

- Legend**
- ERP boundary
 - Zone B building boundaries

02	01-07-11	ML	VC	RO
Issue	Date	By	Chkd	Appd

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
Kings Cross Central
General Partner Limited

Job Title
KXC Zone B
Earthworks and Remediation Plan

Drawing Title

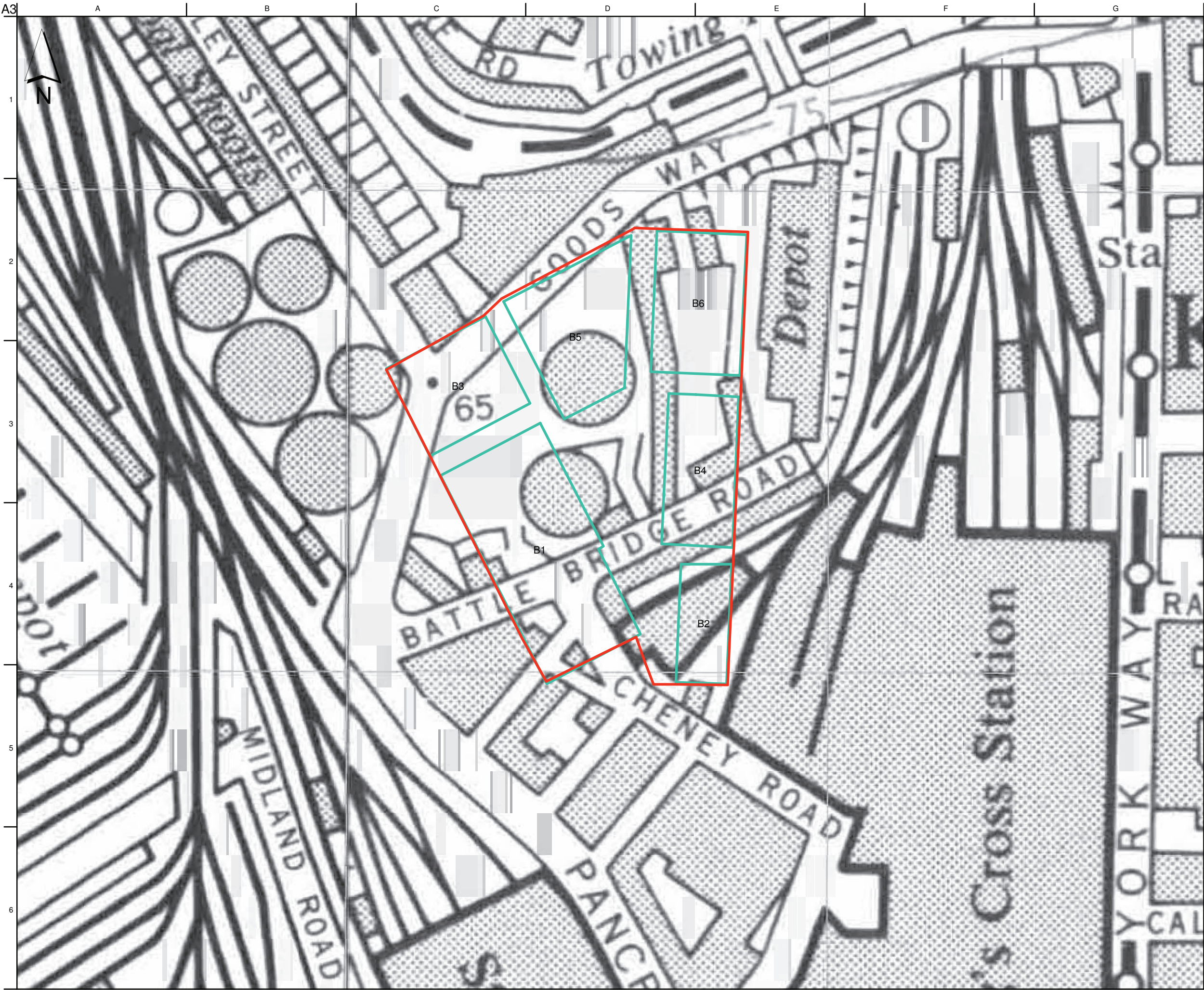
Historical mapping 1965 - 1968

Scale at A3
1:1,500

Discipline
Environment

Drawing Status

Job No 216066	Drawing No Appendix A - Drawing 10	Issue 02
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Drawing Title

Historical mapping 1982 - 1986

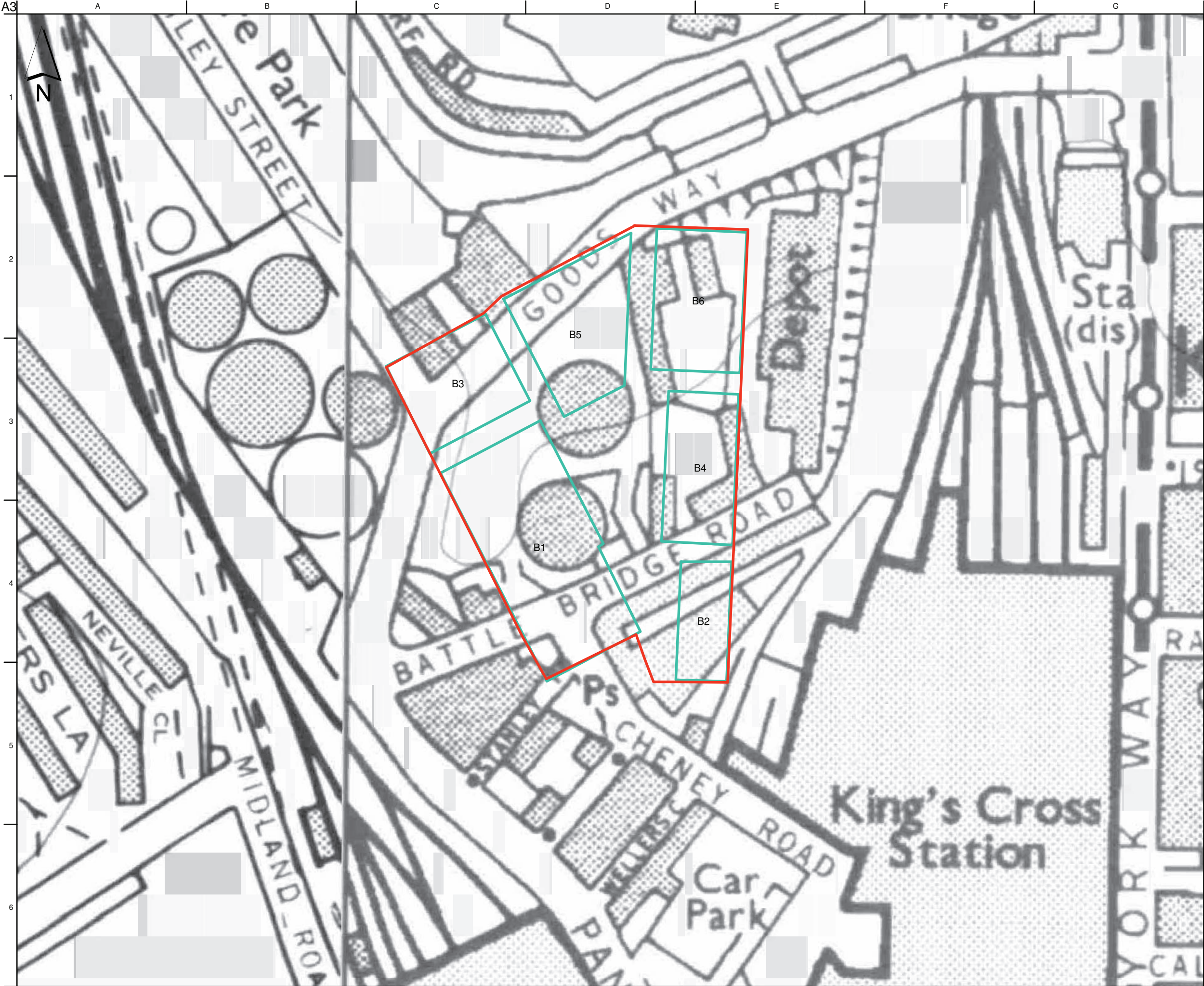
Scale at A3
1:1,500

Discipline
Environment

Drawing Status

Issue

Job No 216066	Drawing No Appendix A - Drawing 11	Issue 02
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Legend

- ERP boundary
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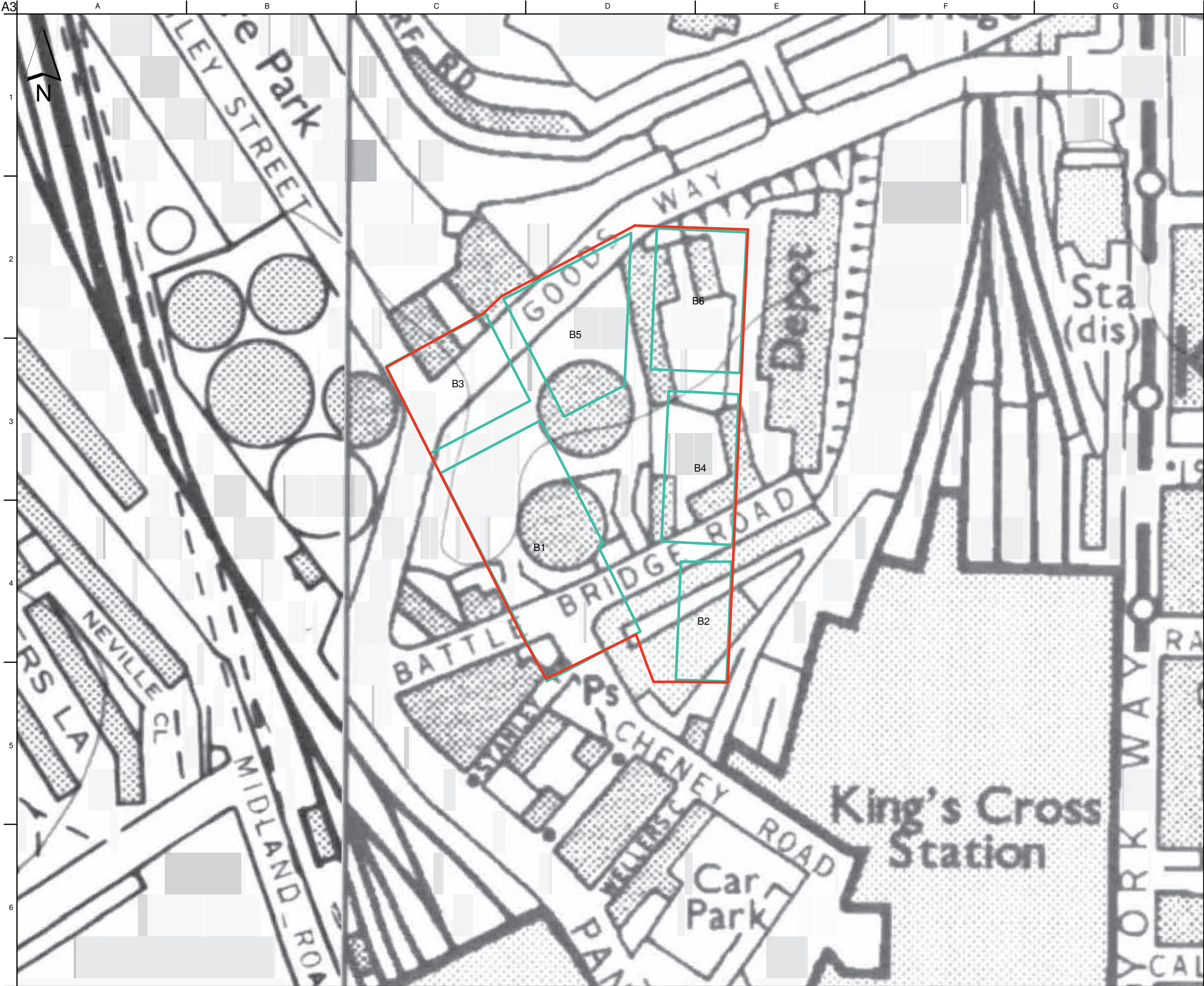
Historical mapping 1984 - 1989

Scale at A3
1:1,500

Discipline
Environment

Drawing Status

Job No 216066	Drawing No Appendix A - Drawing 12	Issue 02
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Legend

- ERP boundary
- Zone B building boundaries

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ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
Kings Cross Central
General Partner Limited

Job Title
KXC Zone B
Earthworks and Remediation Plan

Drawing Title

Historical mapping 1992 - 1994

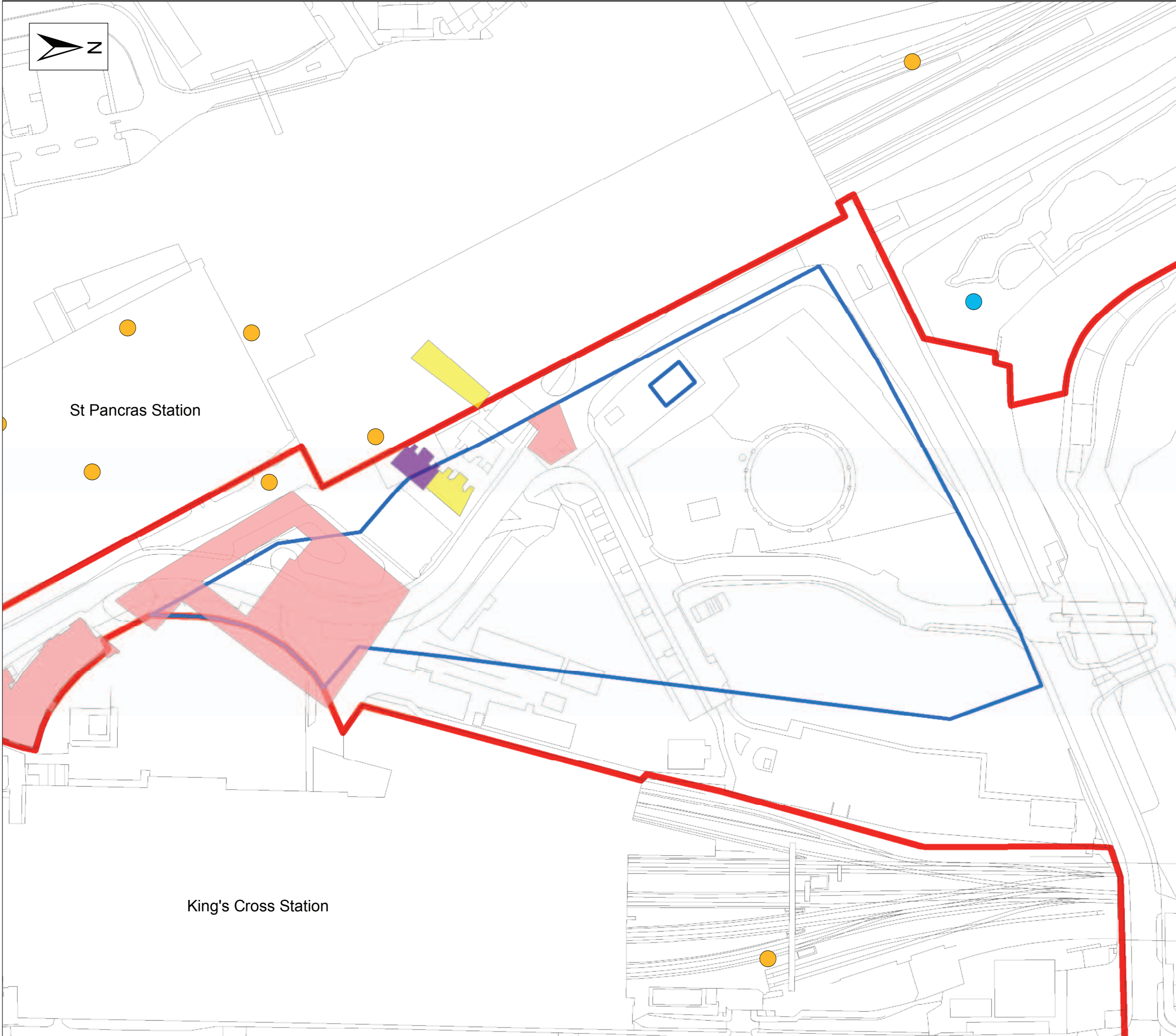
Scale at A3
1:1,500

Discipline
Environment

Drawing Status Issue	Job No 216066	Drawing No Appendix A - Drawing 13	Issue 01
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Appendix B

RPS Unexploded Ordnance Plans



Legend

- Kings Cross Central Site Boundary
- UXO Area 2

Notes

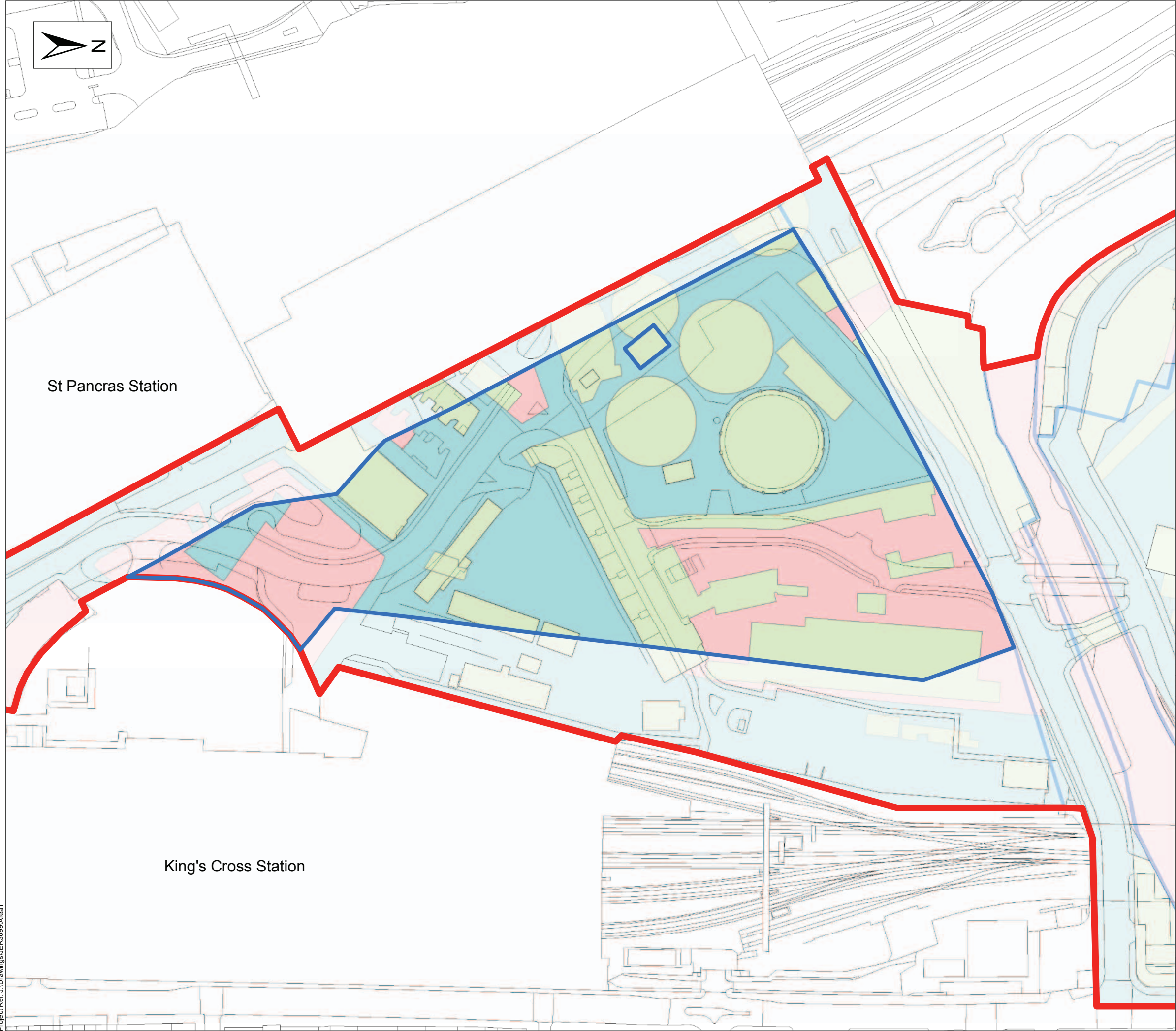
- Bomb strikes recorded between 7th October 1940 - 28th July 1941
- Night Bomb strikes recorded up to 7th October 1940

War Damage Locations


- Blast Damage, Minor in Nature
- Seriously Damaged, But Repairable at Cost
- Damage Beyond Repair


NOTE: Bomb strike, war damage & historical locations are approximate.

Rev:	Date:	Amendment:	Name:	Checked:
■ Data Source: RPS 2007				
Status: FINAL				
<div><div>RPS</div><div>Explosives Engineering Team 185 Park Street London SE1 9DY T 020 7928 0999 F 020 7928 0708 E eetco-ord@rpsgroup.com W www.rpsuxo.com</div></div>				
■ Client: Argent				
Project: Kings Cross Central				
Title: Summary of UXO and Explosives Risk UXO Area 2				
Scale: A3 @ 1:1,500 0 0.025 0.05 km				
Date: 12/06/2007 Datum: OSGB36 Projection: BNG				
Drawn: SRM Checked: - Job Ref: JER3699				
■ Drawing No: JER3699-02-003 Revision: -				




Legend

 Kings Cross Central Site Boundary

 UXO Area Boundary

Unexploded Ordnance Risk

 Low Risk

 Low / Moderate Risk

 Moderate Risk

Rev:	Date:	Amendment:	Name:	Checked:

■ Data Source: RPS 2007

Status: FINAL



Explosives Engineering Team 185 Park Street London SE1 9DY
T 020 7928 0999 F 020 7928 0708 E eetco-ord@rpsgroup.com W www.rpsuxo.com

■ Client: Argent

Project: Kings Cross Central

Title: Unexploded Ordnance Risk Map
UXO Area 2

Scale: A3 @ 1:1,500

0 0.025 0.05km



Date: 12/06/2007 Datum: OSGB36 Projection: BNG

Drawn: SRM Checked: - Job Ref: JER3699

■ Drawing No: **JER3699-02-004** Revision: -

Appendix C

Ground Investigation Logs and Laboratory Test Data

Please see enclosed CD

Appendix D

Screening Assessment

D1 Screening Assessment

D1.1 Introduction

To simplify the assessment of ground contamination risks, the UK statutory guidance suggests that generic soil quality guideline values may be used for initial screening of contamination testing results, provided that such guideline values are available and are appropriate to the site circumstances and the potential pollutant linkages in question. If the results from an adequate site investigation are below the scientific and appropriate guidelines then the site can be regarded as uncontaminated. If the results exceed the screening guidelines then more detailed risk assessment is required to determine whether or not there is a need for remediation.

