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH08
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews		CITO		Tel: 020 8811 2880	0.
London W3 0RF				mail: si@concepto	consultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH08
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



18.00m - 18.38m	Very stiff, greyish brown extremely closely V failed (18.15m) to very closely fissured slightly silty sandy V failed (18.30m) CLAY with occasional bioturbation. Fissures are subvertical and subhorizontal unpolished, smooth.
13.50m - 13.92m	Very stiff, greyish brown extremely closely V falled (13.65m) fissured slightly sifty sandy CLAY with V130+kPa (13.80m) occasional bioturbation. Fissures are randomly aligned with slight polishing V130+stPa (13.80m) fissures becoming polished below 13.75m

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	GATION		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	nsultants co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	LIGATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	onsultants.co.u
Site Name No	Northern Line Extension	Job No. 10/2254 HOLE TYPE	0/2254 H		BH08	Site Name	Northern Line Extension	Job No. 10/2254	/2254 H	HOLE TYPE	BH08
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	21.00m - 21.40m						23.50m - 23.80m				
	Very stiff, greyish brown extremely closely to very closely fissured slightly slightly sandy CLAY with occasional bioturbation and occasional inclusions of fine grey sand (40x40mm). Fissures are subvertical and subhorizontal slightly polished. with frequent bioturbation at 21.35m		V failed (21.15m) V failed (21.30m)				Very stiff, greyish brown extremely closely V failed to very closely fissured slightly slity CLAY V failed with occasional pockets of light brown fine sand (up to 40x40mm) and rare purite nodules (6x10mm). Fissures are predominantly randomly orientated with smooth surfaces with a smooth polished 30° shear surface at 23.55m	issely V fs LAY V fs n fine e ith surface at 23.5	V failed (23.65m) V failed (23.80m) at 23.55m	65m) 80m)	

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Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH08
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

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CONCEPT SITE INVESTIGATIONS

Unit 8. Warple Mews
London W3 ORF
London W3 ORF
Site Name
Northern Line Extension
Carried out for
REO (Powerstation) Ltd

27.65m - 27.83m	Very stiff to stifff, greyish brown very V failed (27.80m) closely fissured slightly slity CLAY V failed (27.95m) Fissures are subhorizontal and subvertical, smooth with a band of well rounded medium flint gravels at 27.80m	27.83m - 28.00m	Greyish brown thinly laminated clayey SAND with rare shell fragments. Laminae infilled with up to 1mm grey sand. with a band of well rounded medium flint gravels at 28.00m	Stiff, dark grey slightly sandy slity CLAY with frequent shell fragments (oysters).
27.20m - 27.58m	Very stiff, greyish brown extremely closely V failed (27.30m) to very closely fissured slightly slity slightly V failed (27.50m) sandy CLAY with frequent bioturbation, rare patrings of grey fine sand (30x20mm) and rare pyritised lignite(10x50mm). Fissures are predominantly subhorizontal and rough.			

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	GATIONS	Tel: 02 Fax: 02 email: s	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	tants.co.uk	Unit 8, Warple M London W3 0RF	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	IGATION		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	insultants co uk
Site Name Nort	Northern Line Extension	Job No. 10/2254 HOLE TYPE	254 HOL		BH09	Site Name		Northern Line Extension	Job No. 10/2254 HOLE TYPE	0/2254	НОГЕ ТҮРЕ	BH09
Carried out for REO	REO (Powerstation) Ltd	Date	Pho	Photograph		Carried	Carried out for R	REO (Powerstation) Ltd	Date		Photograph	
	NUE 10/2254							A C C C C C C C C C C C C C C C C C C C				
	9.00m - 9.28m							12.00m - 12.44m				
	Very stiff, greyish brown extremely closely to very closely fissured slightly slity CLAY with rare black specks (5x5mm). Fissures are subvertical and subhorizontal, moderately polished surfaces.		V failed (9.28m) V failed (9.28m)	ÊÊ				Very stiff, greyish brown extremely closely to very closely fissured slightly silty CLAY. Fissures are subvertical and subhorizontal, polished surfaces occasionally undulated.		V failed (12.10m) V failed (12.20m)	2.20m)	

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Site Name	Northern Line Extension	ob No.	10/2254	Job No. 10/2254 HOLE TYPE	BH09
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

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Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH09
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	

Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptcon

CONCEPT SITE INVESTIGATIONS

Jnit 8, Warple Mew

19.50m - 19.92m	Very stiff, greyish brown slightly sity V failed (19.60m) slightly sandy CLAY with occasional V failed (19.80m) bioturbation and occasional pockets of grey sand (10x20mm) and occasional partings of grey sand (up to 40x50mm)	with a subhorizontal (30°) band of fine grey SAND with occasional tabular pyrite nodules (50x50mm) between 19.70m and 19.72m
17.50m - 17.90m	Stiff, dark brownish grey silty sandy CLAY V failed (17.60m) with abundant coarse sand to fine gravel V failed (17.70m) size tubes infilied with white silt and/or fine V failed (17.80m) sand.	with frequent fine to medium gravel size pockets of light brown fine sand between 17.59m and 17.80m