D1.2 Human Health

D1.2.1 Methodology

Generic assessment criteria (GAC) and Soil Guideline Values (SGVs) have been used to assess whether further action is required to break an identified pollutant linkage. Due to the form of the future development, the commercial/industrial GAC and SGVs have been used as the “assessment criteria”. GAC and SGV values have been calculated using the Contaminated Land Exposure Assessment (CLEA) model software (v.106) issued by the EA.

The assessment criteria used have been used as follows:

- SGV for 11 contaminants (arsenic, cadmium, mercury, nickel, selenium, BTEX, phenol and dioxins, furans and dioxin like polychlorinated biphenyls (PCB)) published during 2009 and 2010;
- Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH) GAC for 31 soil contaminants.
- Contaminated Land: Applications In Real Environments (CL:AIRE) has also developed GAC for 35 additional soil contaminants; and
- Arup has developed assessment criteria for determinands that using CLEA software and published toxicology reports in accordance with recommendations by the EA.

The screening criteria are based on the GAC values for a fraction of organic carbon (foc) content of 1%. The reported results give an average foc of 3.8% and therefore the use of 1% is considered to be a conservative assumption.

Collated soil sample laboratory results are included in Section D2.

D1.2.2 Assessment

Three soil samples collected from the backfill of gasholder 1 and gasholder 3 exceeded the assessment criteria. It is noted that one of these samples is a duplicate collected at approximately the same depth for waste acceptance criteria

testing. A summary of the samples collected from inside the gasholders that exceed the assessment criteria is provided overleaf.

Parameter	Units	No of Samples Tested	Range Measured	Assessment Criteria	No of Samples Exceeding Screening Value
Recent Investigation					
Lead	mg/kg	136	13-7,900	7,300	1
Total Cyanides	mg/kg	69	<0.5-130	78	3
Benzo[a]anthracene	mg/kg	200	290-1,000	90	5 (2.5%)
Benzo[a]pyrene	mg/kg	200	21-870	14	16 (8%)
Benzo[b]fluoranthene	mg/kg	200	140-700	100	5 (2.5%)
Benzo[k]fluoranthene	mg/kg	200	170-460	141	4 (2%)
Chrysene	mg/kg	200	290-1,000	137	4 (2%)
Dibenz(a,h)anthracene	mg/kg	200	20-45	13	2 (1%)
Indeno(1,2,3-c,d)pyrene	mg/kg	200	160-500	60	3 (1.5%)
Naphthalene	mg/kg	200	204-6,300	204	6 (3%)
Total TPH	mg/kg	172	7,100-36,000	2,130	3 (1.5%)
Historical Investigation					
Benzo[a]pyrene	mg/kg	29	0.023-17	14	1
Total TPH	mg/kg	129	3,164-51,488	2,130	6
Note: PAH results from the ‘recent investigation’ are from gas chromatography-mass spectroscopy analysis (GC-MS).					

Chrysotile and amosite asbestos fibres were identified in samples collected from the areas outside of the gasholders on some of the building plots and in the proposed Pancras Square during the BAM Ritchie ground investigation. A summary of the positive identifications of asbestos fibres on Zone B is provided below.

Location on Zone B	Exploratory hole	Depth (m)	Asbestos type	Asbestos proportion by weight (%)
B1	BH2015	0.3	Amosite	0.1
B6	TP2016-A	1.0	Chrysotile	0.007
Pancras Square	TP2018	0.3	Amosite and chrysotile	0.007

The results and assessment of the chemical testing indicate that elevated concentrations of PAH and asbestos fibres are present inside gasholders 3 and 9.

D1.3 Controlled Waters

D1.3.1 Methodology

In accordance with EA advice to third parties, laboratory results from water samples collected within the gasholder bases have been compared with the UK Drinking Water Standards (DWS). Where no DWS are available the results have been compared against the Environmental Quality Standards (EQS). Collated water sample laboratory results are included in Section D3.

D1.3.2 Assessment

Gasholder 1

Four water samples were collected during the BAM Ritchie ground investigation from a standpipe located inside gasholder 1 (BH2006).

Very high concentrations of TPH, PAH (specifically naphthalene) and BTEX (specifically benzene) were reported in some of the water samples as described below.

- TPH concentrations were reported up to 2,800µg/l (compared with an assessment criteria of 10µg/l);
- Naphthalene concentrations were reported up to 380µg/l (compared with an assessment criteria of 2.4µg/l) during sampling rounds 1 and 2, although concentrations were below method detection limits during sampling rounds 3 and 4; and
- Benzene concentrations were reported up to 910µg/l (compared with an assessment criterion of 1µg/l) during sampling rounds 1 and 2, although concentrations were below method detection limits during sampling rounds 3 and 4.

Slight to moderately high concentrations of cyanide, ethylbenzene and toluene were also reported in water samples collected during the monitoring rounds as described below:

- Total cyanide concentrations of up to 0.78mg/l slightly exceeded the assessment criteria of 0.5mg/l during three sampling rounds;
- A fluoranthene concentration of 0.7µg/l exceeded the assessment criteria of 0.1µg/l during sampling round four;
- Ethylbenzene concentrations of up to 60µg/l exceeded the assessment criteria of 20µg/l during sampling rounds one and two, although concentrations were below method detection limits during sampling rounds three and four; and
- Toluene concentrations of up to 110µg/l exceeded the assessment criteria of 50µg/l during sampling rounds one and two, although concentrations were below method detection limits during sampling rounds three and four.

One water sample was collected from gasholder 1 during the historical ground investigations by WYG. Concentrations of contaminants were low compared with the assessment criteria, with the exception of total cyanide which was moderately elevated.

Gasholder 3

Ten water samples were collected during the BAM Ritchie ground investigation from three borehole locations located inside gasholder 1 (BH2007, BH2012 and BH2014). BH2012 and BH2007 were positioned close to the perimeter of the gasholder. BH2007 was located off-site in Pancras square and three water samples were collected from this borehole. BH2012 was positioned in the centre of the gasholder.

Very high concentrations of TPH, PAH (specifically naphthalene and anthracene), BTEX compounds (specifically benzene, toluene and ethylbenzene) and cyanide (total, free and thiocyanate) were reported in some of the water samples as described below:

- TPH concentrations were above the assessment criteria in samples collected from BH2012 during all sampling rounds, which concentrations reported up to 2,900µg/l (compared with an assessment criteria of 10µg/l). Similar concentrations (up to 3,900µg/l) were recorded in samples collected from BH2007. TPH was significantly elevated in water samples collected from the centre of the gasholder (BH2014) with concentrations of up to 44,000µg/l.
- Naphthalene concentrations were generally significantly elevated in all water samples with recorded concentrations of up to 4000µg/l (compared with an assessment criterion of 2.4µg/l). Anthracene concentrations exceeded the assessment criteria in six samples and was particularly elevated in samples collected from the centre of the gasholder (BH2014, concentrations up to 14µg/l compared with an assessment criteria of 0.1µg/l);
- BTEX compounds were elevated above the assessment criteria in the majority of water samples, although concentrations were particularly high in samples collected from the centre of the gasholder (BH2014). Concentrations of benzene were recorded up to 24,000µg/l during sampling round 3 (compared with an assessment criterion of 1µg/l). Elevated concentrations of toluene (up to 4,300µg/l in BH2014) and ethylbenzene (up to 510µg/l in BH2012) were also recorded; and
- Total cyanide exceeded the assessment criteria in all samples, although generally these were not significantly elevated. The cyanide concentration in the sample collected from the centre of the gasholder (BH2014) during the first round of sampling was recorded at 320mg/l (compared with assessment criteria of 0.5mg/l). Free cyanide and thiocyanate also exceeded the assessment criteria in some locations.

Concentrations of heavy metals were also reported in water samples collected during the monitoring rounds as described below:

- Five arsenic concentrations of up to 15µg/l slightly exceeded the assessment criteria of 10µg/l;
- Three mercury concentrations of up to 1.6µg/l slightly exceeded the assessment criteria of 1µg/l;
- Three selenium concentrations of up to 19µg/l slightly exceeded the assessment criteria of 10µg/l; and
- Four fluoranthene concentrations of up to 2.3µg/l slightly exceeded the assessment criteria of 0.1µg/l.

Groundwater samples were not collected from gasholder 3 during the historical ground investigations.

Gasholder 9

Nine water samples were collected during the BAM Ritchie ground investigation from two boreholes located inside gasholder 9 (BH2004 and BH2016). Both boreholes were positioned close to the perimeter of the gasholder. BH2016 is located off-site on plot B3.

Very high concentrations of TPH, PAH (specifically naphthalene), BTEX compounds (specifically benzene, toluene and ethylbenzene) and cyanide (total, free and thiocyanate) were reported in some of the water samples as described below:

- TPH concentrations were above the assessment criteria in approximately half of the samples collected from both boreholes. TPH was significantly elevated in water samples collected from BH2004 during the first round of sampling, with concentrations of up to 310,000µg/l (compared with an assessment criteria of 10µg/l). TPH concentrations decreased during the later sampling rounds and were below detection limits in some instances;
- Naphthalene concentrations were significantly elevated in water samples collected from BH2004 during the first sampling round, with recorded concentrations of up to 5,500µg/l (compared with an assessment criteria of 2.4µg/l). Concentrations reduced to below detection limits during the later rounds of sampling and were also below detection limits in samples collected from BH2016;
- BTEX compounds in water samples collected during the first sampling round from BH2004 were elevated above the assessment criteria, although concentrations decreased in the following sampling rounds and were low in samples collected from BH2016. Concentrations of benzene were recorded up to 1,500µg/l during sampling round one (compared with assessment criteria of 1µg/l). Elevated concentrations of toluene (up to 300µg/l) and ethylbenzene (up to 57µg/l) were also recorded in samples collected from BH2004.

Slight to moderately high concentrations of lead, selenium, cyanide and ethylbenzene were also reported in water samples collected during the monitoring rounds as described below:

- Five lead concentrations of up to 110µg/l exceeded the assessment criteria of 25µg/l;
- Two total cyanide concentrations of up to 0.71mg/l slightly exceeded the assessment criteria of 0.5mg/l during the first sampling round; and
- Two fluoranthene concentrations of up to 0.6µg/l exceeded the assessment criteria of 0.1µg/l.

Samples collected from the northern side of gasholder 9 (off-site on plot B3) generally contained lower concentrations of contaminants, although it is noted that fewer sampling rounds were undertaken from this location.

The water results of the Oscar Faber ground investigation indicated significantly elevated concentrations of heavy metals (notably lead with concentrations up to

830,000µg/l, cadmium with concentrations up to 510µg/l, arsenic with concentrations up to 1350µg/l and mercury up to 210µg/l in samples collected from BH4a). Coal tars and mineral oils were commonly tested for at this time (rather than TPH). Concentrations of coal tars exceeded 9000mg/l which is considered to be a significantly elevated result.

One water sample was collected from gasholder 9 during the historical ground investigations by WYG. Concentrations of contaminants were low compared with the assessment criteria, with the exception of total cyanide which was moderately elevated.

Gasholder 12

Four water samples were collected from BH2001 installed inside gasholder 12 during the BAM Ritchie ground investigation.

Elevated concentrations of TPH, PAH (particularly naphthalene) and BTEX (particularly benzene and toluene) were reported in water samples collected during sampling rounds one, two and three as described below:

- TPH concentrations were reported up to 13,000µg/l (compared with an assessment criteria of 10µg/l);
- Naphthalene concentrations were reported up to 3,600µg/l (compared with an assessment criteria of 2.4µg/l);
- Benzene concentrations were reported up to 440µg/l (compared with an assessment criteria of 1µg/l); and
- Toluene concentrations were reported up to 140µg/l (compared with an assessment criterion of 50µg/l).

Slight to moderately elevated concentrations of PAH (specifically anthracene and fluoranthene), cyanides and BTEX (ethylbenzene) were also reported as described below:

- One anthracene concentration of 0.3µg/l exceeded the assessment criteria of 0.1µg/l;
- Two fluoranthene concentrations of up to 0.6µg/l exceeded the assessment criteria of 0.1µg/l;
- Total cyanide concentrations of up to 8mg/l exceeded the assessment criteria of 0.5mg/l during each monitoring round;
- Two thiocyanate concentrations of up to 1.6mg/l exceeded the assessment criteria of 0.17mg/l; and
- Ethylbenzene concentrations of up to 33µg/l exceeded the assessment criteria of 20ug/l during each monitoring round.

Ammoniacal nitrogen and sulphate concentrations were reported above the assessment criteria in all the water samples collected from gasholder 12. The highest concentrations of ammoniacal nitrogen and sulphate were 17mg/l and 1,400mg/l respectively.

Gasholder B

One water sample was collected from gasholder B during the historical ground investigations by WYG. Concentrations of contaminants were low compared with the assessment criteria, with the exception of total cyanide which was moderately elevated.

Gasholder C

One borehole was installed in BH1009 within gasholder base C. PBA reported elevated concentrations of PAHs in the water sample collected from the borehole.

Gasholders A, D and 8

No groundwater samples were collected from within the bases of former gasholders A, D or 8.

Outside Gasholders

Groundwater samples collected from BH2015 and BH2005C had determinand concentrations below the assessment criteria, with the exception of sulphate and ammoniacal nitrogen. An elevated lead result from BH2015 was reported from one sample.

D1.4 Ground Gas and Vapour

D1.4.1 Methodology

The ground gas/vapour regime has been assessed by considering both the concentrations of landfill gases in the ground, the quantity and variability of surface emission rates (which is related to ongoing biodegradation and further production of gases) and short term variations (especially peaks) in surface emissions.

The following published guidance on the assessment of ground gas has been used:

- The Building Regulations 2000 Approved Document C;
- CIRIA Report C665 Assessing risks posed by hazardous ground gases to buildings;
- BS 8485: Code of practice for the characterisation and remediation from ground gas in affected developments and
- The Local Authority Guide to Ground Gas, CIEH; London, 2008.

4.6.4 Assessment

The gas monitoring results from the historical and recent ground investigations are provided in Section D4. A summary of the results is presented below:

- All gas results from the 2010/11 PBA ground investigation were classified as characteristic situation (CS)1 which is defined as ‘very low hazard potential’;

- Carbon dioxide did not exceed 5% concentration by volume in any of the monitoring measurements;
- Hydrogen sulphide was at 1% or below detection limits for all monitoring rounds, (where measured); and
- Methane did not exceed 0.2% concentration by volume in any of the monitoring measurements during the 2010/11 PBA or WYG ground investigations.
- One gas sample was collected from BH2003 which is outside of the gasholder bases. Ammonia was reported at a concentration of 0.02mg/m³.
- The sample collected from BH2001 in gasholder 12 reported a naphthalene concentration of 2.83mg/m³.
- One sample collected from BH2004 in gasholder 9 reported toluene concentrations of 630mg/m³ and 450mg/m³ from the shallow and deep monitoring wells respectively.
- Gas samples collected in gasholder 3 (BH2007, BH2012, BH2014) reported concentrations of ammonia (maximum of 0.22mg/m³) and naphthalene (0.014mg/m³).
- Gas samples collected from outside of the gasholders (BH2005C, BH2009 and BH2015) reported concentrations of ammonia (0.06mg/m³ in BH2009), naphthalene (0.029mg/m³ in BH2005C, 0.002 mg/m³ in BH2009 and 0.003 mg/m³ in BH2015).

Historical Ground Investigations

- Gas monitoring was undertaken from standpipes located inside gasholders 1 and 9. Low concentrations of carbon dioxide and methane were recorded.
- Very high levels of methane were measured during the WYG ground investigation in gasholder B (BH107). These concentrations classify this area as CS3 which is defined as ‘moderate hazard potential’. It was reported by WYG that the measured concentrations were ‘above the detection limits’ of the gas meter. Subsequently it is reported that a ‘Transco engineer detected natural gas’ at this location. A gas sample collected at this location reported elevated concentrations of methane, ethane, propane and butane. Elevated concentrations of methane (50%) were also detected in a standpipe (BH102) located in the area outside of the gasholders, which classifies this area as CS2 (‘low hazard potential’). However no methane was measured at this location after it had been vented for one hour and sealed for a further two hours.
- A value of 4% methane was recorded in gasholder 9 during the Oscar Faber ground investigation. This concentration reduced to 0.5% after a certain amount of dissipation time, the duration of which was not specified in the report.

D2 Soil Screening Tables

Ground Investigation		CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	Norwest Holst	Norwest Holst	Norwest Holst	Norwest Holst	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	CTRL 1992 - 1997	CTRL 1992 - 1997	Norwest Holst	CTRL 1992 - 1997			
Report Number								F15323	F15323	F15323	F15323														F15323				
Lab Ref		SA7323-0.2	SA7323-0.55	SA7323-1	SA7323-3	TP5010-0.15	TP5010-1	534-536(2)	529-541(7)	400-402(301)	406-408(305)	WYG11399	WYG11400	WYG11407	WYG11408	WYG11409	WYG11412	WYG11413	WYG11414	WYG11428	WYG11429	WYG11415	WYG11416	TP7327-0.2	TP7327-0.5	352-354(303)	SA7324A-0.25		
Date		Not known	Not known	Not known	Not known	Not known	Not known	20/08/2008	20/08/2008	15/08/2008	15/08/2008	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	15/7/99	Not known	Not known	13/08/2008	Not known		
Explotary hole location		SA7323	SA7323	SA7323	SA7323	TP5010	TP5010	TP1021A	TP1021A	TP1022	TP1022	BH102A	BH102A	BH104	BH104	BH104	BH106	BH106	BH106	TT109	TT109	BH107	BH107	Offsite B1	Offsite B1	Offsite B1	Offsite B1		
Zone B Location		B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	Offsite B1	Offsite B1	Offsite B1	B3			
Location on plot/ gas holder number		Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	GH9 (interior)	GH9 (interior)	GH9 (interior)	GH1 (interior)	GH1 (interior)	GH1 (interior)	GH1 footprint	GH1 footprint	GHB (exterior)	GHB (exterior)	Footprint (immediately south of boundary)	Footprint (immediately south of boundary)	Footprint (immediately south of boundary)	Outside gasholders		
Depth (m)		0.2m	0.55m	1.0m	3.0m	0.15m	1.0m	1.5m	3m	3.5m	4.0m	0.5m	1.5m	1.5m	2.5m	10.5m	1.0m	7.0m	11.0m	0.5m	1.0m	2.0m	5.0m	0.2m	0.5m	3m	0.25m		
Strata		Made Ground	Made Ground	Made Ground	London Clay	Made Ground	Made Ground	Made Ground	Weathered London Clay	Made Ground	London Clay	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	London Clay	London Clay	London Clay	Made Ground			
Determinants	Units	Screening Criteria																											
Metals		Commercial																											
Arsenic	mg/kg	640	38	32	19	20	18	27	11	4	< 3	4	21	15	17	15	12	8	9	39	28	22	14	14	20	23	5	16	
Cadmium	mg/kg	230.0	1	1	1	1	3	1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	0.6	0.5	< 0.5	< 0.5	1	1	< 0.2	1	
Chromium	mg/kg	30400	34	49	44	24	52	39	7.9	47	11	45	45	44	33	40	19	6	11	24	29	26	31	41	35	25	43	22	
Copper	mg/kg	71700	184	61	41	27	98	29	6	31	8	28	47	36	48	49	18	48	27	145	89	67	33	40	33	36	28	87	
Lead	mg/kg	7300	452	279	125	18			11	34	5	17	200	140	260	180	71	131	488	2516	303	424	170	45	28	27	17	230	
Mercury	mg/kg	3600	1.13	0.89	0.31	0.09	1	1	< 0.4	0.6	< 0.4	< 0.4	< 0.3	< 0.8	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	< 0.3	< 0.3	0.09	0.06	0.4	0.29	
Nickel	mg/kg	1800	58	35	20	31	21	26	6.9	44	6.5	48	46	38	29	32	20	6	12	49	54	29	30	35	40	39	45	42	
Molybdenum	mg/kg	nc					646	71																					
Selenium	mg/kg	13000	1.1	0.64	0.45	0.33	1	1	< 3	< 3	< 3	< 3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1		1.4	0.4	< 0.5	0.65	0.67	< 3	0.66	
Zinc	mg/kg	662000	580	179	88	65	326	60	26	91	21	87	120	120	208	100	41	45	99	612	367	288	102	78	73	75	88	159	
Miscellaneous																													
Total Cyanide	mg/kg	nc	5	1	1	1			< 1	< 1	< 1	< 1	< 5	< 5	12	< 5	< 5	< 5	4	259	53	61	< 5	8			< 1	1	
Free Cyanide	mg/kg	78.00																											
Thiocyanate	mg/kg	nc																											
Boron	mg/kg	192000	0.6	0.7	1.1	1.8			< 3.5	< 3.5	< 3.5	< 3.5	1.5	1.7	2.6	2.2	0.9	0.6	0.8	1.1	1.7	3	1.4	2.5	1	1.4	< 3.5	1.4	
Total organic carbon	%	nc																											
pH	pH Units	nc	11.5	10	8.2	7.8	8.93	7.84	7.98	8.14	8.63	7.85	8.1	7.8											8.7	7.4	7.8	8.1	
Asbestos identification	nc	nc	Not detected	Not detected																					Not detected			Not detected	
Asbestos Concentration	%	nc	< 0.001	< 0.001																					<0.001			<0.001	
Phenol	mg/kg	3200											< 0.02																
Sulphur (free)	nc	nc																											
Sulphide	mg/kg	nc																											
Total Sulphate	% as SO4	nc																											
Sulphur (elemental)	mg/kg	nc																											
Phenol (monohydric) SOM 1%	mg/kg	nc	0.5	0.5	0.5	0.5																							
Total sulphate	mg/kg	nc							21000			< 0.15	1600	5200	20	30	35	230	26	45	33	527	64	34	25	30		< 0.15	0.5
Sulphate (2:1 water soluble) as SO4	g/l	nc	0.533	0.0839	0.167	1.59			1.6	0.29	0.092	2.2																	
Organic matter	%	nc							3.8	0.48	3.3	0.97															21	0.124	
Moisture	%	nc																									0.57		
Acid Neutralisation Capacity	mol/kg	nc											34																
Loss on ignition	%	nc																											
Stones content > 50mm	%	nc																											
BTEX																													
Benzene	µg/kg	28000.00																											
Toluene	µg/kg	870000.00									< 0.01																		
Ethylbenzene	µg/kg	881000									< 0.01																		
m- & p-Xylene	µg/kg	575000									< 0.01																		
o-Xylene	µg/kg	480000									< 0.01																		
Total BTEX	µg/kg	nc																											
Methyl tert-butyl ether	µg/kg	nc									< 0.01																		
Hydrocarbons																													
TEM	mg/kg	nc	700	500	1300	500																			500	500		800	
Diesel range organics (DRO)	mg/kg	2130	127	57	65	39																			88	232		39	
Gasoline Range Organics by GC (GRO)	mg/kg	2130	0.1	0.1	0.1	0.1																			0.1	0.1		0.1	
TPH (SUM DRO + GRO)	mg/kg	2130	127.1	57.1	65.1	39.1																			88.1	232.1		39.1	
TPH (Mineral Oil/ Hydrocarbon oil)	mg/kg	2130																											
TPH (Aromatic hydrocarbons)	mg/kg	2130																											
TPH (Solvent Extracted)	mg/kg	2130																											
TPH	mg/kg	2130	127.1	57.1	65.1	39.1	1000	395																	88.1	232.1			
EPH DRO (C10 - C40)	mg/kg	2130																											
Acenaphthene	mg/kg	84900	1	1	1	1		0.013			0.004	0.11	1.3	0.6	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3	0.5		0.5	0.3	< 0.1	1	1	55	
Acenaphthylene	mg/kg	84300	1	1	1	1		0.014			0.003	0.094	3	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	1.6	1.6	0.3	< 0.1	1	1			
Anthracene	mg/kg	525000	1	1	1	1		0.032			0.008	0.34	23	0.4	0.4	< 0.1	0.2	0.6	1.5	0.9	3.2	3.5	1.1	0.1	1	1			
Benzo(a)anthracene	mg/kg	90.0	3	3	1	1		0.11			0.024	0.79	26	1.2	1.8	0.2	0.4	0.2	5.4	6.3	7.2	8.5	3.1	0.3	1	1			
Benzo(a)pyrene	mg/kg	14.00	4	4	1	1		0.11			0.023	0.89	27	1.5	1.7	< 0.1	0.4	0.2	4.9	3.3	5.4	11.9	3.1	0.4	1	1			
Benzo(b)fluoranthene	mg/kg	100.0	3	3	1	1		0.15			0.032	1.1	26	1.6	1.6	< 0.1	0.2	0.2	8.2	6	7.9	13.6	5	< 0.1	1	1			
Benzo(k)fluoranthene	mg/kg	141.0	4	3	1	1		0.082			0.013	0.51	16	1.4	1.4	< 0.1	0.3	0.1	2.1	1.7	2.8	7.1	1.4	< 0.1	1	1			
Benzo(g,h,i)perylene	mg/kg	654	3	2	1	1		0.17			0.015	0.6																	

Ground Investigation		CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	White Young Green	White Young Green	White Young Green	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997	CTRL 1992 - 1997
Report Number																
Lab Ref		SA7324A-0.5	SA7324A-1.0	SA7324A-3.0	SA7324A-4.0	WYG11422	WYG11423	WYG11424	SA3838-0.5	SA3838-2.0	SA3838-2.8	SA7322-0.2	SA7322-0.2	SA7322-0.2	SA7322-1.2	SA7322-0.2
Date		Not known	Not known	Not known	Not known	15/7/99	15/7/99	15/7/99	Not known	Not known	Not known	Not known	Not known	Not known	Not known	Not known
Exploatory hole location		SA7324A	SA7324A	SA7324A	SA7324A	TT105	TT105	TT106	SA3838	SA3838	SA3838	SA7322	SA7322	SA7322	SA7322A	SA7322A
Zone B Location		B3	B3	B3	B3	B3	B3	B3	B6	B6	B6	Pancras Square	Pancras Square	Pancras Square	Pancras Square	Pancras Square
Location on plot/ gas holder number		Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	GH9/ footprint	GH9/ footprint	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders
Depth (m)		0.5m	1.0m	3.0m	4.2m	1.5m	2.4m	1.0m	0.5m	2m	2.8m	0.2m	1.0m	1.2m	1.2m	2.6m
Strata		Made Ground	Made Ground	Made Ground	London Clay	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	London Clay
Determinants	Units	Screening Criteria Commercial														
Metals																
Arsenic	mg/kg	640	18	16	25	23	13	43	23	16	12	12	64		20	28
Cadmium	mg/kg	230.0	1	1	1	1	< 0.5	< 0.5	1.2	1	1	1	1		1	1
Chromium	mg/kg	30400	32	32	41	37	25	34	28	22	17	27	15	31	47	45
Copper	mg/kg	71700	51	52	37	39	33	36	120	56	51	13	29	102	48	40
Lead	mg/kg	7300	1030	1350	151	132	236	100	1000	262	168	7	142	407	108	64
Mercury	mg/kg	3600	1.37	1.67	4.05	5.99	< 0.3	< 0.3	1.9	1	1	1	0.7	0.77	0.26	0.21
Nickel	mg/kg	1800	22	20	35	36	23	30	40	19	16	23	12	24	34	38
Molybdenum	mg/kg	nc														
Selenium	mg/kg	13000	0.68	0.89	1.32	1.32	< 0.5	< 0.5	1	1	1	1	0.63	0.37	0.54	0.67
Zinc	mg/kg	662000	552	628	114	122	132	79	790	96	165	45	195	404	150	113
Miscellaneous																
Total Cyanide	mg/kg	nc	5	1	1	1	< 5	< 5	451				2	1	1	1
Free Cyanide	mg/kg	78.00														
Thiocyanate	mg/kg	nc														
Boron	mg/kg	192000	1	1.5	2.6	2.7	2	1.5	6.3				2.2	2.7	0.7	0.5
Total organic carbon	%	nc														
pH	pH Units	nc	7.4	7.9	8.4	8.3				8.24	9.51	8.23	9.9	9.2	10.2	8.5
Asbestos identification		nc							Not detected				Not detected	Not detected	Not detected	
Asbestos Concentration	%	nc							<0.001				< 0.001	< 0.001	< 0.001	
Phenol	mg/kg	3200														
Sulphur (free)		nc														
Sulphide	mg/kg	nc														
Total Sulphate	% as SO4	nc														
Sulphur (elemental)	mg/kg	nc														
Phenol (monohydric) SOM 1%	mg/kg	nc	0.5	0.5	0.5	0.5							0.5	0.5	0.5	0.5
Total sulphate	mg/kg	nc					160	250	200							
Sulphate (2:1 water soluble) as SO4	g/l	nc	0.856	0.751	0.334	0.399				0.3	0.48	0.03	0.537	0.645	0.168	0.106
Organic matter	%	nc														
Moisture	%	nc														
Acid Neutralisation Capacity	mol/kg	nc														
Loss on ignition	%	nc														
Stones content > 50mm	%	nc														
BTEX																
Benzene	µg/kg	28000.00													1	1
Toluene	µg/kg	870000.00													1	1
Ethylbenzene	µg/kg	581000													1	1
m- & p-Xylene	µg/kg	575000														
o-Xylene	µg/kg	480000													1	1
Total BTEX	µg/kg	nc													4	
Methyl tert-butyl ether	µg/kg	nc														
Hydrocarbons																
TEM	mg/kg	nc	2500	2300	500	500							800	1500	500	500
Diesel range organics (DRO)	mg/kg	2130	82	60	69	96							118	262	28	66
Gasoline Range Organics by GC (GRO)	mg/kg	2130	0.1	0.1	0.1	0.1							0.1	0.1	0.1	0.1
TPH (SUM DRO + GRO)	mg/kg	2130	82.1	60.1	69.1	96.1							118.1	262.1	28.1	66.1
TPH (Mineral Oil/ Hydrocarbon oil)	mg/kg	2130					123	69	581							
TPH (Aromatic hydrocarbons)	mg/kg	2130							110							
TPH (Solvent Extracted)	mg/kg	2130							4399	177	60					
TPH	mg/kg	2130											118.1	262.1	28.1	66.1
EPH DRO (C10 - C40)	mg/kg	2130														
Acenaphthene	mg/kg	84900				0.9	< 0.1	0.4					1	1	2	1
Acenaphthylene	mg/kg	84300				1.2	0.2	0.4					1	1	7	1
Anthracene	mg/kg	525000				0.3	0.1	2.4					1	1	4	1
Benzo(a)anthracene	mg/kg	90.0				1	0.5	7.3					2	4	3	1
Benzo(a)pyrene	mg/kg	14.00				0.9	0.4	6.8					3	5	6	1
Benzo(b)fluoranthene	mg/kg	100.0				1.1	0.6	12					2	3	12	1
Benzo(k)fluoranthene	mg/kg	141.0				0.7	0.4	3.7					2	4		1
Benzo(g,h,i)perylene	mg/kg	654				0.8	0.2	4.7					2	3	5	1
Chrysene	mg/kg	137.0				1.2	0.8	9.5					2	4	5	1
Dibenzo(a,h)anthracene	mg/kg	13.00				0.3	0.1	1.8							2	
Fluoranthene	mg/kg	22600				3	0.9	12					4	6	16	1
Fluorene	mg/kg	63500				1.5	< 0.1	0.9					1	1	2	1
Indeno(1,2,3-c,d)pyrene	mg/kg	60.0				0.8	0.2	6.3					3	4	5	2
Naphthalene	mg/kg	204.0				4.1	1.2	1.7					1	1	2	1
Phenanthrene	mg/kg	21900				1.8	0.5	8.5					3	5	13	1
Pyrene	mg/kg	54200				3.5	0.1	11					4	6	15	1
Coronene	mg/kg	nc														
PAH (Sum of 16 - excluding coronene)	mg/kg	nc				23.1	7.4	94.8					32	49	99	16
PAH (Sum of 17 - including coronene)	mg/kg	nc														18
PCB																
PCB 28	mg/kg	nc														
PCB 52	mg/kg	nc														
PCB 101	mg/kg	nc														
PCB 118	mg/kg	nc														
PCB 138	mg/kg	nc														
PCB 153	mg/kg	nc														
PCB 180	mg/kg	nc														
	Indicates where the data exceeds the															

Soil Screening Assessment - BAM Nuttall Ground Investigation Data

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Ground Investigation		PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011
Report Number		133347	133347	121863	122111	122209	122210	122209	133347	133347	133347	133346	133347	133346	133347	133346	133347	133347	133347	133344	133344	133344	133344	133344	133344	121783	122211	122209	122209	122210	122211				
Lab Ref		AF61368	AF61369	AF60262	AF68443	AF68336	AF68366	AF68337	AF61376	AF61377	AF61378	AF61343	AF61379	AF61380	AF61344	AF61381/ AF64444	AF61382	AF61345	AF61383	AF61384	AF61385	AF61323	AF61318	AF61319	AF61320	AF61321	AF61322	AF57622	AF68428	AF68289	AF68290	AF68354	AF68429		
Date		04/01/2011	04/01/2011	10/12/2010	07/02/2011	25/01/2011	25/01/2011	25/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	04/01/2011	10/12/2010	07/02/2011	25/01/2011	25/01/2011	25/01/2011	07/02/2011		
Exploatory hole location		BH2004	BH2004	TP2020	TP2026	TP2026	TP2026	TP2026	BH2009	BH2009	BH2009	BH2009	BH2009	BH2009	BH2015	BH2015	BH2015	BH2015	BH2015	BH2015	BH2015	TP2019	TP2014	TP2014	TP2014	TP2014	TP2014	TP2002	BH2016	BH2016	BH2016	BH2016	BH2016	BH2016	
Zone B Location		B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B1	B3	B3	B3	B3	B3	B3	B3	B3	B3
Location on plot/ gas holder number		Inside GH9	Inside GH9	GHB (edge)	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Gas holder B (edge)	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Outside gasholders	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	
Depth (m)		13m	15m	1m	1m	1m	1m	2m	0.35m	1m	2m	2m	3m	4m	5m	0.3m	1m	2m	3m	4m	5m	0.1m - 0.8m	0.6m	1m	2m	2m	3m	0.3m	0.3m	1m	2m	2m	3m	3m	3m
Strata		Reworked London Clay	London Clay	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Reworked Weathered London Clay	Weathered London Clay	Weathered London Clay	Made Ground	Made Ground	Made Ground	Made Ground	Weathered London Clay	Weathered London Clay	Made Ground	Topsoil	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	
4-Chlorophenylphenylether	mg/kg	nc	<0.50										<0.50						<0.50								<0.50								
4-Methylphenol	mg/kg	nc	<0.50										<0.50						<0.50								<0.50								
4-Nitroaniline	mg/kg	nc	<0.50										<0.50						<0.50								<0.50								
ethyl-methyl benzenes	mg/kg	nc																																	
Tentatively Identified Compounds	mg/kg	nc	Not detected										Not detected																						
BenzoFuran	mg/kg	nc																																	
Biphenyl	mg/kg	nc																																	
1-methylnahtalene	mg/kg	nc																																	
1-methylnaphthalene	mg/kg	nc																																	
Indene	mg/kg	nc																																	
2-benzothiophene	mg/kg	nc																																	
Cinnamaldehyde	mg/kg	nc																																	
Biphenyl	mg/kg	nc																																	
naphthol(2,3-B)thiophene	mg/kg	nc																																	
PCBs as Aroclor 1242	mg/kg	nc	<1.0										<1.0						<1.0								<1.0								
2-sec-Butyl-4,6-dinitrophenol	mg/kg	nc																																	
4-Chloro-3-methylphenol	mg/kg	nc																																	
2-Chlorophenol	mg/kg	nc																																	
2,4-Dichlorophenol	mg/kg	nc																																	
2,6-Dichlorophenol	mg/kg	nc																																	
2,4-Dimethylphenol	mg/kg	nc																																	
2,4-Dinitrophenol	mg/kg	nc																																	
2-Methyl-4,6-dinitrophenol	mg/kg	nc																																	
2-Methylphenol	mg/kg	nc																																	
3-Methylphenol	mg/kg	nc																																	
4-Methylphenol	mg/kg	nc																																	
2-Nitrophenol	mg/kg	nc																																	
4-Nitrophenol	mg/kg	nc																																	
Pentachlorophenol	mg/kg	nc																																	
Phenol	mg/kg	3200																																	
2,3,4,5-Tetrachlorophenol	mg/kg	nc																																	
2,3,4,6-Tetrachlorophenol	mg/kg	3900																																	
2,3,5,6-Tetrachlorophenol	mg/kg	nc																																	
2,3,4-Trichlorophenol	mg/kg	nc																																	
2,3,5-Trichlorophenol	mg/kg	nc																																	
2,3,6-Trichlorophenol	mg/kg	nc																																	
2,4,5-Trichlorophenol	mg/kg	nc																																	
2,4,6-Trichlorophenol	mg/kg	nc																																	
3,4,5-Trichlorophenol	mg/kg	nc																																	
Indicates where the data exceeds the sc																																			

Ground Investigation		PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011			
Report Number		122209	122209	122211	122210	122209	122209	122211		122209	122210	122209	122210	122209	122209	122209	133344	133344	133343	133344	133344	133344	133344	133344	133344	133344	133344	133344	121783			
Lab Ref		AF68291	AF68292	AF68430	AF68355	AF68293	AF68294	AF68431	AF68295	AF68356	AF68296	AF68357	AF68297	AF68298	AF68299	AF61285	AF61286	AF61269	AF61287	AF61288	AF61270	AF61289	AF61271	AF61290	AF61291	AF61292	AF61293	AF61296	AF61298	AF61299	AF61301	AF57621
Date		25/01/2011 BH2016	25/01/2011 BH2016	07/02/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	07/02/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	25/01/2011 BH2016	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	04/01/2011 BH2001	10/12/2010 BH2003		
Zone B Location		B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	B3	
Location on plot/ gas holder number		Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH9	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Inside GH12	Outside gasholders	
Depth (m)		4m	6m	6m	6m	7m	8m	8m	9m	9m	10m	11m	12m	13m	15m	0.3m	1m	2m	3m	3m	4m	5m	6m	7m	8m	9m	10m	12m	14m	14m	16m	0.3m
Strata															Clay	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	London Clay	Made Ground	
	Screening Criteria																															
Determinants	Units	Commercial																														
Metals																																
Arsenic	mg/kg	640	13	13		15	16		18		14		22	10	10		11		7.6								7	5.9	8.6		6.6	9
Cadmium	mg/kg	230.0	<0.10	<0.10		0.1	<0.10		<0.10		<0.10		<0.10	<0.10	0.24		0.16		0.17							<0.10	<0.10	0.39		0.25	0.11	
Chromium	mg/kg	30400	8	7		15	9.8		45.0		11		6.8	21	13				8.9							15	11	84		15	24	
Copper	mg/kg	71700	20	21		27	43		39		100		150	24	27				19							12	12	26		25	27	
Lead	mg/kg	7300	67	88		99	400		230		890		820	4100	890				95							22	15	330		19	140	
Mercury	mg/kg	3600	0.27	0.19		0.12	0.58		0.24		0.41		0.35	<0.10	<0.10				0.29							<0.10	0.27	0.31		0.11	0.29	
Nickel	mg/kg	1800	23	21		32	26		25		26		22	24	33				18							11	12	11	41		27	13
Molybdenum	mg/kg	nc																														
Selenium	mg/kg	13000	<0.20	<0.20		<0.20	<0.20		<0.20		<0.20		<0.20	<0.20	0.46		<0.20		<0.20							<0.20	<0.20	<0.20		1	< 0.20	
Zinc	mg/kg	662000	52	65		92	72		66		120		230	83	68				71							22	26	28	510		78	60
Miscellaneous																																
Total Cyanide	mg/kg	nc																	<0.50													
Free Cyanide	mg/kg	78.00																	<0.50													
Thiocyanate	mg/kg	nc																	<0.50							<0.50	<0.50	1.7		<0.50	< 0.5	
Boron	mg/kg	192000																	<5.0								<5.0	18	16			
Total organic carbon	%	nc				0.7				1.6		1.3																				
pH	pH Units	nc	9	8.9		8.8	8.5	9.2		8.9	9.3	9	9.5	8.9	10.4	9		9.7	9.8	10.9		11.3		10.5	11			11.5	11.9	11.7	9.4	8.3
Asbestos identification	nc			Not detected				Not detected								Not detected						Not detected				Not detected						
Asbestos Concentration	%	nc																														
Phenol	mg/kg	3200	<0.3	<0.3		<0.3	<0.3		<0.3		<0.3		<0.3	<0.3	0.4		<0.3		0.7							1					0.3	<0.2
Sulphur (free)	nc																															
Sulphide	mg/kg	nc																														
Total Sulphate	% as SO4	nc																														
Sulphur (elemental)	mg/kg	nc																														
Phenol (monohydric) SOM 1%	mg/kg	nc																														
Total sulphate	mg/kg	nc	0.28	0.22		0.76	0.66		0.37		0.47		0.98	0.09	0.08																	
Sulphate (2:1 water soluble) as SO4	g/l	nc																														
Organic matter	%	nc	1.2	1.1		0.9	3.1		2.6		3.1		1.7	0.5	1.1				2.6													
Moisture	%	nc	18.9	15.4		19.9	20.8	20.5	22.3		24.1	25.8	22.7	16.9	5.23	19.2		13.6	14.1	14.6	14.8	11.8		16.2	13.7	14.2						
Acid Neutralisation Capacity	mol/kg	nc																	0.062			0.119										
Loss on ignition	%	nc				3.09			4.14		23.7								3.2			1.69										
Stones content > 50mm	%	nc			<0.02				<0.02		<0.02							<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
BTEX																																
Benzene	µg/kg	28000.00				1.5				3.3		13							2.8	1.7	5.9											
Toluene	µg/kg	870000.00				1.5				3.6		< 1							< 1	< 1	4											
Ethylbenzene	µg/kg	581000				< 1				< 1		< 1							2.7	< 1	4											
m- & p-Xylene	µg/kg	575000				< 1				2.6		< 1							4.4	< 1	5											
o-Xylene	µg/kg	480000				< 1				< 1		< 1							7.6	< 1	3.4											
Total BTEX	µg/kg	nc				<0.005				0.0072		0.0097							<0.005													
Methyl tert-butyl ether	µg/kg	nc				<1.0	<1.0				<1.0		<1.0	<1.0																		
Hydrocarbons																																
Aliphatic >C5-C6	mg/kg	3380				< 0.1	< 0.1				< 0.1		< 0.1	< 0.1																		
Aliphatic >C6-C8	mg/kg	8250				< 0.1	< 0.1				< 0.1		< 0.1	< 0.1																		
Aliphatic >C8-C10	mg/kg	2130				< 0.1	1.1				< 0.1		< 0.1	< 0.1																		
Aliphatic >C10-C12	mg/kg	10300				< 0.1	6.7				< 0.1		< 0.1	< 0.1																		
Aliphatic >C12-C16	mg/kg	60800				< 0.1	27				< 0.1		< 0.1	< 0.1																		
Aliphatic >C16-C21	mg/kg	673000				< 0.1	25				< 0.1		< 0.1	< 0.1																		
Aliphatic >C21-C35	mg/kg	673000				< 0.1	13				< 0.1		< 0.1	< 0.1																		
Aliphatic >C35-C44	mg/kg	673000				< 0.1	< 0.1				< 0.1		< 0.1	< 0.1																		
Aromatic >C5-C7	mg/kg	27700				< 0.1	< 0.1				< 0.1		< 0.1	< 0.1																		
Aromatic >C7-C8	mg/kg	59000				< 0.1	< 0.1				< 0.																					