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk) 1 consultants co.uk	Unit 8, Warple Mews London W3 0RF	SONCEPT SITE INVESTIGATIONS	IGATIONS	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk) onsultants.co.uk
Site Name Northern Line Extension	Job No. 10/2254	54 HOLE TYPE	BH09	Site Name	Northern Line Extension	Job No. 10/2254	4 HOLE TYPE	BH09
Carried out for REO (Powerstation) Ltd	Date	Photograph		Carried out for	REO (Powerstation) Ltd	Date	Photograph	
					Indexes and the second se			
23.50m - 23.92m					24.00m - 24.35m			
Very stiff, greyish brown very closely fissured slightly sandy slightly slity CLAY with pockets of brown slit (up to 40x40mm). Fissures are subvertical and subhorizontal, polished, smooth.		V failed (23.60m) V failed (23.80m)			Very stiff, greyish brown slightly sandy slightly slity CLAY with occasional bioturbation and occasional pockets of brown sand (30x30mm).		V failed (24.10m) V failed (24.30m)	
with a 45° polished slightly undulating shear surface at	tly undulating shear surfac	e at			becoming grey below 24.15m			
with occasional bioturbation below 23.80m	tion below 23.80m				becoming sandy below 24.25m			



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Site Name Northern Line Extension	A dol	lo. 10/2254	Job No. 10/2254 HOLE TYPE	BH09	Site Name	Site Name Northern Line Extension
Carried out for REO (Powerstation) Ltd	Date		Photograph		Carried out for	Carried out for REO (Powerstation) Ltd

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CONCEPT SITE INVESTIGATIONS

13.00m - 13.45m	Very stiff, greyish brown extremely closely V failed (13.15m) to very closely fissured slightly slity CLAY V failed (13.30m) with rare pockets of brown fine sand	(10x20mm) and rare bioturbation. Fissures are randomly orientated with unpolished	smooth surfaces.				
24.50m - 24.65m	Stiff, greyish brown sandy silty CLAY with … V failed (24.65m) frequent partings of light brown sand (up to … V failed (24.80m) 8mm)	with a tabular pyrite nodule (25x40mm) at 24.55m	24.65m - 24.92m	Stiff, greyish brown thinly laminated slightly sandy silty CLAY. Laminaes infilled with up to 2mm of grey fine sand.	becoming very stiff and slightly silty below 24.80m		

	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	insultants co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	IGATIONS	Tel: 020 8811 Fax: 020 8811 email: si@conc	Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk
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 19.90m - 20.30m d (17.65m) d (17.80m) <lid (17.80m)<="" li=""> d (17.80m) d (17.80m)<th></th><th></th><th></th><th></th><th></th><th></th><th>A CONTRACTOR OF A CONTRACTOR O</th><th></th><th></th><th></th></lid>							A CONTRACTOR OF A CONTRACTOR O			
ed (17.65m) ed (17.80m) ed (17.80m) ed (17.80m) ed (17.80m) ed (17.80m) ed (17.80m) ed (17.80m) ed (17.80m) en earload sightly silfly cLAY. Fissures are randomly orientated with unpolished smooth surfaces. with a 45° polished slightly undulating shea 19.95m and 20.05m with a pyrite nodule (20x40mm) at 20.20m with occasional bioturbation at 20.15m		17.50m - 17.92m					19.90m - 20.30m			
		Very stiff, greyish brown extremely clos to very closely fissured slightly slig sandy CLAY with occasional bioturbatic Fissures are randomly orientated with unpolished smooth surfaces.		7.65m) 7.80m)			Very stiff, greyish brown extremely cle to very closely fissured slightly slity. C Fissures are randomly orientated with unpolished smooth surfaces.		1 (20.05m) 1 (20.15m)	
		becoming grey with frequent bioturba 17.55m and 17.65m	on between				with a 45° polished slightly undulatir 19.95m and 20.05m	ig shear surface a	at	
		with a lignite fragment (20x50mm) at	7.60m				with a pyrite nodule (20x40mm) at 2	0.20m		
		with occasional pockets of brown san below 17.70m	l (20x20mm)				with occasional bioturbation at 20.1	Ę		

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Northern Line Extension REO (Powerstation) Ltd				email: si@conceptconsultants.co.uk	consultants.co.uk
	ie Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH10
	tion) Ltd	Date		Photograph	