Soil Screening Assessment - BAM Nuttall Ground Investigation Data

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D3 Groundwater Screening Tables

er	Concentration exceeds the assessment criteria																	
nc = no criteria																		
Ground Investigation				Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	Oscar Faber	White Young Green
Lab Ref				W06903	W06904	W06905	W06913	W08081	W07495	W08080	W06906	W06907	W06908	W06909	W06910	W06911	W06912	WYG11814
Date samples collected				18.03.91	18.03.91	18.03.91	19.03.91	18.03.91	18.03.91	18.03.91	18.03.91	18.03.91	18/03/1991	19/03/1991	19/03/1991	19/03/1991	18/03/1991	16/07/1999
Exploratory Hole Location				Not known	Not known	Not known	TP20	TP12	BH4A	BH2	Not known	Not known	Not known	Not known	Not known	Not known	TP2	BH106
Depth (m)				Surface	4.5	7.0		8.0	2.5	9.0	Surface	4.5	8.0	Surface	7.0	14.0	3.3	0.9
Location				Inside gasholder 3	Inside gasholder 3	Inside gasholder 3	B3 (inside GH9)	On B1 and B3 boundary (inside GH9)	B3 (inside GH9)	Pancras Square	Gas holder 8	Gas holder 8	Gas holder 8	Gas holder 10	Gas holder 10	Gas holder 10	B5	Inside GH1
																		B1
	Screening Criteria	Units	Standard	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data
Inorganics																		
Arsenic	10	ug/l	UK DWS	< 5	< 5	9	150	66	1350	< 5	< 5	< 5	< 5	< 5	< 5	< 5	157	0.026
Cadmium	5	ug/l	UK DWS	1	< 1	1	2	< 2	510	2	< 1	< 1	2	< 1	< 1	< 1	< 1	< 0.001
Chromium	50	ug/l	UK DWS															< 0.01
Copper	2000	ug/l	UK DWS															< 0.005
Lead	25	ug/l	UK DWS	530	690	920	3300	238	830000	150	550	770	< 20	< 20	< 20	< 20	1200	< 0.01
Mercury	1	ug/l	UK DWS	23	1.4	0.8	14	4	210	4.3	0.8	0.5	< 0.5	< 0.5	< 0.5	0.9	8	< 0.00005
Nickel	50	ug/l	UK DWS															< 0.005
Selenium	10	ug/l	UK DWS															0.014
Zinc	5000	ug/l	UK DWS															< 0.005
Miscellaneous																		
Alkalinity	nc	mg CaCO3 l ⁻¹	nc															
Chloride	nc	mg/l	nc	13	14	14		15	80	277	9	14	10	20	20	20	29	
Sulphate as SO4	250	mg/l	UK DWS	6	2	1	307	195	104	1504	5	6	1	4	3	3	354	280
Cyanide total	0.5	mg/l	UK DWS	0.6	1.9	1.4	0.1	3.6	5	< 0.5	1.2	0.9	0.9	0.3	0.3	0.2	6.4	3
Cyanide free	0.001	mg/l	FEQS															
Thiocyanate	0.17	mg/l	DIV	< 1	< 1	< 1	< 1	< 1	4.4	13.6	< 1	< 1	< 1	< 1	< 1	< 1	3.1	
Hardness	nc																	
Ammoniacal Nitrogen as N	0.39	mg/l	UK DWS	2	3.4	3.4	3.3	0.24	32	0.65	2.9	3.8	4.1	6.5	7	12	51	
Phenol	0.03																	
Total Organic Carbon	nc																	23
pH	nc	pH units	nc	7	7.6	7.7	8.6	7.4	7.4	7.1	7.5	7.6	7.6	7.8	7.6	7.6	9.4	8.3
Electrical conductivity	nc	µS cm ⁻¹	nc	425	495	500	1000	748	1358	3510	380	290	470	375	380	380	930	1000
Total phenol	0.0005	mg/l	UK DWS	0.1	0.07	0.08	< 0.05	< 0.5	< 0.5	15.2	< 0.05	< 0.05	0.2	0.08	< 0.05	0.07	0.6	ND
Sulphide (H2S)	0.00025	mg/l	FEQS	0.2	0.2	0.2	0.4	< 0.05	23	< 0.05	0.2	0.8	1	0.2	0.2	0.2	0.2	
PAH																		
Acenaphthene	2.57	mg/l	DIV															0.003
Acenaphthylene	4.01	mg/l	DIV															<0.001
Anthracene	0.00002	mg/l	FEQS															0.001
Benzo(a)anthracene	0.001	mg/l	DIV															<0.001
Benzo(a)pyrene	0.00001	mg/l	UK DWS															<0.001
Benzo(b)fluoranthene	0.017	mg/l	DIV															<0.001
Benzo(k)fluoranthene	0.00036	mg/l	DIV															<0.001
Benzo(g,h,i)perylene	0.00018	mg/l	DIV															<0.001
Chrysene	0.0012	mg/l	DIV															<0.001
Dibenzo(a,h)anthracene	0.00083	mg/l	DIV															<0.001
Fluoranthene	0.000002	mg/l	FEQS															0.002
Fluorene	nc	mg/l	nc															0.002
Indeno(1,2,3-c,d)pyrene	0.0000036	mg/l	DIV															<0.001
Naphthalene	0.01	mg/l	FEQS															0.13
Phenanthrene	0.03	mg/l	DIV															0.006
Pyrene	0.106	mg/l	DIV															0.001
Total of 16 PAH	nc	mg/l	nc															0.145
Coal tars	nc	mg/l	nc	11	< 10	< 10	27	< 10	9030	< 10	< 10	< 10	< 10	< 10	< 10	< 10	17	
Mineral oils	nc	mg/l	nc	< 10	< 10	< 10	< 10	15	1010	31	< 10	12	13	21	13	18	< 10	
Hydrocarbon oils	nc	mg/l	nc															<0.1
Toluene extractable matter	nc	mg/l	nc	18	12	12	34	24	11150	58	< 10	15	14	23	14	20	21	

er	Concentration exceeds the assessment criteria										
nc = no criteria											
Ground Investigation				White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green	White Young Green
Lab Ref				WYG11815	WYG11809	WYG1181	WYG118110	WYG118111	WYG11808	WYG118113	WYG118116
Date samples collected				16/07/1999	16/07/1999	20/07/1999	20/07/1999	20/07/1999	20/07/1999	20/07/1999	20/07/1999
Exploratory Hole Location				BH107	BH102	BH104	BH102C	BH103	BH101	BH105A	SA7322A
Depth (m)				2.4	0.9	1.0	2.03	2.5	0.79	0.52	1.02
Location				Inside GHB	Outside gasholders	Inside GH9	Outside gasholders	Outside gasholders	Outside gasholders	Inside GHA	Outside gasholders
				B1	B1	B3	B5	Between B5 and B6	Pancras Square	Pancras Square	Pancras Square
	Screening Criteria	Units	Standard	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data	Historical data
Inorganics											
Arsenic	10	ug/l	UK DWS	0.026	0.023	0.028	0.0031	0.032	0.014	0.037	0.026
Cadmium	5	ug/l	UK DWS	< 0.001	< 0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	50	ug/l	UK DWS	0.027	< 0.01	< 0.01	0.03	0.037	< 0.01	<0.01	0.27
Copper	2000	ug/l	UK DWS		< 0.005	< 0.005	0.005	<0.005	<0.005	0.005	0.006
Lead	25	ug/l	UK DWS	< 0.01	< 0.01	< 0.01	<0.01	0.013	<0.01	<0.01	<0.01
Mercury	1	ug/l	UK DWS	< 0.00005	< 0.00005	< 0.00005	<0.00005	< 0.00005	<0.00005	< 0.00005	< 0.00005
Nickel	50	ug/l	UK DWS	0.006	< 0.005	< 0.005	0.013	0.011	<0.005	0.012	<0.005
Selenium	10	ug/l	UK DWS	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	5000	ug/l	UK DWS	< 0.005	< 0.005	< 0.005	0.007	0.015	0.006	<0.005	<0.005
Miscellaneous											
Alkalinity	nc	mg CaCO3 l ⁻¹	nc								
Chloride	nc	mg/l	nc								
Sulphate as SO4	250	mg/l	UK DWS	1500	250	290	2100	2900	270	420	1500
Cyanide total	0.5	mg/l	UK DWS	0.19	0.27	1.4	0.68	65	0.44	2	0.19
Cyanide free	0.001	mg/l	FEQS								
Thiocyanate	0.17	mg/l	DIV								
Hardness	nc										
Ammoniacal Nitrogen as N	0.39	mg/l	UK DWS								
Phenol	0.03										
Total Organic Carbon	nc			12	17	28	20	54	10	26	10
pH	nc	pH units	nc	7.2	7.9	7.2	6.6	7.2	7.5	7.3	6.9
Electrical conductivity	nc	µS cm ⁻¹	nc	2500	1200	1500	3400	4900	1200	980	1400
Total phenol	0.0005	mg/l	UK DWS	0.18	ND	0.032	0.315	103.74	0.106	15.704	ND
Sulphide (H2S)	0.00025	mg/l	FEQS								
PAH											
Acenaphthene	2.57	mg/l	DIV	0.003	0.001	<0.001	0.002	0.05	0.002	0.02	0.003
Acenaphthylene	4.01	mg/l	DIV	0.003	<0.001	<0.001	<0.001	0.3	<0.001	0.02	0.003
Anthracene	0.00002	mg/l	FEQS	0.008	<0.001	<0.001	0.005	0.15	0.003	0.031	0.008
Benzo(a)anthracene	0.001	mg/l	DIV	<0.001	<0.001	0.002	<0.001	0.021	<0.001	<0.001	<0.001
Benzo(a)pyrene	0.00001	mg/l	UK DWS	<0.001	<0.001	<0.001	<0.001	0.059	<0.001	0.014	<0.001
Benzo(b)fluoranthene	0.017	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.046	<0.001	0.011	<0.001
Benzo(k)fluoranthene	0.00036	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.032	<0.001	0.007	<0.001
Benzo(g,h,i)perylene	0.00018	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.03	<0.001	0.008	<0.001
Chrysene	0.0012	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.067	<0.001	0.016	<0.001
Dibenzo(a,h)anthracene	0.00083	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.007	<0.001	0.002	<0.001
Fluoranthene	0.000002	mg/l	FEQS	0.008	<0.001	<0.001	0.004	0.2	0.004	0.055	0.008
Fluorene	nc	mg/l	nc	0.011	<0.001	<0.001	0.008	0.15	0.004	0.045	0.011
Indeno(1,2,3-c,d)pyrene	0.0000036	mg/l	DIV	<0.001	<0.001	<0.001	<0.001	0.035	<0.001	0.008	<0.001
Naphthalene	0.01	mg/l	FEQS	0.021	0.003	0.014	0.039	21.5	0.001	1.25	0.021
Phenanthrene	0.03	mg/l	DIV	0.014	<0.001	<0.001	0.012	0.39	0.004	0.096	0.014
Pyrene	0.106	mg/l	DIV	0.005	<0.001	<0.001	0.002	0.15	0.002	0.039	0.005
Total of 16 PAH	nc	mg/l	nc	0.073	0.004	0.016	0.004	23.23	0.02	1.64	0.073
Coal tars	nc	mg/l	nc								
Mineral oils	nc	mg/l	nc								
Hydrocarbon oils	nc	mg/l	nc	7.2	0.5	0.4	4.5	110	4.3	0.8	3.8
Toluene extractable matter	nc	mg/l	nc								

Groundwater Screening Assessment, Monitoring Round 4

	Concentration exceeds the assessment criteria															
nc = no criteria																
Ground Investigation				PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011
Report Number				122478	122478	122478	122478	122478	122478	122478	122478	122478	122478	122478	122478	122478
Lab Ref				AF75878	AF75879	AF75880	AF75884	AF75885	AF75886	AF75875	AF75877	AF75876	AF75882	AF75881	AF75883	AF75887
Date samples collected				10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011	10/02/2011
Date analysis completed				24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011	24/02/2011
Exploratory Hole Location				BH2004	BH2004	BH2006	BH2012	BH2014	BH2015	BH2001	BH2003	BH2002	BH2010	BH2007	BH2011	BH2005C
Depth (m)				2.04	2.11	4.07	4.11	4.25	2.97	2.09	3.35	3.10	2.88	4.32	1.20	2.14
Standpipe																
Location				Inside GH9	Inside GH9	Inside GH1	Inside GH3	Inside GH3	Outside GHs	Inside GH12	Outside GHs	Outside GHs	Outside GHs	Inside GH3	Outside GHs	Outside GHs
				B1	B1	B1	B1	B1	B1	B3	B3	B3	B5	Pancras Square	Pancras Square	Pancras Square
	Screening Criteria	Units	Standard	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3	Round 3
Inorganics																
Arsenic	10	ug/l	UK DWS	5.2	10	7.9	8.4	7	6.8	6.7	2.9	6.6	7.9	9.1	13	2.6
Cadmium	5	ug/l	UK DWS	0.11	0.09	0.095	<0.080	<0.080	<0.080	0.14	<0.080	0.15	<0.080	<0.080	0.22	0.11
Chromium	50	ug/l	UK DWS	1.8	1	<1.0	<1.0	3.2	7	<1.0	3	13	6.9	<1.0	2.6	3.2
Copper	2000	ug/l	UK DWS	13	9.7	4.3	1.6	9.4	19	6.4	11	15	16	1.9	4.5	5.5
Lead	25	ug/l	UK DWS	120	65	1.1	<1.0	<1.0	26	17	<1.0	2.3	44	<1.0	2.7	12
Mercury	1	ug/l	UK DWS	<0.50	<0.50	<0.50	1.5	0.93	0.95	<0.50	<0.50	<0.50	1.2	0.51	1.8	<0.50
Nickel	50	ug/l	UK DWS	8.5	7.9	5.1	11	7.2	6.7	12	6.3	26	13	12	11	8.7
Selenium	10	ug/l	UK DWS	3.6	2.7	5.5	4.3	19	9.5	5.5	9.4	13	16	4.4	18	4.2
Zinc	5000	ug/l	UK DWS	130	120	67	15	58	61	57	84	140	62	18	48	36
Miscellaneous																
Alkalinity	nc	mg CaCO3 l ⁻¹	nc	140	150	82	82	87	230	53	370	730	440	110	130	300
Chloride	nc	mg/l	nc	54	53	94	50	330	510	70	82	1100	250	53	180	38
Sulphate as SO4	250	mg/l	UK DWS	1300	1300	1100	350	1300	690	640	1400	1500	670	360	1100	640
Cyanide total	0.5	mg/l	UK DWS	0.37	0.2	0.59	2.7	1.9	< 0.05	1.8	0.06	0.06	0.17	2.7	3.6	< 0.05
Cyanide free	0.001	mg/l	FEQS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Thiocyanate	0.17	mg/l	DIV	< 0.5	< 0.5	< 0.5	1.1	6.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	15	< 0.5
Ammoniacal Nitrogen as N	0.39	mg/l	UK DWS	2.1	0.65	3.4	6.1	64	2.3	6.8	0.39	6	4.3	3.5	19	3.7
pH	nc	pH units	nc	7.4	7.5	7.8	11.7	8.5	7.6	9.3	7.3	7	7.4	11.7	7.6	7.5
Electrical conductivity	nc	µS cm ⁻¹	nc	2500	2500	2400	1900	3400	3100	1600	2900	5900	2700	2000	2800	1700
PAH																
Acenaphthene	2570	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	7.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.3	<0.1
Acenaphthylene	4010	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	36	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	23	<0.1
Anthracene	0.1	ug/l	FEQS	<0.1	<0.1	<0.1	<0.1	7.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1
Benzo(a)anthracene	1	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	0.01	ug/l	UK DWS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	17	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	0.36	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.18	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	1.2	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.83	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	ug/l	FEQS	<0.1	<0.1	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1
Fluorene	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	27	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	18	<0.1
Indeno(1,2,3-c,d)pyrene	0.0036	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	2.4	ug/l	FEQS	200	<0.1	<0.1	220	3800	0.6	860	<0.1	<0.1	<0.1	90	1200	1.5
Phenanthrene	30	ug/l	DIV	<0.1	<0.1	<0.1	0.8	26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	21	<0.1
Pyrene	106	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total of 16 PAH	nc	ug/l	nc	200	<2	<2	220	3900	<2	860	<2	<2	<2	90	1300	<2
Coronene	nc	ug/l	nc	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Phenol																
Phenol (total)	nc	ug/l	nc	< 0.03	< 0.03	< 0.03	0.09	0.42	< 0.03	0.2	< 0.03	< 0.03	< 0.03	0.14	0.05	< 0.03
TPH																
TPH	10	ug/l	UK DWS	490	<10	<10	1100	43000	<10	2100	<10	<10	<10	710	3300	<10
BTEX																
Benzene	1	ug/l	UK DWS	< 1	< 1	< 1	360	24000	< 1	170	< 1	< 1	< 1	460	160	< 1
Ethylbenzene	20	ug/l	FEQS	< 1	< 1	< 1	2.1	110	< 1	33	< 1	< 1	< 1	2.5	< 1	< 1
Toluene	50	ug/l	FEQS	< 1	< 1	< 1	61	4300	< 1	110	< 1	< 1	< 1	51	26	< 1
m- & p-Xylene	nc	ug/l	nc	< 1	< 1	< 1	11	500	< 1	33	< 1	< 1	< 1	6.8	8.4	< 1
o-Xylene	nc	ug/l	nc	< 1	< 1	< 1	13	270	< 1	20	< 1	< 1	< 1	12	9.3	< 1

	Concentration exceeds the assessment criteria																
nc = no criteria																	
Ground Investigation				PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011
Report Number				122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318
Lab Ref				AF71315	AF71316	AF71325	AF71317	AF71320	AF71319	AF71323	AF71324	AF71326	AF71327	AF71313	AF71314	AF71318	AF71321
Date samples collected				02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011
Date analysis completed				14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011
Exploratory Hole Location				BH2004	BH2004	BH2006	BH2012	BH2014	BH2015	BH2016	BH2016	BH2003	BH2001	BH2002	BH2010	BH2011	BH2007
Depth (m)				2.0	2.0	4.0	4.0	4.1	3.0	2.80	2.78	1.4	2.1	3.0	2.7	1.2	4.2
Standpipe				Deep	Shallow	Deep				Deep	Shallow						
Location				Inside GH9	Inside GH9	Inside GH1	Inside GH3	Inside GH3	Outside GHs	Inside GH9	Inside GH9	Outside GHs	Inside GH12	Outside GHs	Outside GHs	Outside GHs	Inside GH3
				B1	B1	B1	B1	B1	B1	B3	B3	B3	B3	B3	B5	Pancras Square	Pancras Square
	Screening Criteria	Units	Standard	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2
Inorganics																	
Arsenic	10	ug/l	UK DWS	7	10	6.9	15	12	7	6.9	9.3	3.6	8.6	8.1	5	20	33
Cadmium	5	ug/l	UK DWS	0.12	0.11	0.19	0.11	0.14	0.081	0.089	0.13	0.1	0.14	0.13	0.08	0.31	0.13
Chromium	50	ug/l	UK DWS	3.3	3.8	2.2	4.8	10	5.9	2	2.6	4	2.4	18	5.9	4.4	2.6
Copper	2000	ug/l	UK DWS	10	8.9	6.3	3.8	17	11	6	17	15	13	13	11	9	1.4
Lead	25	ug/l	UK DWS	110	76	10	4	4.4	6.3	18	33	<1.0	4.4	17	1.5	17	2.8
Mercury	1	ug/l	UK DWS	<0.50	<0.50	<0.50	0.76	1.6	0.91	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	3.2
Nickel	50	ug/l	UK DWS	6.3	7.5	8.3	14	8.4	4	5.2	8.9	7.6	18	28	8.4	11	13
Selenium	10	ug/l	UK DWS	5.4	5.1	6.7	4	38	9.6	9.2	3.5	8.9	7.4	15	11	17	4.1
Zinc	5000	ug/l	UK DWS	130	160	120	41	100	59	41	41	87	78	140	58	84	51
Miscellaneous																	
Alkalinity	nc	mg CaCO3 l ⁻¹	nc	170	180	120	420	160	210	110	200	580	170	940	500	180	240
Chloride	nc	mg/l	nc	69	55	110	63	500	350	97	66	66	68	1100	170	170	89
Sulphate as SO4	250	mg/l	UK DWS	1400	1300	1300	360	1400	470	620	510	1300	680	1500	650	1400	540
Cyanide total	0.5	mg/l	UK DWS	0.49	0.23	0.73	15	2.2	0.08	0.18	0.03	0.08	3.6	< 0.05	0.08	3.1	3.9
Cyanide free	0.001	mg/l	FEQS	< 0.05	< 0.05	< 0.05	0.01	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Thiocyanate	0.17	mg/l	DIV	< 0.5	< 0.5	< 0.5	1.2	7.3	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	13	1.4
Ammoniacal Nitrogen as N	0.39	mg/l	UK DWS	3.4	0.61	3.9	2.3	47	0.67	3	3.3	0.16	6.1	5.9	3.1	14	5.1
pH	nc	pH units	nc	7.4	7.6	7.8	11.6	9.5	7.5	9.1	8	9.1	9.3	7.2	7.6	8	11.5
Electrical conductivity	nc	µS cm ⁻¹	nc	2500	2400	2600	1900	3900	2200	1600	1400	1700	1600	6100	2000	3200	2000
PAH																	
Acenaphthene	2570	ug/l	DIV	1.8	<0.1	1	2.2	6.2	<0.1	<0.1	<0.1	<0.1	1.9	<0.1	<0.1	7.3	0.8
Acenaphthylene	4010	ug/l	DIV	0.4	<0.1	0.2	<0.1	27	<0.1	<0.1	<0.1	<0.1	0.5	<0.1	<0.1	25	1.4
Anthracene	0.1	ug/l	FEQS	0.1	<0.1	0.2	0.3	4.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3	0.2
Benzo(a)anthracene	1	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	0.01	ug/l	UK DWS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	17	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	0.36	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.18	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	1.2	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.83	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	ug/l	FEQS	0.6	<0.1	<0.1	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	4.4	<0.1
Fluorene	nc	ug/l	nc	0.7	<0.1	0.4	1	16	<0.1	<0.1	<0.1	<0.1	1	<0.1	<0.1	19	1.1
Indeno(1,2,3-c,d)pyrene	0.0036	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	2.4	ug/l	FEQS	3400	0.9	380	510	3000	<0.1	<0.1	<0.1	<0.1	3600	<0.1	0.5	1200	900
Phenanthrene	30	ug/l	DIV	1.1	<0.1	1.5	2.2	16	<0.1	<0.1	<0.1	<0.1	2.7	<0.1	<0.1	21	1.5
Pyrene	106	ug/l	DIV	0.6	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	2.6	<0.1
Total of 16 PAH	nc	ug/l	nc	3400	<2	380	520	3100	<2	<2	<2	<2	3600	<2	<2	1300	900
Coronene	nc	ug/l	nc														
PCB																	
PCBs as Aroclor 1242	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TPH																	
TPH	10	ug/l	UK DWS	11000	<10	2800	3400	36000	<10	90	<10	<10	13000	<10	<10	4000	6500
Total Aliphatic Hydrocarbons	nc	ug/l	nc	710	<5	<5	<5	<5	<5	<5	<5	<5	550	<5	<5	<5	<5
Total Aromatic Hydrocarbons	nc	ug/l	nc	10000	<5	2800	3400	36000	<5	90	<5	<5	12500	<5	<5	4000	6500
TPH aliphatic >C10-C12	nc	ug/l	nc	23	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C12-C16	nc	ug/l	nc	40	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	30	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C16-C21	nc	ug/l	nc	330	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	150	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C21-C35	nc	ug/l	nc	320	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	360	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C35-C44	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C5-C6	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C6-C8	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH aliphatic >C8-C10	nc	ug/l	nc	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH aromatic >C10-C12	nc	ug/l	nc	8800	<0.1	1100	1400	11000	<0.1	28	<0.1	<0.1	9100	<0.1	<0.1	2500	2200
TPH aromatic >C12-C16	nc	ug/l	nc	220	<0.1	79	140	730	<0.1	21	<0.1	<0.1	180	<0.1	<0.1	320	110
TPH aromatic >C16-C21	nc	ug/l	nc	27	<0.1	<0.1	41	120	<0.1	<0.1	<0.1	<0.1	17	<0.1	<0.1	130	20
TPH aromatic >C21-C35	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12	<0.1
TPH aromatic >C35-C44	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH aromatic >C5-C7	nc	ug/l	nc	47	<0.1	600	430	7100	<0.1	<0.1	<0.1	<0.1	250	<0.1	<0.1	290	2000
TPH aromatic >C7-C8	nc	ug/l	nc	130	<0.1	290	330	7900	<0.1	<0.1	<0.1	<0.1	630	<0.1	<0.1	160	440
TPH aromatic >C8-C10	nc	ug/l	nc	1000	<0.1	760	1100	9200	<0.1	41	<0.1	<0.1	2400	<0.1	<0.1	630	1700
BTEX																	
Benzene	1	ug/l	UK DWS	22	<1.0	510	630	6200	<1.0	<1.0	<1.0	<1.0	320	<1.0	<1.0	200	3000
Ethylbenzene	20	ug/l	FEQS	<1.0	<1.0	21	36	68	<1.0	<1.0	<1.0	<1.0	27	<1.0	<1.0	<1.0	75
Toluene	50	ug/l	FEQS	<1.0	<1.0	75	100	3600	<1.0	<1.0	<1.0	<1.0	130	<1.0	<1.0	25	230
m- & p-Xylene	nc	ug/l	nc	1.1	<1.0	16	25	780	<1.0	<1.0	<1.0	<1.0	21	<1.0	<1.0	9.7	75
o-Xylene	nc	ug/l															

Ground Investigation				PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011	PBA 2010/ 2011
Report Number				122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318	122318
Lab Ref				AF71315	AF71316	AF71325	AF71317	AF71320	AF71319	AF71323	AF71324	AF71326	AF71327	AF71313	AF71314	AF71318	AF71321	AF71322
Date samples collected				02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011	02/02/2011
Date analysis completed				14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011	14/02/2011
Exploratory Hole Location				BH2004	BH2004	BH2006	BH2012	BH2014	BH2015	BH2016	BH2016	BH2003	BH2001	BH2002	BH2010	BH2011	BH2007	BH2005C
Depth (m)				2.0	2.0	4.0	4.0	4.1	3.0	2.80	2.78	1.4		3.0	2.7	1.2	4.2	1.3
Standpipe				Deep	Shallow	Deep				Deep	Shallow							
Location				Inside GH9	Inside GH9	Inside GH1	Inside GH3	Inside GH3	Outside GHs	Inside GH9	Inside GH9	Outside GHs	Inside GH12	Outside GHs	Outside GHs	Outside GHs	Inside GH3	Outside GHs
				B1	B1	B1	B1	B1	B1	B3	B3	B3	B3	B3	B5	Pancras Square	Pancras Square	Pancras Square
	Screening Criteria	Units	Standard	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2	Round 2
Styrene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tribromomethane	nc	ug/l	nc	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isopropylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	1.4	<1.0
Bromobenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	nc	ug/l	nc	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
n-Propylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorotoluene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trimethylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	2.4	50	<1.0	<1.0	<1.0	<1.0	2.4	<1.0	<1.0	1.4	7.9	<1.0
4-Chlorotoluene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
tert-Butylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	nc	ug/l	nc	6	1.3	<1.0	1.2	34	<1.0	<1.0	<1.0	<1.0	4.8	<1.0	<1.0	1.5	2.8	<1.0
sec-Butylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Isopropyltoluene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
n-Butylbenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	nc	ug/l	nc	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trichlorobenzene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Hexachlorobutadiene	nc	ug/l	nc	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichlorobenzene	nc	ug/l	nc	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Tentatively Identified Compounds	nc	ug/l	nc	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected	None Detected
Azobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
bis(2-Chloroethoxy)methane	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
bis(2-Chloroethyl)ether	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
bis(2-Chloroisopropyl)ether	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
bis(2-Ethylhexyl)phthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Butylbenzylphthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbazole	nc	ug/l	nc	<0.50	<0.50	<0.50	1.3	53	<0.50	<0.50	<0.50	<0.50	1.5	<0.50	<0.50	23	1.5	<0.50
Di-n-butylphthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Di-n-octylphthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dibenzofuran	nc	ug/l	nc	<0.50	<0.50	<0.50	1	18	<0.50	<0.50	<0.50	<0.50	1	<0.50	<0.50	23	1.2	<0.50
Diethylphthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dimethylphthalate	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorobutadiene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachlorocyclopentadiene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Hexachloroethane	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Indeno[1,2,3-cd]pyrene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Isophorone	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
N-Nitrosodi-n-propylamine	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
N-Nitrosodimethylamine	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Nitrobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Pentachlorophenol	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Phenanthrene	nc	ug/l	nc	1.1	<0.50	1.5	2.2	16	<0.50	<0.50	<0.50	<0.50	2.7	<0.50	<0.50	21	1.5	<0.50
Phenol	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.9	<0.50	<0.50
1,2-Dichlorobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2,4-Trichlorobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Chloronaphthalene	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Chlorophenol	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Methyl-4,6-dinitrophenol	nc	ug/l	nc	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2-Methylnaphthalene	nc	ug/l	nc	63	<0.50	13	19	160	<0.50	<0.50	<0.50	<0.50	52	<0.50	<0.50	44	29	<0.50
2-Methylphenol</																		

	Concentration exceeds the assessment criteria													
nc = no criteria														
Ground Investigation				PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011	PBA 2011
Report Number				122024	122024	122024	122024	122024	122024	122024	122024	122024	122024	122024
Lab Ref				AF64184	AF64188	AF64183	AF64182	AF64189	AF64180	AF64186	AF64181	AF64185	AF64187	AF64190
Date				13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011	13/01/2011
Exploratory Hole Location				BH2006	BH2012	BH2004	BH2004	BH2015	BH2001	BH2010	BH2003	BH2007	BH2011	W1
Depth (mbgl)				5.0	4.6	2.5	3.0	3.2	2.5	3.0	1.8	8.0	5.0	2.5
Location				Inside GH1	Inside GH3	Inside GH9	Inside GH9	Outside GHs	Inside GH12	Outside GHs	Outside GH's	Inside GH3	Outside GHs	
				B1	B1	B1	B1	B1	B3	B5	Pancras Square	Pancras Square	Pancras Square	
	Screening Criteria	Units	Standard	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1	Round 1
Inorganics														
Arsenic	10	ug/l	UK DWS	4.4	28	6.1	4.9	5.5	10	3.3	2.8	7.3	1.9	2.6
Cadmium	5	ug/l	UK DWS	0.1	0.16	0.14	0.11	<0.080	0.14	<0.080	<0.080	<0.080	<0.080	0.2
Chromium	50	ug/l	UK DWS	<1.0	6.5	<1.0	2	6.4	<1.0	13	<1.0	1.2	2.9	23
Copper	2000	ug/l	UK DWS	5.2	7.2	3.6	5.9	17	28	5.4	13	20	3.9	<1.0
Lead	25	ug/l	UK DWS	8.4	8	16	40	16	11	<1.0	<1.0	8.4	<1.0	<1.0
Mercury	1	ug/l	UK DWS	<0.50	1.2	0.57	<0.50	<0.50	<0.50	<0.50	<0.50	0.64	<0.50	<0.50
Nickel	50	ug/l	UK DWS	6.8	<1.0	7.6	6.9	8.1	23	7.6	7.3	9.1	11	400
Selenium	10	ug/l	UK DWS	6.2	14	26	3.3	12	8.2	7.7	9.4	7.4	4.7	7
Zinc	5000	ug/l	UK DWS	77	32	82	100	67	46	32	80	62	63	7400
Miscellaneous														
Alkalinity	nc	mg CaCO3 l ⁻¹	nc	89	500	200	180	230	120	87	440	160	400	160
Chloride	nc	mg/l	nc	120	280	200	160	520	110	95	130	130	59	64
Sulphate as SO4	250	mg/l	UK DWS	1200	380	1300	1500	740	490	580	1400	680	1000	3100
Cyanide total	0.5	mg/l	UK DWS	0.78	320	0.71	0.65	0.35	8	0.11	0.1	3.6	0.07	0.21
Cyanide free	0.001	mg/l	FEQS	< 0.05	0.34	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Thiocyanate	0.17	mg/l	DIV	< 0.5	7.5	< 0.5	< 0.5	< 0.5	1.6	< 0.5	< 0.5	2.2	< 0.5	0.91
Ammoniacal Nitrogen as N	0.39	mg/l	UK DWS	6.6	46	5.3	2.9	0.27	17	0.93	0.16	16	4.4	< 0.01
pH	nc	pH units	nc	7.7	11.4	7.5	7.6	7.6	8.8	8.9	7.6	11.8	8	5.8
Electrical conductivity	nc	µS cm ⁻¹	nc	2800	2400	3400	3500	3600	1700	1900	3100	2400	2600	4100
PAH														
Acenaphthene	2570	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	0.9	54
Acenaphthylene	4010	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	27
Anthracene	0.1	ug/l	FEQS	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	22
Benzo(a)anthracene	1	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.9
Benzo(a)pyrene	0.01	ug/l	UK DWS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.9
Benzo(b)fluoranthene	17	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3
Benzo(k)fluoranthene	0.36	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9
Benzo(g,h,i)perylene	0.18	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	1.2	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	3.1
Dibenzo(a,h)anthracene	0.83	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	0.1	ug/l	FEQS	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	27
Fluorene	nc	ug/l	nc	<0.1	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	<0.1	65
Indeno(1,2,3-c,d)pyrene	0.0036	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	2.4	ug/l	FEQS	37	2800	730	5500	1.4	76	<0.1	<0.1	1200	1	8400
Phenanthrene	30	ug/l	DIV	<0.1	2.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	120
Pyrene	106	ug/l	DIV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	18
Total of 16 PAH	nc	ug/l	nc	37	2800	730	5500	<2	76	<2	<2	1200	<2	8700
Coronene	nc	ug/l	nc	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PCB														
PCBs as Aroclor 1242	nc	ug/l	nc											
TPH														
TPH	10	ug/l	UK DWS	1300	3900	2800	310000	<10	1000	<10	<10	5700	170	490000
BTEX														
Benzene	1	ug/l	UK DWS	910	2500	1500	440	< 1	440	< 1	< 1	3700	< 1	
Ethylbenzene	20	ug/l	FEQS	65	510	57	3.8	< 1	29	< 1	< 1	380	< 1	
Toluene	50	ug/l	FEQS	110	970	300	190	< 1	140	< 1	< 1	620	< 1	
m- & p-Xylene	nc	ug/l	nc	35	360	79	240	< 1	28	< 1	< 1	450	< 1	
o-Xylene	nc	ug/l	nc	38	230	39	110	< 1	20	< 1	< 1	240	< 1	

D4 Gas Monitoring Data

Location	Date	Atmospheric pressure (mbar)	Methane (%)	Carbon dioxide (%)	Gas flow (l/hr)
Oscar Faber					
BH3 located inside GH9 on B1 B3 boundary (initial reading)	10/04/91	Not reported	4	0.04	Not reported
BH3 (dissipated reading)	10/04/91	Not reported	0.5	0.04	Not reported
BH5 (GH1, initial reading)	10/04/91	Not reported	1.3	0.05	Not reported
BH5 (GH1, dissipate reading)	10/04/91	Not reported	0.5	0.05	Not reported
White Young Green					
BH104 located inside GH9 on B1 plot	21/07/99	1009	0.1	0.1	-1.0
	10/08/99	1008	0.0	0.1	-1.5
	07/09/99	1008	0.1	0.0	0.1
BH106 located inside GH1 on B1 plot	21/07/99	1009	0.1	0.2	0.05
	10/08/99	1009	0.1	0.3	3.4
	07/09/99	1010	0.0	1.2	0.5
BH107 located inside GHB on B1 plot	21/07/99	1009	1.0	0.2	0.03
	10/08/99	1006	>150	5.0	0.0
	07/09/99	1009	47.6	1.0	0.2
BH102 located outside gasholders on B1 plot	21/07/99	1010	5.0	0.0	0.05
	10/08/99	1007	49.6	0.2	>4.8
	07/09/99	1010	16	0.1	0.02
BH102C located outside gasholders on B5 plot	21/07/99	1009	0.0	0.0	-0.3
	10/08/99	1008	0.0	9.2	0.56
	07/09/99	1009	0.0	9.7	0.1

Historical Gas Monitoring Data Zone B

Location	Date	Atmospheric pressure (mbar)	Methane (%)	Carbon dioxide (%)	Gas flow (l/hr)
BH103 located outside gasholders between B5 and B6 plots	21/07/99	1009	0.0	0.7	-0.9
	10/08/99	1008	0.0	2.2	-0.16
	07/09/99	1010	0.0	2.3	0.1
BH101 located outside gasholders in Pancras Square	21/07/99	1009	0.0	0.6	-1.8
	10/08/99	1009	0.0	0.1	-0.4
	07/09/99	1010	0.0	0.0	0.0
BH105A located inside gasholder A in Pancras Square	21/07/99	1009	0.2	0.0	-1.0
	10/08/99	1009	0.3	0.6	-24.0
	07/09/99	1009	0.3	0.5	0.2
Peter Brett Associates (monitoring undertaken by Norwest Holst)					
BH1007 located outside gasholders in plot B6	25/09/2008	1026	<0.1	0.0	<0.1
	01/10/2008	999	<0.1	0.0	<0.1
	09/10/2008	1028	<0.1	0.0	<0.1
	16/10/2008	1010	<0.1	0.0	<0.1
	23/10/2008	1019	<0.1	0.0	<0.1
	29/10/2008	1009	<0.1	0.0	<0.1
BH1010 located outside gasholders in Pancras Square	25/09/2008	1026	<0.1	0.0	<0.1
	01/10/2008	999	<0.1	0.0	<0.1
	09/10/2008	1028	<0.1	0.0	<0.1
	16/10/2008	1010	<0.1	0.0	<0.1
	23/10/2008	1019	<0.1	0.0	<0.1
	29/10/2008	1009	<0.1	0.0	<0.1
BH1019 located outside gasholders in plot B2	25/09/2008	1026	<0.1	0.0	<0.1
	01/10/2008	999	<0.1	0.0	<0.1
	09/10/2008	1028	<0.1	0.0	<0.1
	16/10/2008	1010	<0.1	0.0	<0.1
	23/10/2008	1019	<0.1	0.0	<0.1
	30/10/2008	996	<0.1	0.0	<0.1

Historical Gas Monitoring Data Zone B

Location	Date	Atmospheric pressure (mbar)	Methane (%)	Carbon dioxide (%)	Gas flow (l/hr)	Characteristic situation
BH2005C located outside the gasholders on B1 plot	09/12/10	1029	0.1	< 0.01	< 0.01	CS1
	14/12/10	1032	0.1	0.0	< 0.01	CS1
	16/12/10	1004	0.1	0.0	< 0.01	CS1
	06/01/11	997	0.0	0.0	< 0.01	CS1
	11/01/11	1002	0.0	0.2	< 0.01	CS1
	25/01/11	1016	0.0	0.0	0.0	CS1
	09/02/11	1016	0.1	0.0	0.0	CS1
	24/02/11	1020	0.0	0.1	0.0	CS1
	10/03/11	1009	0.0	0.2	0.0	CS1
	24/03/11	1034	0.0	0.0	0.1	CS1
BH2004 shallow standpipe located inside GH9 on B1 plot	14/12/10	1032	0.1	0.0	<0.01	CS1
	16/12/10	1004	0.1	0.0	<0.01	CS1
	06/01/11	997	0.0	0.0	<0.01	CS1
	11/01/11	1003	0.1	0.2	<0.01	CS1
	02/02/11	1006	0.0	0.1	0.0	CS1
	09/02/11	1016	0.0	0.0	0.0	CS1
	24/02/11	1018	0.0	0.3	0.0	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
BH2004 deep standpipe located inside GH9 on B1 plot	24/03/11	1034	0.0	0.0	0.0	CS1
	14/12/10	1032	0.2	0.0	<0.01	CS1
	16/12/10	1004	0.1	0.0	<0.01	CS1
	06/01/11	997	0.0	0.0	<0.01	CS1
	11/01/11	1003	0.0	0.1	<0.01	CS1
	02/02/11	1006	0.0	0.0	0.0	CS1
	09/02/11	1016	0.0	0.0	0.0	CS1
	24/02/11	1018	0.0	0.2	0.0	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
BH2006 shallow standpipe located inside gasholder 1 on B1 plot	24/03/11	1032	0.0	0.0	0.0	CS1
	14/12/10	1033	0.1	0.0	< 0.01	CS1
	16/12/10	999	0.1	0.1	< 0.01	CS1
	07/01/11	998	0.0	0.1	< 0.01	CS1
	11/01/11	1003	0.0	0.1	< 0.01	CS1
	02/02/11	1006	0.0	0.0	0.0	CS1
	09/02/11	1016	0.0	0.0	0.2	CS1
	24/02/11	1018	0.0	0.0	0.0	CS1