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London W3 0RF				rax: u∠u oo 11 ∠oo 1 email: si@conceptconsultants.co.uk	eonsultants.co.u
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH10
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22.80m - 23.05m	Stiff, very thinly bedded dark greyish brown V failed (22.90m) sandy CLAY with frequent medium to V failed (22.95m) coarse gravel size pockets of brown clayey fine to medium sand.	with medium gravel size fragment of black lignite at 22.80m	with a subrounded medium gravel of black flint at	22.86m	with abundant coarse sand size oxidised glauconite between 23.00m and 23.05m	with frequent coarse sand size tubes infilled with white slit between 22.80m and 22.84m	
22.30m - 22.75m	Very stiff, greyish brown extremely closely V failed (22.45m) to very closely fissured slightly sith slightly V failed (22.60m) sandy CLAY with occasional bioturbation and occasional pockets of light brown sand. Fissures are randomly orientated	with smooth surfaces.	with a 45° polished striated shear surface at 23.35m	with a pyrite nodule (10x10mm) at 22.65m	with frequent bioturbation at 22.72m		

Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	IGATIO		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	isultants co.uk	Unit 8, Warple Mews London W3 0RF	CONCEPT SITE INVESTIGATIONS	TIGATION		Tel: 020 8811 2880 Fax: 020 8811 2881 email: si@conceptconsultants.co.uk	onsultants co uk
Site Name N	Northern Line Extension	Job No. 10/2254	10/2254 H	НОГЕ ТҮРЕ	BH10	Site Name	Northern Line Extension	Job No. 10/2254 HOLE TYPE	0/2254	HOLE TYPE	BH10
Carried out for F	REO (Powerstation) Ltd	Date		Photograph		Carried out for	REO (Powerstation) Ltd	Date		Photograph	
	BHO Stores California						Sister Arabi				
	23.60m - 23.90m						23.95m - 24.35m				
	Firm, dark grey silty very sandy CLAY with occasional pockets of grey fine sand (30x40mm)		V failed (23.60m) V failed (23.90m)	.90m) .90m)			Firm to stiff, dark grey thinly to thickly laminated slightly sandy slightly slity CLAY with laminae occasionally infilled with up to 1mm of grey sand.		V failed (24.10m) V failed (24.20m)	1.10m) 1.20m)	
	becoming thinly laminated with laminae infilled with up to 1mm of grey fine sand below 23.70m	nae infilled	with up to				with a tabular pyrite nodule (10x40mm) at 24.10m)mm) at 24.1(Dm		
	with frequent shell fragments (oysters) between 23.78m and 23.84m	s) betweer	23.78m ר								
	laminae infilled with brown sand and occasional tabular pyrite nodules (30x30mm) along laminae below 23.88m	occasion <i>a</i> ae below 2	ıl tabular 3.88m								

London W3 ORF Finite Extension Job No. 10/2254 HOLE TYPE	Unit 8, Warple Mews		CITOS		al: 020 8811 2880	0.
	London W3 0RF				rax: ∪∠∪ 0011 ∠001 email: si@conceptconsultants.co.uk	l consultants.co.i
	Site Name		Job No.	10/2254	ноге түре	BH10
Carried out for REO (Powerstation) Ltd	Carried out for	REO (Powerstation) Ltd	Date		Photograph	

Unit 8, Warple Mews		CITO		el: 020 8811 288	0,
London W3 0RF				email: si@conceptconsultants.co.uk	consultants.co.uk
Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH10
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



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			NALES INCLUSION

25.80m - 25.85m I icht vellowish grev fine to medium V18kPa (2) (25.90m)	occasionally coarse SAND V16kPa (2) (26.00m)	25.85m - 26.15m	Soft to firm, light brownish grey sandy SILT. Sand is fine to medium.	with a coarse gravel size pocket of slightly gravelly fine to coarse SAND at 25.88m. Gravel is subangular to angular fine of multicoloured flint.	
24.65m - 24.75m Verv stiff thickly laminated brownish crev … V failed (24.70m)	silty CLAY.		with a subangular medium gravel size fragment of cream shell at 24.67m		

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Site Name	Site Name Northern Line Extension	Job No.	10/2254	Job No. 10/2254 HOLE TYPE	BH10
Carried out for	Carried out for REO (Powerstation) Ltd	Date		Photograph	



26.20m - 26.50m

Stiff, light brownish grey mottled grey and PP250+kPa (26.30m) orangish brown sandy SILT. Sand is fine to PP140+kPa (26.40m) medium.

... with a coarse gravel size pocket of grey clay at 26.23m

... becoming grey SILT between 26.44m and 26.50m

CONCEPT SITE INVESTIGATIONS

9. LABORATORY TEST RESULTS

Northern Line Extension Reference Design

10/2254