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Location	Date	Atmospheric pressure (mbar)	Methane (%)	Carbon dioxide (%)	Gas flow (l/hr)	Characteristic situation
	10/03/11	1006	0.0	0.0	0.0	CS1
	24/03/11	1032	0.0	0.0	0.0	CS1
BH2006 deep standpipe located inside gasholder 1 on B1 plot	14/12/10	1033	0.1	0.0	< 0.01	CS1
	16/12/10	999	0.1	0.1	< 0.01	CS1
	07/01/11	998	0.0	0.1	< 0.01	CS1
	11/01/11	1003	0.0	0.0	< 0.01	CS1
	02/02/11	1006	0.0	0.0	0.0	CS1
	09/02/11	1016	0.0	0.0	0.0	CS1
	24/02/11	1018	0.0	0.0	0.0	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
	24/03/11	1034	0.0	0.0	0.0	CS1
BH2012 located inside gasholder 3 on B1 plot	16/12/10	1006	0.1	0.0	< 0.01	CS1
	06/01/11	998	0.0	0.0	< 0.01	CS1
	11/01/11	1000	0.0	0.0	< 0.01	CS1
	24/01/11	1029	0.0	0.0	0.0	CS1
	09/02/11	1016	0.0	0.0	0.0	CS1
	24/02/11	1020	0.0	0.0	0.0	CS1
	10/03/11	1009	0.0	0.0	0.0	CS1
	24/03/11	1034	0.0	0.0	0.0	CS1
BH2014 located inside gasholder 3 on B1 plot	24/01/11	1029	0.0	0.0	0.0	CS1
	09/02/11	1016	0.7	0.0	-0.5	CS1
	24/02/11	1020	0.0	0.0	0.0	CS1
	10/03/11	1009	0.0	0.0	0.0	CS1
	24/03/11	1034	0.0	0.0	0.0	CS1
BH2009 located outside gasholders on B1plot	11/01/11	1001	0.1	0.1	< 0.01	CS1
	26/01/11	1006	0.0	0.0	0.0	CS1
	09/02/11	1016	0.0	0.0	0.0	CS1
	24/02/11	1020	0.0	0.2	0.0	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
	24/03/11	1034	0.0	0.0	0.0	CS1
BH2001 located inside GH12 on B3 plot	16/12/10	999	0.1	0.1	<0.01	CS1
	07/01/11	998	0.0	0.1	<0.01	CS1
	11/01/11	1003	0.2	0.0	<0.01	CS1
	25/01/11	1016	0.0	0.0	<0.01	CS1
	09/02/11	1013	0.0	0.0	<0.01	CS1

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Location	Date	Atmospheric pressure (mbar)	Methane (%)	Carbon dioxide (%)	Gas flow (l/hr)	Characteristic situation
	24/02/11	1018	0.0	0.0	<0.01	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
	24/03/11	1032	0.0	0.1	0.0	CS1
BH2003 located outside the gasholders on B3 plot	14/12/10	1033	0.1	0.1	<0.01	CS1
	16/12/10	999	0.1	0.1	<0.01	CS1
	07/01/11	998	0.0	0.1	<0.01	CS1
	11/01/11	1003	0.2	0.0	<0.01	CS1
	24/01/11	1029	0.0	0.0	<0.01	CS1
	09/02/11	1013	0.7	0.7	<0.01	CS1
	24/02/11	1018	0.0	0.0	<0.01	CS1
	10/03/11	1006	0.0	0.1	0.0	CS1
	24/03/11	1032	0.0	0.0	0.0	CS1
BH2002 located outside the gasholders on B3 plot	26/01/11	1006	0.0	0.0	0.0	CS1
	09/02/11	1013	0.0	0.9	0.0	CS1
	24/02/11	1020	0.0	0.1	0.0	CS1
	10/03/11	1006	0.0	0.0	0.0	CS1
	24/03/11	1032	0.0	0.0	0.0	CS1
BH2016 shallow standpipe located outside the gasholders on B3 plot	02/02/11	1006	0.0	0.4	0.0	CS1
	24/02/11	1018	0.0	0.0	0.0	CS1
	10/03/11	1006	0.0	0.2	0.0	CS1
	24/03/11	1032	0.0	0.5	0.1	CS1
BH2016 deep standpipe located outside the gasholders on B3 plot	02/02/11	1006	0.0	0.0	0.0	CS1
	24/02/11	1018	0.0	0.3	0.0	CS1
	10/03/11	1006	-0.3	0.0	0.0	CS1
	24/03/11	1032	0.0	0.0	0.0	CS1

BAM Ritchie Gas Monitoring Data 2010/2011

APPENDIX B

Archaeological Specification & Written Scheme of Investigation for Zones B/E dated February 2010

Argent (King's Cross) Ltd

**King's Cross Central -
Southern Area**

Archaeological
Specification for
Development Zones B
and E

February 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Job number

IHCM Ltd
45 crescent Lane,
London SW4 9PT
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7755 2121
www.arup.com

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1 Introduction

1.1 Objective of this Specification

Enabling and construction works in the ground are being brought forward as part of the development of Development Zones B and E, which lie in the southern area of the King's Cross Central (KXC) site. Zone B is broken down into 6 separate plots referred to as B1, B2, B3, B4, B5 and B6, which sit around a new piece of principal public realm referred to as Pancras Square. Zone E includes one new building, E1, which will wrap around the existing Grade II listed Stanley Building South. The buildings in Zone B will share a common basement. The basement for Building E1, although separate to the shared Zone B basement, will be accessed via the same. Details of these works will be submitted as reserved matters pursuant to conditions attached to the KXC outline planning permission dated 22 December 2006 (ref: 2004/2307/P), (the 'Outline Planning Permission'). Figure 1 shows the location of the Development Zones and plots.

This Archaeological Specification relates to archaeological mitigation works for **Development Zones B and E**. The mitigation proposed for these zones is consistent with that proposed for all of the plots south and north of Regent's Canal, in order to achieve a holistic approach and ensure the implementation of consistent sets of archaeological investigation objectives and methods, with combined post-site documentation outputs.

The other KXC Development Zones will be separately addressed as buildings in these zones are brought forward for Reserved Matters Approval.

The KXC Environmental Statement submitted with the outline planning application characterizes the Southern Area prior to first phase urban development and then through the many episodes of change and adaptation during the 19th and first half of the 20th centuries – as a dynamic hub of activity between King's Cross and St Pancras Stations, and economic and social decline in the latter decades of the 20th century.

Heritage documentation and mitigation objectives related to the existing Gasholder No. 8 guide frame, are addressed in a Specification and Written Scheme of Investigation for Building Recording and Analysis for the Gasholder No.8 Guide Frame, submitted and approved (application ref. 2008/5668/L) pursuant to Condition 3 of Listed Building Consent 2004/2315/L for the dismantling of the same structure. The recording standards set out in the documents are stated to include the bell and the tank as and when works to these elements are undertaken.

A Specification and Written Scheme of Investigation for Building Recording and Analysis was also submitted and approved in relation to the now demolished Stanley Building North (application ref. 2007/0769/L) pursuant to Condition 3 of Listed Building Consent 2004/2313/L for the demolition of the same building. A separate Specification and Written Scheme of Investigation will be submitted for building recording works relating to Stanley Building South as part of any Reserved Matters submission relating to the same.

1.2 Outline Planning Conditions

Conditions 56 of the Outline Planning Permission requires a programme of 'Archaeological Investigation and Mitigation' to be carried out during the implementation of the scheme. Condition 56 requires:

"the implementation of a programme of archaeological work in accordance with a written scheme of investigation"

For the Southern Area, an Archaeological Watching Brief process was determined to be the appropriate mitigation measure, as identified within the Environmental Statement. This specification sets out the strategy to ensure archaeological objectives are achieved to satisfy Condition 56 and implement the Environmental Statement.

1.3 Summary History of King's Cross Central

In summary, the developmental history of the KXC site, including Zones B and E, is outlined below. It is to be noted that the Sites and Monuments Records and research undertaken for the KXC Environmental Statement do not allow a precise characterisation of the pre-Industrial period archaeological history:

1. Wooded landscape in prehistoric times generally used for ad hoc activities with increasing small clearance for farming from Neolithic times onwards.
2. Agricultural landscape in Roman to Post-Medieval times on the eastern flanking slope of the Fleet Valley.
3. 17th and 18th century shallow quarrying for weathered clayey soils for brick making.
4. Construction of the Regent's Canal in the opening decades of the 19th century.
5. Early 19th century establishment of a gas industry south of Regent's Canal.
6. Phased urban development comprising terraced housing with some areas of commerce and a little light industry, with replacement with some blocks of flats.
7. The mid 19th century creation of the Great Northern Railway Goods Depot then involving the following activities in the Northern Area of KXC:
 - In the north, the terracing back of the gentle south facing slopes to create a sub-horizontal ground surface.
 - In the south, the raising of the ground level with spoil from the north end of KXC, to complete the level landscape as it approaches the Regent's Canal.
 - Construction of an arrangement of buildings servicing the railway industry sited to the south.
 - Construction of a vast network of railway tracks throughout the North Area of KXC.
8. A period of stability of railway, and urban functions from the late 19th century through to after World War II.
9. Early 20th century decline of the gas making industry.
10. Some damage in World War II as a result of German bombing.
11. Decline of the railway functions in the 1960s -1980s with phased demolition of the more major buildings in the Northern Area and removal of many areas of railway sidings.
12. A series of temporary uses in the surviving buildings and open areas. Removal in 2001-3 of all residual railway related buildings and infrastructure. Removal of Stanley Building North and Culross Buildings and upgrading of the German Gym.
13. Large-scale ground disturbances associated with the construction of the Channel Tunnel Rail Link out of St Pancras Station, the LUL Northern Ticket Hall and the KXC Shared Service Yard. Removal of the Triplet Gasholder guide frame. Some remodelling of Pancras Way.

To assist in relating the present-day site topography to its former railway and other uses, Figure 2 is included in this Specification. It shows the site in 1896, at a time when it had reached maximum development and after which changes are relatively minor.

1.4 Background History of Development Zones B and E

1.4.1 Summary

Development Zone B is substantially the former gas works.

The start of the industrial development of the area was initiated by the insertion of the Regent's Canal in the first quarter of the 19th century (opened 1820). This permitted the immediate development of the Pancras Works south of the canal, roughly opposite the Eastern Goods Yard. Further south, generally between King's Cross Station and St Pancras Station, mixed residential and commercial development occurred at this time. As the gas industry expanded and the great railway works were inserted so there was piecemeal changes then some major removal of the residential and light commercial urban fabric.

The gas works ceased making coal gas in 1904, with a brief revival in 1907, and its manufacturing plant was demolished in 1911. The gasholders remained in use, linked to trunk mains.

Zone E and the south west corner of Zone B formerly comprised an area of residential development. Today, only Stanley Building South and the immediate hard landscaping survives. The Stanley Buildings originally included five blocks of approximately 20 m by 12 m. They were purpose-built in 1864-5 as low-rental 'philanthropic' housing by the Improved Industrial Dwellings Co. One five-storey block remains, identified here as Stanley Building South.

Four of the former blocks have been demolished pursuant to Listed Building Consent 2004/2313/L, in order to accommodate the extension of St Pancras Station for the Channel Tunnel Rail Link terminal and for the realignment of Pancras Way.

Stanley Building South is currently unoccupied. It is listed Grade II and lies within the King's Cross St. Pancras Conservation Area.

The Stanley buildings had no basements. Consequently, earlier made ground survives here and forms part of the infill of the historic River Fleet valley.

1.4.2 General Gas Industry Site History

The former gasworks within the KXC site, locally known as the Imperial Gasworks or Pancras Works, was built as the principal works of the Imperial Gas Light and Coke Company. When opened in 1824 this was the largest gasworks in the world. The works was sited alongside the Regent's Canal. It used coal initially delivered to the works by the canal and then later via a viaduct across the Regent's Canal from the Goods Yard. The gas was produced in large retort houses. This was then stored in the gasholders on the site, which acted as reservoirs so that an adequate supply of gas was always available when required. The Gas Light and Coke Co. acquired the Imperial Gas Light and Coke Company in 1876.

The consumption of gas was steadily climbing throughout the second half of the 19th century, in response to London's rising population and prosperity and falling costs in the making of gas. Proportionate increases in gas storage capacity were needed to meet peak demands at all the company's works. With connection by trunk mains to the company's huge Beckton gas works supplementing local production, several of the Pancras gasholders came to be enlarged in the 1880s. By 1900 the works occupied 11 acres (4.6 hectares), of which more than half was devoted to gas storage.

Gasholder No. 8, centrally placed in Zone B, was designed by John Clark, the engineer of the Pancras Works, and its ironwork was built by Westwood and Wrights in 1883. Both they and Clark had been responsible for the 'telescoping' of the three 'Siamese Triplet' Gasholders Nos. 10, 11, and 12, completed in 1880 and located to the north west of Zone B, where the modern canopy of St Pancras Station is now sited. The brick tank of No. 8, set deeply into in the ground, had been constructed c.1853 for a previous gasholder, and was now deepened by 2 feet to 28 feet (8.5 m), still considerably less than the exceptional 55 feet (16.8 m) depth of the tanks of the triplet group. So the new bell of No 8 was given three telescopic 'lifts', within a guide frame some 83 feet (25.3 m) tall, compared with the two lifts, within guide frames 108 feet (32.9 m) tall, of the reconstructed triplet group. With different proportions, the guide frame of No. 8 has only two tiers of columns and girders compared with the three tiers of the triplet group.

All of these guide frames were based stylistically on those of John Clark's father, Joseph, some of whose work may be seen at the Bethnal Green and Bromley-by-Bow gasholder stations.

Although No. 8 is the only gasholder guide frame still standing today on the gasworks site, it may be noted here that in 1886-7 two other gasholders were enlarged and two more were added, with a new style of guide frame in lattice girder construction (with resemblance to the wind girders of St Pancras Station trainshed). There were then no fewer than nine substantial gasholders on the site, seven of which remained until the commencement of the CTRL works in 2001. Several of the gasholder tanks are still found within the ground of Zone B, founded at various depth and backfilled. Developed piecemeal on a constricted site, the holders were smaller and more attuned to the urban setting than some other London gasholders of the period. They presented a remarkable townscape - and landmark for people approaching St Pancras Station by train.

The Pancras Works ceased to make gas in 1904, but the gasholders continued in use, storing town gas piped from other gasworks. In the 1970s town gas was replaced by natural gas brought ashore from the North Sea, although again the gasholders continued in use.

The high-pressure national gas grid established first in the 1960s for the distribution of natural gas has an inherent storage capacity and flexibility, allowing a considerable and ongoing reduction in the national stock of gasholders. However, high-pressure mains cannot be used in built-up areas, and meeting the peaks of demand in large cities remains a problem. The removal of several of the gasholders, necessitated by the alignment of the CTRL and sanctioned by the CTRL Act of 1996, required an augmentation of the regional gas supply network. With that achieved, all of the Pancras Works gasholders were decommissioned and purged of gas in 2000.

1.4.3 Immediate Archaeological Features Associated with Gasholder No. 8

The depth of the brick tank, recorded at 28 feet (8.5 m), is one-third of the full height of the bell, which is some 25 m. To reduce the amount of excavation, it was normal to leave the soil in the central portion of the tank in place, in the form of an inverted cone or "dumpling" to ensure stability of the soil. The bottom of the tank and the sloped sides of this 'dumpling' would be sealed with a layer of puddled clay or concrete if necessary, to prevent leakage of water out of the tank. On this site, the tank will assuredly cut into the underlying impermeable London Clay, and so these surfaces are likely to have received only a thin 'blinding' of concrete.

The wall of the tank will increase in thickness with depth, stepping out several times on the outer face to provide adequate resistance as a compressive ring against earth pressure, which would otherwise tend to force the walls inwards. Vertical piers to support the guide columns will project behind the wall, probably capped with a massive padstone. The inner face of the wall will be a uniform cylinder with vertical iron guides attached to the face. A central pillar in the tank provides support to the bell trusses when the tank is empty.

Immediately adjoining the tank on its south-west side, there is a circular brick well for the pipes that descend beneath the bottom of the tank wall to convey gas into and out of the gasholder bell. This had until 2001 a traditional hand-operated pump, with flywheel, for removing any accumulated water.

1.4.4 Other Gas Industry Facilities Associated with Gasholder No. 8 in Development Zone B

According to Ordnance Survey mapping dated 1871, Development Zone B included the following elements of the gasworks, remnants of which may still be in the ground on site and along the proposed Boulevard and the present day Goods Way:

1. A significant portion of one of the major Retort Houses.
2. Sets of Condensers and Tar Wells.
3. Sets of Boilers and Pumps and Hydraulic Mains.

- 4. Sets of Scrubbers.
- 5. Sets of Purifiers.
- 6. Store House.
- 7. Crushing House.
- 8. Gas delivery pipes and machinery.
- 9. Wells and pumps for topping up the Gasholder tanks.
- 10. Coal, clinker and coal waste holding pens.
- 11. A large variety of small cylindrical tanks
- 12. Offices/stores
- 13. Associated hard landscaping.

1.4.5 Urban History and Other Heritage Resources within Blocks B and E

Limited development on the southern part of the KXC site took place in the late 18th century, stimulated by ‘The New Road’, to the south of KXC. The development was substantially one of low quality two storey terraced housing, the layout of which responded to field and property boundaries, the somewhat ad-hoc exploitation of soils for brick/tile making, the Fleet Sewer, and the Small Pox Hospital grounds (under King’s Cross Station). Today, the orientations of the German Gymnasium and Stanley Building South, and their surrounding local roads, are based on this first phase development pattern.

There was further piecemeal expansion of the King’s Cross residential area in the second and third decades of the 19th century, including the areas of terraced housing bordering Suffolk Street, Cheney Street, Ashby Street, Northampton Street and Norfolk Street south of the gas works, with Upper Edmond Street to the east. These streets were generally located towards the southern end of Development Zone B. This street pattern was diagonally placed across the previous agricultural field pattern.

The housing was typified by 2 storey structures and those on Suffolk Street West possibly having half basements. The houses generally fronted the roads and had rear extension kitchens and with ‘privies’ set at the bottom of small yards/gardens.

The existing housing between the two stations remained for a few more years. The erection in 1864-5 of the original five blocks of Stanley Buildings, an early project of Sir Sidney Waterlow’s philanthropic and profit-restricted Improved Industrial Dwellings Company, responded to existing poor local housing conditions and the imminent dispossession of sites by the Midland Railway. The German Gymnasium, part of a contemporaneous redevelopment on Pancras Road, reflected other aspects of mid-Victorian Society.

Further platforms and sidings were added to the west of King’s Cross Station before 1894 including new “docks” for express milk traffic and for horses and carriages (which subsequently became a Motor rail terminal). This facility was within Zone B at the south end. To improve road traffic circulation around the station, a new bridge was built across the enlarged “throat” of the station, with a western approach along the southern edge of the gas works. This was officially named Battle Bridge Road in 1873, possibly in advance of its construction. These works, set at a lower level related to rail tracks entering from the north where joining with the main rail routes passing under the Regent’s Canal. The Milk Dock displaced the remaining pocket of back-street houses so that the railway extended west as far as Cheney Street.

By 1894 most of the residential streets had been swept away leaving the Stanley Buildings to the west and the German Gymnasium at the south end of this KXC development area.

Pressure on land made it more difficult for railway workers to find decent affordable housing close to their place of work, and to that end, the Great Northern Railway in 1891-2 erected a tenement-style block of flats along the new Battle Bridge Road called the Culross Buildings.

It was accompanied by a mission hall, Culross Hall, one of three provided by the company for it’s employees spiritual needs. The Culross Buildings were totally unrelated to the few remaining earlier buildings in the area, such as the German Gymnasium (1864/5) and the Stanley Buildings (1864/5), and were demolished in 2008 pursuant to Conservation Area Consent 2004/2317/C.

1.5 Potential Archaeological Resources in Development Zones B and E

Related to the two Development Zones are identified the following potential industrial and earlier aged remains, generally noted from north to south:

Block/Plot Reference	Potential Industrial Remains
B3 and B5	Foundations of the Gasholder No. 8 - brick wall to the north.
B5	Gasholder No. 8 foundations.
B3, B4, B5, B6	Gasholder No. 8 buried infrastructure (with some connections to above ground features including an upstanding pump).
B1, B3, B4, B5, B6	Foundations and complex Infrastructure associated with the other gasholders, notably, wells for water used within the gasholder tanks and lots of interconnecting metal pipes.
Mostly B5 and B6	Buildings and related artefacts associated with the gas manufacturing process (see Section 1.4.4 above).
Whole of Zone B	Soil formations associated with the gas works, some of which may be contaminated.
B3 and B5	Surface setts and sub surface make up of Battle Bridge Road.
B1, B2 and B4	Basement and foundations of Culross Buildings.
Zone E and Plot B1	Foundations and surrounding infrastructure to demolished Stanley Buildings.
Generally Zones B and E	Made ground soil formations predating first phase urban development.
Generally Zone B and E	Natural soil formations associated with the Fleet river and valley and generally of prehistoric times, back to the last glaciation.

1.6 Previous Archaeological Works

Associated with the construction of the CTRL there have been some archaeological investigations. The archaeological fieldwork data resulting from these works has not been made available to IHCM for the purpose of supporting mitigation objectives in the southern development plots. It is understood that reports on these investigations have not yet been issued by the Archaeological Contractor for LCR.

There has been some archaeological works in the Southern Area for KXC, associated with the design and procurement of the Boulevard to be located to the east of Zone B and where the Pancras Works was also located, and Pancras Road to the west where Stanley Building North was once sited. Further, as part of earlier submissions to discharge Condition 3 of Listed Building Consent 2004/2313/L and Condition 3 of Conservation Area Consent 2004/2317/C, there has been phased recording of Stanley Building North and the Culross Buildings (both now demolished). All the field work was carried out by Pre Construct

Archaeology Ltd. The table below provides an initial summary of PCA's findings, illustrating the character of the discoveries located in the position shown on Figure 3. The findings are still being evaluated and analysed through the post-excavation programme of archaeological work.

Test Pit Reference	Brief Description
Trial Pit 1	A red brick wall and possible footing was observed at 20.15mOD, aligned north to south, and was 2.64m deep. This wall was only visible on the eastern excavation limit and extended beyond the limits of excavation.
Trial Pit 2	A red brick wall and possible associated brick surface were observed in this pit. The wall was observed at 19.54mOD and extended beyond the limits of excavation in the north of the pit. The surface was observed at 18.29mOD and extended beyond the limits of excavation in the south of the pit.
Trial Pit 3	A modern brick inspection chamber and what appeared to be a concrete pad were observed in this pit. The concrete was observed at 17.44mOD and was 0.52m thick.
Trial Pit 4	Five, probably associated, red brick walls and the remnants of a paved sandstone surface were observed in this pit. The masonry was first observed at 19.28mOD and continued to a depth of 17.68mOD. The sandstone paving was observed at 18.53mOD and was 0.1m deep.
Trial Pit 5	A dark brownish red brick surface was observed between 18.48mOD and 18.08mOD. It was 0.1m thick and extended beyond the limit of excavation.
Trial Pit 6	Two concrete surfaces were observed in this test pit. The upper surface observed at 19.16mOD was 0.3m deep. The lower surface observed at 18.56mOD was 0.4m deep and had dark staining from the ground contaminants.
Trial Pit 7	Was abandoned
Trial Pit 8	Two metal pipes were observed in this pit. One pipe, 0.2m in diameter, was observed at 19.57mOD and was aligned northeast southwest. The other pipe was found to be 0.45m in diameter at 19.15mOD and was aligned northwest southeast.
Trial Pit 9	A curved brick wall was observed at 19.29mOD. The wall was 1.8m high and located on a concrete footing in the eastern part of this pit. The concrete footing was observed at 17.49mOD and was 1.5m deep.
Trial Pit 10	A yellow stock brick wall was observed at 20.17mOD and measured 1.44m north to south, 0.22m east to west. It was of uncertain depth. A metal pipe measuring 0.30m in diameter was observed at 18.93mOD and was aligned northwest to southeast. It was not possible to ascertain a relationship between the wall and the pipe due to the limited scope of the excavations
Trial Pit 11	A concrete wall and its footing aligned east to west were observed at 20.40mOD and 17.56mOD respectively. These extended beyond the limits of excavation. The wall was found to be 2.84m deep but of uncertain thickness and the footing was found to be at least 1.0m wide and of uncertain depth.
Trial Pit 12	The wall of the gasholder was observed at 18.96mOD, this was found to have sandstone blocks capping the brickwork. An interior brick surface was recorded at 18.21mOD and was 0.2m deep. Further excavations inside the gasholder were hampered by the presence of contaminated ground water. The trial pit was excavated to a depth of 4.5m.
Trial Pit 13	The wall of the gasholder was observed at 18.94mOD, this was excavated to a depth of 3.2m. Excavations inside the gasholder revealed that the brickwork stepped in by 0.8m giving the wall an overall width of 1.42m.
Trial Pit 14	A cobbled surface was observed at 19.15mOD, this had been truncated in the east of the pit. No other structures were observed.
Trial Pit 15	Modern reinforced concrete was observed at 18.04mOD and was 0.1m thick. This is possibly the base of the attenuation tank. No other structures were observed.
Trial Pit 16	The cobbled road surface was observed at 19.14mOD (ground level). At

	16.34mOD what appeared to be a thin concrete surface extending beyond the limit of excavation was observed
Trial Pit 17	The cobbled road surface was observed at 19.04mOD (ground level). At 18.64mOD a patchy reddish brown brick surface was found to be 0.1m deep. This extended beyond the excavation limits.
Trial Pit 18	No structures were observed in this pit. Made ground deposits were observed to depth of 4.3m.
Trial Pit 19	No structures were observed in this pit. Made ground deposits were observed to depth of 3.2m
Trial Pit 20	No structures were observed in this pit. Made ground deposits were observed to depth of 1.2m.
Trial Pit 21	Modern services were observed at 17.96mOD. The trial pit was abandoned.
Trial Pit 21a	No structures were observed in this pit. Made ground deposits were observed to depth of 4.5m.
Trial Pit 22	A pipe was observed at 14.20mOD. The excavation was abandoned at a depth of 4.5m.
Trial Pit 23	A cobbled surface was observed at 15.58mOD, this extended beyond the excavation limits. No further structures were observed.
Trial Pit 24	An east-west aligned red brick wall was observed at 14.86mOD, measuring 0.5m in width, 1.04m in height. The wall extended beyond the excavation limits.
Trial Pits 25, 26	These were not excavated.
Trial Pit 27	Only modern backfill was observed. The trial pit was not surveyed due to access problems.
Trial Pit 28	No structures were observed in this pit. Made ground deposits were observed to a depth of 4.5m.
Trial Pit 29	No structures were observed in this pit. Made ground deposits were observed to a depth of 4.5m.
Trial Pit 30	No structures were observed in this pit. Made ground deposits were observed to a depth of 4.5m.
Trial Pit 31	This exposed more of the gasholder's curved wall. This was recorded with a total station due to the presence of contaminants.
Pancras Road	Brief Description
General ground reduction to road formation level for the recreation of Pancras Road - to the south and	Natural clay observed at 15.77 m OD overlain by 19th century made ground including structural remains of the foundation of the original western end of the German Gymnasium. Culvert and footings of 19th century variously found to the south and north of the Gym including of Stanley Building North. The 19th century features found heavily truncated by 20th century ground works. No

north of the German Gymnasium.	formations found of Prehistoric to 18th century date were identified and considered to have been truncated.
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1.7 The General Character of the Engineering Construction Works in the Southern Area

The engineering works (enabling and construction works) will be phased and submitted to the London Borough of Camden as part of the planning process. There is to be a holistic approach to the ground works in Zones B and E, basically comprising the construction of a piled retaining wall, the creation of a double-height basement and piling for each proposed structure.

The relevant works affecting the potential archaeological resources and mitigation undertakings will likely include:

1. Trial pitting to visually inspect the shallow ground conditions and establish the precise location of obstructions buried in the ground.
2. Sinking of bore holes to provide design data in respect of deep ground conditions and foundation designs.
3. Site preparation including the removal of present ground surfaces, any surviving upstanding features and obstructions in the way of proposed ground works.
4. Construction and forming of temporary works.
5. Cut and fill earthworks to new formation level including the treatment of any contaminated soils encountered.
6. Excavation for shallow and deep buried services.
7. Excavation of basements and sumps, pits and other small area excavations.
8. Piling including forming of pile caps and ground beams.
9. Hard and soft landscaping around the proposed buildings, where a large number of known and evaluated heritage features will be removed.

The nature of those works most relevant to archaeology are described in greater detail in Section 2 of this Specification. This is to be read with the engineering and architectural plans and other documents provided in the individual plot submissions.

It is likely that there will be design development prior to construction but not affecting the archaeological mitigation, related to the above types of engineering works.

1.8 Archaeological Watching Brief Process

A series of Archaeological Watching Briefs will accompany the engineering works in the two Development Zones, providing archaeological information to satisfy the aforementioned Planning Condition 56. Section 3 of this specification defines an Archaeological Watching Brief. The Archaeological Watching Briefs will occur wherever there are to be ground works, unless designed out and approved in writing with the London Borough of Camden and English Heritage.

Paragraph 10.8.1 and Table 10.8 of the KXC Environmental Statement sets out the mitigation measures proposed. It confirms that Archaeological Watching Briefs would be in place where any engineering ground works would occur which would encounter made ground from the 19th Century or earlier, or River Fleet Alluvium.

The Watching Brief will conform to standards required by the Institute of Field Archaeologists and the guidelines of the Greater London Archaeological Advisory Service of

English Heritage. The Archaeological Contractor shall be a member of the Institute of Field Archaeologists.

The archaeological officer of English Heritage for the London Borough of Camden, will be given access to monitor the archaeological site and post-site works on behalf of English Heritage and for the London Borough of Camden.

IHCM (International Heritage Conservation and Management) is the Archaeological Consultant to the Employer for this work, Argent (King's Cross) Limited.

The phasing of developments, and thus archaeological works, will allow for a process of adapting and modifying archaeological watching brief objectives.

Note

This specification is one of a series prepared for undertaking Archaeological Watching Briefs in the King's Cross Central scheme. They have common content in regard to general requirements for site and post-site works, together with specific requirements for each development site, based on the nature of the site, the archaeological potential and the works proposed.

2 Details of Enabling Works

The design for the construction of the many buildings and associated hard/soft landscaping within the Southern Area will be detailed within submission documents for each plot scheme. The schemes will include those undertakings referred to in Section 1.7 above. The main processes are explained further below.

2.1 Trial Pitting and Borehole Investigations

The engineering designs for the new construction requires there to be programmes of further geotechnical investigations. These aim to investigate the shallow and deep ground conditions (made-ground, alluvium and London Clay), with observation trial pits and bore holes respectively.

The location of the pits will result from further assessment of the engineering findings and of the planned insertion of temporary and permanent new works and ground obstructions. Many of the pits will be 1 to 5m deep and shored so the pit faces can be hand logged. Some deeper probing may occur, at levels unsafe for general trial pitting excavations. The engineering investigations will also address ground contamination and the need for remediation.

2.2 Site Preparation and Removal of Old Foundations and Obstructions

Each scheme in the Southern Area is to be built in an area of complex ground conditions resulting from more than 200 years of development and change, the latest (modern) phase of which can be presently observed and relates to completion of the CTRL scheme and early KXC works. Section 1.7 above indicates where development related ground works are likely to be located.

2.3 Construction of Temporary Works

Given the scale and scope of the developments within the site, it is likely that the engineering contractors and sub-contractors would need to undertake temporary works. Such works may involve local excavation into the ground for:

- Connections to services.
- Fences.
- Crane bases.
- Foundations for huts.
- Forming hard standing for cars and construction plant.

2.4 Cut and Fill Earthworks and Including the Treatment and Removal of Soil Contamination

Given the industrial and commercial history of King's Cross, it is likely that there are still localities of 'hot-spots' of soil contamination. The contamination, if it is related to 19th century industrial processes, may have a heritage interest, especially where such contamination is associated with structural remains and industrial processes and where the contamination needs treatment or disposal.

It is likely that contamination would be found during earthworks, shallow remodelling of the ground to a new formation level, and at times of excavation associated with basement and infrastructure construction.

2.5 Excavation of Basements, Sumps, Pits and other Small ‘Area’ Excavations within Buildings

The development proposal includes for permanent spaces set in the ground and includes:

- A shared double-height Zone B basement and single-level basement for Building E1. The latter basement will be accessed via the Zone B basement. Some basements may be formed within a piled retaining wall and / or within temporary works. Some construction may also occur within open excavations with battered faces.
- Duct chambers.
- Lift sumps.
- Headings.

It is the excavation of basements that would provide the greatest opportunity for archaeologically investigating any surviving historic ground conditions and structural remains.

2.6 Piling, including forming of Pile Caps and Ground Beams

The type of buildings being constructed favours piled foundations and a substructure of pile caps/pile rafts and ground beams. The piling may occur before the forming of basements and other below-ground sump structures. For archaeological objectives, piling would allow for assessing ground conditions before larger-scale ground works occur. If basements are formed first, the piling would have no archaeological interest requiring the Archaeological Contractor to monitor their construction.

2.7 External Shallow and Deep Buried Services

The construction works may necessitate diversion of existing buried services and definitely the insertion of new ones. Shallow infrastructure works may be located above soil formations of archaeological interest. Services inserted in trenches below 0.5 m deep, and in areas where there may be physical obstructions and ground contamination, could traverse through or below archaeologically interesting ground conditions.

2.8 Hard and Soft Landscaping

The formation of roads, squares and other open areas will variously replace the presently-found modern and surviving older surfaces, following the insertion of new services.

To achieve the new hard and soft landscaping will also require surface and shallow (0 - 0.5 m below ground level) and deep (0.5 - 2.5 m below ground level) buried archaeological remains to be locally removed.

3 Archaeological Objectives of the Watching Brief

3.1 Definitions

3.1.1 Archaeological Watching Brief

An Archaeological Watching Brief, as recommended by the Institute of Field Archaeologists (IFA, 1994), refers to:

“A formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons within a specified area or site on land or underwater where there is the possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.”

In all cases, the watching brief is intended:

"to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works."

"to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support a treatment to a satisfactory and proper standard."

"to establish and make available information about the archaeological resource existing on a site."

The Institute stresses that an Archaeological Watching Brief is not intended to reduce the requirement for excavation or preservation of known or probable deposits, and is intended only to guide, not to replace, any requirement for contingent excavation or preservation of possible deposits.

4 Archaeological Programme of Works

4.1 General Archaeological Watching Brief Objectives at King's Cross Central

The Archaeological Watching Briefs will collect and interpret data from the many site-based engineering components of the development scheme for Zones B and E in the Southern Area of KXC.

The archaeological objectives will be related to:

1. Determining the character of the site and landscape prior to first-phase industrial development, including information about the rural topography with evidence of Prehistoric to Post-Medieval land use; the exploitation of soils for brick making; early commercial development as part of the rapidly expanding early to mid 19th century industrial fabric of London.
2. The mid 18th to early 19th century 'early' urban and commercial land uses, prior to the insertion of the great mid 19th century railway buildings and associated railway facilities.
3. The character of foundations and soils of mid to late 19th century, specifically related to the existing gas and railway related buildings and associated landscaping.
4. Adding archaeological data to that obtained for CTRL and LUL development works that have been taking place for the last few years at King's Cross and St. Pancras.
5. The Archaeological Watching Briefs will also provide specialist advice to the Development Manager (Argent) and the Engineer and the Principal Engineering Contractor for each plot on made-ground and historic engineering features during the site works, if and when discoveries are made. The Archaeological Watching Brief will monitor site works to reduce the chance of accidental damage occurring to retained heritage buildings.
6. Updating Archaeological Watching Brief objectives (project design) from time to time as plots are developed and new schemes arise, responding to findings and interpretation discussions between all concerned parties.
7. For Development Zones B and E, providing one or more interim reports on the findings, planned to be issued during the ground works development programme and a draft final report within six months following the completion of site works in each zone.

4.2 General Archaeological Objectives Prior to Construction

Prior to the start of engineering site works in each zone the opportunity will be taken to investigate a set of archaeological objectives. Some works will be 'archaeologically driven', providing an opportunity to undertake archaeological investigation by 'excavation' and 'strip and map' techniques. These investigations will then be taken off the agenda for being undertaken as Watching Briefs during the construction phase of the scheme.

4.3 Archaeology During Constuction

During the engineering ground works for the scheme a programme of archaeology will be undertaken. The programme will be developed related to the engineering undertakings and

modified to respond to findings made during the pre-development archaeological evaluation works.

4.4 Other General Archaeological Undertakings

It is likely that other archaeological mitigation will be required during the engineering programme of ground works but it is not possible to precisely forecast all of these. This will be subject to discussion with the London Borough of Camden and English Heritage at the time.

4.5 Specific Archaeological Research Objectives Related to Blocks B and E

The following investigation objectives have been formulated for Development Zones B and E:

- 1) Determining of the internal layout arrangements of buildings, and how these relate to map and other contemporary documentation.
- 2) Understanding and documenting construction techniques of the many former buildings on site, especially those associated with the gas production and storage. Examination of any surviving foundations related to the former Stanley buildings and Culross Buildings.
- 3) The finding of any evidence of how the gas industry buildings and structures functioned.
- 4) The detailed examination of the infrastructure.
- 5) Documenting of any surviving evidence of the hard landscape on and around the development footprint.
- 6) The understanding of site preparation of the site ready for first phase urban uses.
- 7) Identification and examination of pre-railway development made-ground and site conditions, including of the possible occupation on the east side of the Fleet valley channel. This may include soil sampling for investigation of the hisitoric environment.

It is not possible to show on a plan where the archaeological programme of works will occur but it is assumed that it would be throughout Zones B and E, where ever there are to be temporary and permanent new ground works.

It is not intended to investigate the whole of Development Zone B given the industrial character of the site. The locations for investigation will be determined as a result of:

- 1) Future engineering site investigations.
- 2) Safety regarding access and ground contamination.
- 3) The engineering sequence and programme of works.
- 4) Site discussions with the London Borough of Camden and English Heritage.
- 5) Evaluation of findings where the works shall occur in phases potentially spanning several years.

5 Actions by the Archaeological Contractor Prior to and During the Development Programme on Each Zone

To satisfy Archaeological investigation requirements, the appointed Archaeological Contractor shall:

1. Provide a Written Scheme of Investigation (WSI) for IHCM, for onward submission to the London Borough of Camden and English Heritage. This shall be approved in writing prior to development work starting on site.
2. Provide a Health & Safety Plan under CDM Regulations and work to it.
3. Obtain an archaeological site code.
4. Be fully familiar with the heritage documentation undertaken by IHCM in the Environmental Statement produced for Argent (King's Cross) Limited – to be provided at tender.
5. Be familiar with archaeological site works carried out for CTRL.
6. Be familiar with the conditions attached to the Planning, Listed Building and Conservation Area Consents associated with the King's Cross Central development.
7. Coordinate the fieldwork programme with Argent, the Engineer, IHCM and the English Heritage archaeological officer representing the London Borough of Camden.
8. Attend, unless otherwise agreed, all works that are on and that penetrate below the present hard landscape surfaces.
9. Generally advise the Principal Engineering Contractor on made-ground and structural features within it, related to the site history potentially spanning Prehistoric to Modern times. Advise on archaeological value of the heritage assets, with an assumption that only remains (including building fabric) of no and low value may be penetrated/removed without the agreement of IHCM and/or Camden/English Heritage.
10. Observe and document, from ground level, machine excavation without shoring and hand digging undertaken by the Principal Engineering Contractor.
11. Descend at agreed times pits and areas less than 1.2 m deep without shoring, and deeper pits with shoring, to observe, explore, photograph and document made ground and alluvial soil formations, structural remains of the various buildings and other archaeological remains.
12. Provide advice to the Principal Engineering Contractor on backfilling and reinstatement, ensuring protection of archaeological features and accurate historic reinstatement respectively.
13. Provide within one week of the end of a watching brief episode a brief 'Initial Summary' of results of the watching Brief, indicating the suspected significance of any observed remains, together with a simplified diagram illustrating the location, depth and adjacent features. The 'Initial Summary' will be submitted by e-mail to IHCM and London Borough of Camden and English Heritage within the one week period from the end of the watching brief. As comprehensive archaeological and geotechnical reports become available from site works in nearby development plots, these will be made available as soon as possible to all relevant parties (and in any event within the timescales specified in Section 7.0), to inform evaluation and mitigation objectives and methods for the development processes being addressed in this Specification.

6 Salvage

The Archaeological Contractor will identify and retain where appropriate archaeological artefacts to determine those with a potential for archaeological archiving; those for reuse within the plot scheme; materials with a potential to be reused within KXC; materials with a potential for reuse on heritage projects elsewhere; and material that can be disposed of. The Archaeological Contractor will ensure appropriate heritage documentation is complete.

IHCM will coordinate archaeological salvage particularly of Hydraulic artefacts that may have an important museum use in London and nationally.

In summary, moveable artefacts found during the archaeological programme of works will be:

1. Recovered and documented by standard archaeological methods.
2. Evaluated for conservation, interest to the development objectives and for heritage value.
3. Typically lodged as part of the archaeological archive.
4. Considered as architectural salvage for reuse within the scheme and KXC, or, considered for a disposal strategy.

No architectural salvage will be necessary within the terms of this archaeological specification, given that a programme of heritage activities related to Gasholder No. 8 has already been approved pursuant to an earlier Reserved Matters submission.

7 Provisions to be Made by the Archaeological Contractor after the Site Works on Each Zone

The following requirements are to be satisfied by the Archaeological Contractor:

1. Provision of a factual and interpretive report on the site works in respect of made ground and alluvial soil formations, structural remains, artefacts and ecofacts. The report shall conform to methods prescribed by 'MAP2', Management of Archaeological Projects Draft 2 (English Heritage, 1991) and by English Heritage Greater London Division (English Heritage, 1998, Archaeological Guidance Papers 3 and 4). The report shall contain text, drawings and photographs as appropriate.
2. Provision of each agreed report in draft one month following the completion of site works, and the final reports one month after receiving comments on the drafts from IHCM.
3. Provision of a completed 'Online Access to the Index of Archaeological Investigation' form (OASIS form) to English Heritage.
4. Lodging of the site paper archive with the Museum of London. Artefacts are to be retained by the landowners or their nominated agency pending consideration of the potential for museum displays.
5. The documents and archive from Plot B and E shall be used with similar from the other development plots to result in an holistic analysis and publication/report on the heritage of KXC.

8 Provisions by the Principal Engineering Contractors and Developer in Support of the Archaeological Site Works on Each Plot

8.1 General Developer Provisions

1. Office and temporary accommodation for the Archaeological Contractor.
2. Male and female washing and lavatory facilities for the Archaeological Contractor.
3. Secure storage for the Archaeological Contractor.
4. CDM Co-ordinator role for CDM Regulations.
5. Contract Manager.

8.2 General Contractor Provisions

1. Production of investigation and construction method statements that reference the integration of archaeological site works.
2. Right of legal entry to the plot and preparation of the site ready for archaeological attendance.
3. All electricity and lighting necessary for archaeological equipment and working conditions.
4. Site induction to ensure safe working methods by archaeologists and approved visitors.

8.3 Technical Contractor Provisions

1. Allow inspection of and provide technical advice on services drawings.
2. With the Engineer or other client representative define all possible constraints that have to be taken into account and including those related to:
 - Nearby Listed Buildings.
 - Conservation Areas.
 - Working near to active railway corridors.
 - Locations where archaeological salvage is required.
3. Dispose of the spoil from the agreed archaeological working areas, if and when necessary.
4. Provide geotechnical advice and information to aid archaeological works and interpretation programme.
5. Prepare and undertake break-out of 20th century structures and soils agreed with the Archaeological Consultant.
6. Provide all supportive works to excavations deeper than 1.2 m, where access is required and the excavation faces are not battered.
7. Break out all unnatural obstructions impeding archaeological works when requested by the Archaeological Contractor.
8. Provide, if necessary, tent covers over evaluation areas to be dug in winter conditions where very sensitive archaeological resources are encountered.

9. Provide labour for moving spoil away from investigation areas, pits and trenches being used for approved archaeological purposes.
10. Provide labour for protecting archaeological surfaces when temporary works are being set in place.
11. Undertake any required reinstatement of the excavation areas incorporating as necessary special protective materials over important/fragile archaeological resources (Terram and / or sand). In practice, little or no reinstatement will be required here, as the excavations will be continued down to formation level.

9 The Archaeological Contractor Nominated for the Watching Brief on Each Plot

The Archaeological Contractor proposed for the Archaeological Watching Brief is:

Gary Brown and Helen Hawkins

Pre-Construct Archaeology Ltd

Unit 54 Brockley Cross Business Centre

96 Endwell Road

Brockley

London SE4 2PD

Tel: 020 7732 3925

Fax: 020 7732 7896

Or, alternatively, the Watching Brief may be undertaken by IHCM to satisfy special client requirements.

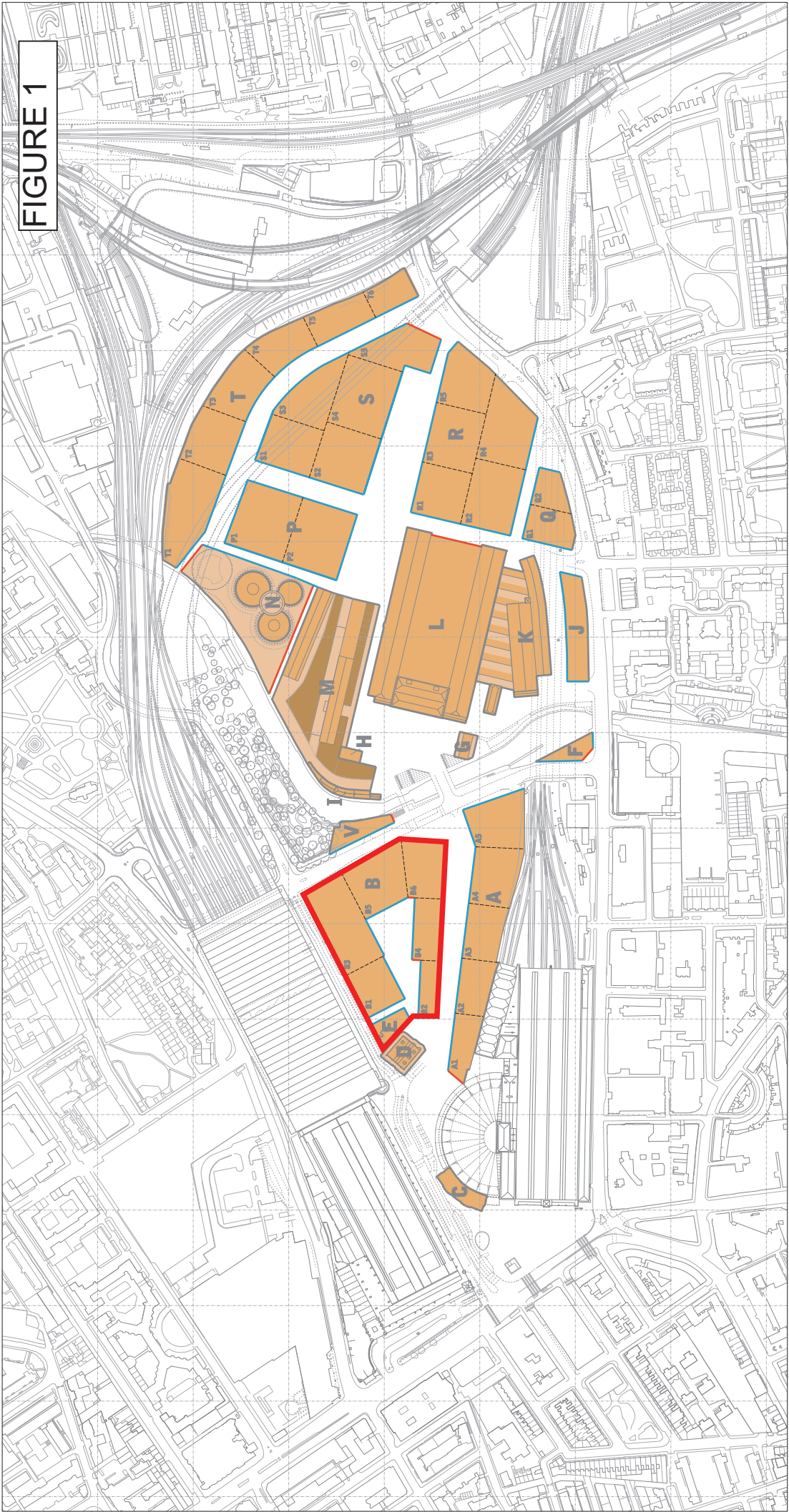
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English Heritage. Management of Archaeological Projects. 1991.

English Heritage. Standards and Practices in Archaeological Fieldwork in London, Archaeological Guidance Paper 3. June 1998.

English Heritage. Archaeological Reports, Archaeological Guidance Paper 4. June 1998.

Institute of Field Archaeologists. Standards for Archaeological Watching Briefs. 1994.



Development Zones

Development Zone Boundary (L.O.D. ±1.0m)

Development Zone Boundary (L.O.D. ±5m)

Indicative Subdivision into Development Plots

West Handyside Canopy

In some cases, Development Zones include areas of public realm, as shown in drawing KXC 004. For example, Development Zone M includes the Coal Drops Yard, between the Eastern and Western Coal Drops, which would be refurbished as part of the public realm.

Indicative Position & Orientation for Gas Holder Guide Frames, which would be re-erected within Development Zone N

Key:

Argent (King's Cross) Limited

King's Cross Central

Main Site Planning Application

Revised Development Specification

Revised Parameter Plans

Scale 1:4000 @ A3

Rev: T

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KXC 005
Development Zones



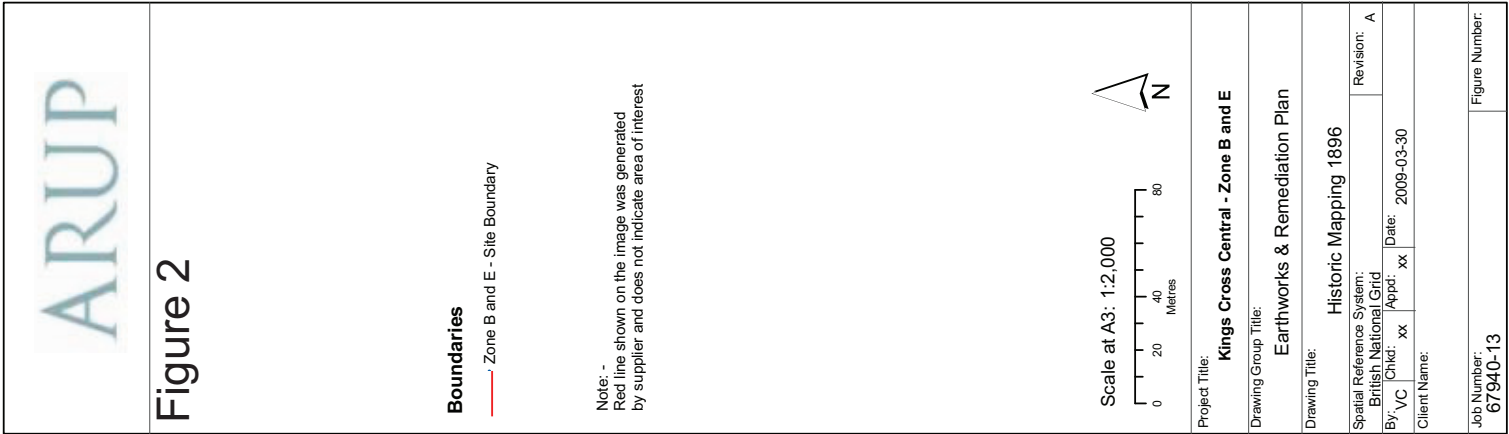
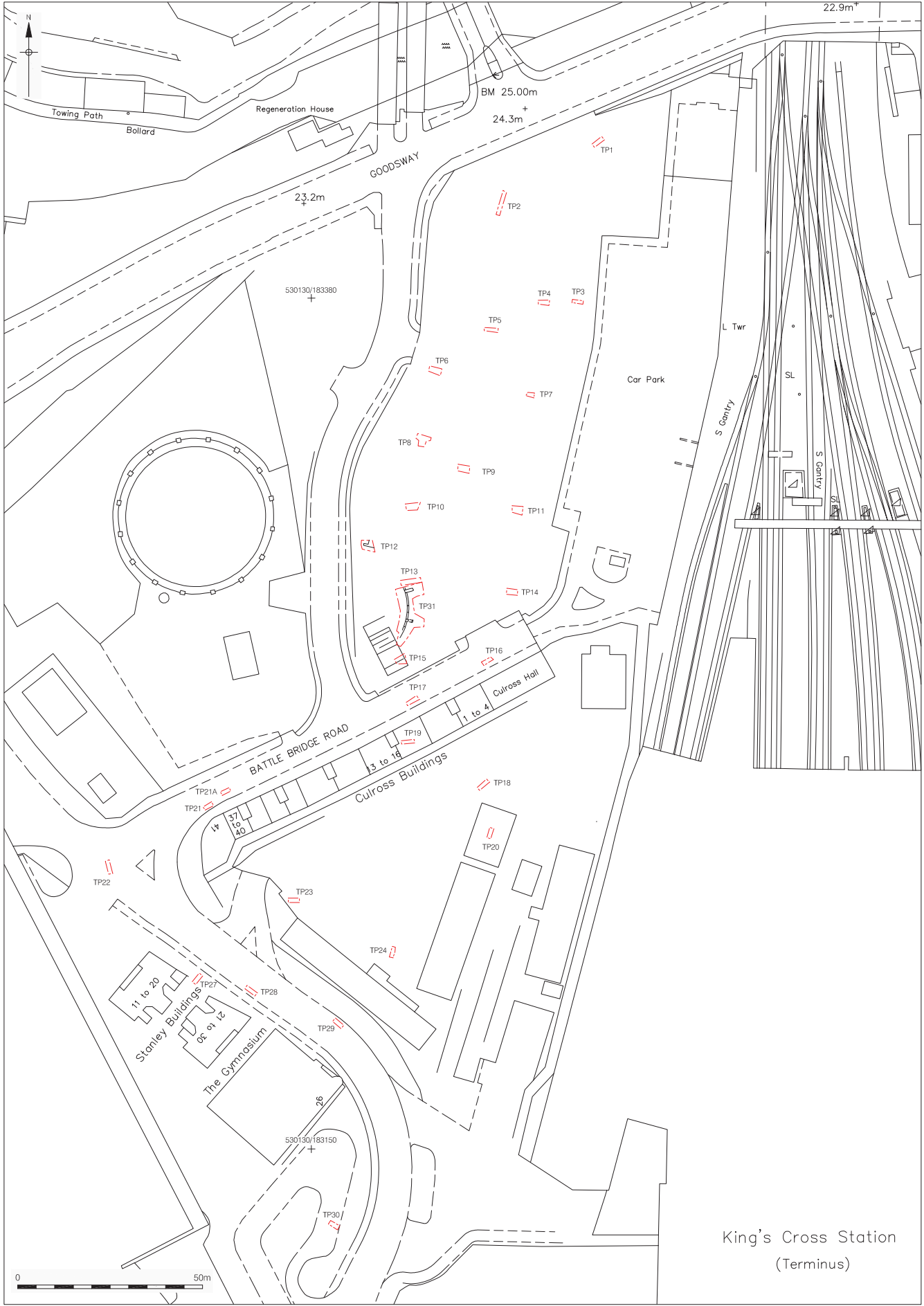


Figure 3



Test Pit Locations
Area South of the Canal
1:1,000 at A3

**WRITTEN SCHEME OF INVESTIGATION
FOR AN
ARCHAEOLOGICAL WATCHING BRIEF
AT
DEVELOPMENT ZONES B AND E
KING'S CROSS CENTRAL
LONDON BOROUGH OF CAMDEN**

FOR

Argent (King's Cross) Limited

Helen Hawkins

Pre-Construct Archaeology
Unit 54
Brockley Cross Business Centre
96 Endwell Road
Brockley
London SE4 2PD

February 2010

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1 INTRODUCTION

1.1 Objective of this Written scheme of Investigation

Enabling and construction works in the ground are being brought forward as part of the development of Development Zones B and E, which lie in the southern area of the King's Cross Central ('KXC') site. Zone B is broken down into 6 separate plots referred to as B1, B2, B3, B4, B5 and B6, which sit around a new piece of principal public realm referred to as Pancras Square. Zone E includes one new building, E1, which will wrap around the existing Grade II listed Stanley Building South. The buildings in Zone B will share a common basement. The basement for building E1, although separate to the shared Zone B basement, will be accessed via the same. Details of these works will be submitted as Reserved Matters pursuant to conditions attached to the KXC outline planning permission dated 22 December 2006 (ref: 2004/2307/P), (the 'Outline Planning Permission'). Figure 1 shows the location of the Development Zones and plots.

This Written Scheme of Investigation (WSI) relates to archaeological investigation works for **Development Zones B and E**.

Condition 56 of the outline planning permission 2004/2307/P requires a programme of archaeological Investigation and recording be prepared and implemented. Pre-Construct Archaeology Ltd is nominated as the archaeological contractor to undertake these works.

For the Development Zones B and E, an Archaeological Watching Brief process was determined to be the appropriate mitigation measure, as identified within the Environmental Statement. This Written Scheme of Investigation sets out the strategy to ensure archaeological objectives are achieved to satisfy Condition 56 and implement the Environmental Statement.

In preparing this document full reference has been made to the Specification as prepared by International Heritage Conservation and Management Ltd. ('IHCM') which provides the strategy for archaeological investigation and mitigation of the potential effects on Development Zones B and E, as reported in the Environmental Statement. It commits to undertaking appropriate works and directs the contents of the Written Scheme of Investigation provided by the commissioned archaeological contractor. As such, the specification fulfils the requirements of Condition 56 of the Outline Planning Permission.

The 'Archaeological Watching Brief(s)' will be applied to the engineering and construction works within Development Zones B and E, for example:

1. Trial pitting to visually inspect the shallow ground conditions and establish the precise location of obstructions buried in the ground.
2. Sinking of bore holes to provide design data in respect of deep ground conditions and foundation designs.
3. Site preparation including the removing of present ground surfaces, the removal of any surviving upstanding features and removal of obstructions in the way of proposed ground works.
4. Construction and forming of temporary works.
5. Cut and fill earthworks to new formation level including the treatment of any contaminated soils encountered.
6. Excavation for shallow and deep buried services.
7. Excavation of basements and sumps, pits and other small area excavations.
8. Piling including forming of pile caps and ground beams.
9. Hard and soft landscaping around the proposed buildings, where a large number of known and evaluated heritage features will be removed.

The locations of the archaeological works are generally wherever there are to be ground works. Specific undertakings are defined in Section 1.8 above and other locations, but presently not yet determined, can be anticipated.

1.2 Background History of Plot B and E

1.2.1 Summary

Development Zone B is substantially the former gas works.

The start of the industrial development of the area was initiated by the insertion of the Regent's Canal in the first quarter of the 19th century (opened 1820). This permitted the immediate development of the Pancras Works south of the canal, roughly opposite the Eastern Goods Yard. Further south, generally between King's Cross Station and St Pancras Station, mixed residential and commercial development occurred at this time. As the gas industry expanded and the great railway works were inserted so there were piecemeal changes then some major removal of the residential and light commercial urban fabric.

The gas works ceased making coal gas in 1904, with a brief revival in 1907, and its manufacturing plant was demolished in 1911. The gasholders remained in use, linked to trunk mains.

Zone E and the south west corner of Zone B formerly comprised an area of residential development. Today, only Stanley Building South and the immediate hard landscaping survive. The Stanley Buildings originally included five blocks of approximately 20 m by 12 m. They were purpose-built in 1864-5 as low-rental 'philanthropic' housing by the Improved Industrial Dwellings Co. One five-storey block remains, identified here as Stanley Building South.

Four of the former blocks have been demolished pursuant to Listed Building Consent 2004/2313/L in order to accommodate the extension of St. Pancras Station for the Channel Tunnel Rail Link terminal and for the realignment of Pancras Way.

Stanley Building South is currently unoccupied. It is listed Grade II and lies within the King's Cross St. Pancras Conservation Area.

The Stanley Buildings had no basements. Consequently, earlier made ground survives here and forms part of the infill of the historic River Fleet valley.

1.2.2 General Gas Industry Site History

The former gasworks within the KXC site, known as the Imperial Gasworks or Pancras Works, was built as the principal works of the Imperial Gas Light and Coke Company. When opened in 1824 this was the largest gasworks in the world. The works was sited alongside the Regent's Canal. It used coal initially delivered to the works by the canal and then later via a viaduct across the Regent's Canal from the Goods Yard. The gas was produced in large retort houses. This was then stored in the gasholders on the site, which acted as reservoirs so that an adequate supply of gas was always available when required. The Gas Light and Coke Co. acquired the Imperial Gas Light and Coke Company in 1876.

The consumption of gas was steadily climbing throughout the second half of the 19th century, in response to London's rising population and prosperity and falling costs in the making of gas. Proportionate increases in gas storage capacity were needed to meet peak demands at all the company's works. With connection by trunk mains to the company's huge Beckton gas works supplementing local production, several of the Pancras gasholders came to be enlarged in the 1880s. By 1900 the works occupied 11 acres (4.6 hectares), of which more than half was devoted to gas storage.

Gasholder No. 8, centrally placed in Zone B, was designed by John Clark, the engineer of the Pancras Works, and its ironwork was built by Westwood and Wrights in 1883. Both they and Clark had been responsible for the 'telescoping' of the three 'Siamese Triplet' gasholders Nos. 10, 11, and 12, completed in 1880 and located to the north west of Zone B, where the modern canopy of St Pancras Station is now

sited. The brick tank of No. 8, set deeply into in the ground, had been constructed c.1853 for a previous gasholder, and was now deepened by 2 feet to 28 feet (8.5 m), still considerably less than the exceptional 55 feet (16.8 m) depth of the tanks of the triplet group. So the new bell of No. 8 was given three telescopic 'lifts', within a guide frame some 83 feet (25.3 m) tall, compared with the two lifts, within guide frames 108 feet (32.9 m) tall, of the reconstructed triplet group. With different proportions, the guide frame of No. 8 has only two tiers of columns and girders compared with the three tiers of the triplet group.

All of these guide frames were based stylistically on those of John Clark's father, Joseph, some of whose work may be seen at the Bethnal Green and Bromley-by-Bow gasholder stations.

Although No. 8 is the only gasholder guide frame still standing today on the gasworks site, it may be noted here that in 1886-7 two other gasholders were enlarged and two more were added, with a new style of guide frame in lattice girder construction (with resemblance to the wind girders of St Pancras Station trainshed). There were then no fewer than nine substantial gasholders on the site, seven of which remained until the commencement of the CTRL works in 2001. Several of the gasholder tanks are still found within the ground of Zone B, founded at various depth and backfilled. Developed piecemeal on a constricted site, the holders were smaller and more attuned to the urban setting than some other London gasholders of the period. They presented a remarkable townscape - and landmark for people approaching St Pancras Station by train.

The Pancras Works ceased to make gas in 1904, but the gasholders continued in use, storing town gas piped from other gasworks. In the 1970s town gas was replaced by natural gas brought ashore from the North Sea, although again the gasholders continued in use.

The high-pressure national gas grid established first in the 1960s for the distribution of natural gas has an inherent storage capacity and flexibility, allowing a considerable and ongoing reduction in the national stock of gasholders. However, high-pressure mains cannot be used in built-up areas, and meeting the peaks of demand in large cities remains a problem. The removal of several of the gasholders, necessitated by the alignment of the CTRL and sanctioned by the CTRL Act of 1996, required an augmentation of the regional gas supply network. With that achieved all of the Pancras Works gasholders were decommissioned and purged of gas in 2000.

1.2.3 Immediate Archaeological Features Associated with Gasholder No. 8

The depth of the brick tank, recorded at 28 feet (8.5 m), is one-third of the full height of the bell, which is some 25 m. To reduce the amount of excavation, it was normal to leave the soil in the central portion of the tank in place, in the form of an inverted cone or "dumpling" to ensure stability of the soil. The bottom of the tank and the sloped sides of this 'dumpling' would be sealed with a layer of puddled clay or concrete if necessary, to prevent leakage of water out of the tank. On this site, the tank will assuredly cut into the underlying impermeable London Clay, and so these surfaces are likely to have received only a thin 'blinding' of concrete.

The wall of the tank will increase in thickness with depth, stepping out several times on the outer face to provide adequate resistance as a compressive ring against earth pressure, which would otherwise tend to force the walls inwards. Vertical piers to support the guide columns will project behind the wall, probably capped with a massive padstone. The inner face of the wall will be a uniform cylinder with vertical iron guides attached to the face. A central pillar in the tank provides support to the bell trusses when the tank is empty.

Immediately adjoining the tank on its south-west side, there is a circular brick well for the pipes that descend beneath the bottom of the tank wall to convey gas into and out of the gasholder bell. This had until 2001 a traditional hand-operated pump, with flywheel, for removing any accumulated water.

1.2.4 Other Gas Industry Facilities Associated with the Gasholder No. 8 in Development Zones B.

According to Ordnance Survey mapping dated 1871 Development Zone B included the following elements of the gasworks, remnants of which may still be in the ground on site and along the proposed Boulevard and the present day Goods Way:

1. A significant portion of one of the major Retort Houses.
2. Sets of Condensers and Tar Wells.
3. Sets of Boilers and Pumps and Hydraulic Mains.
4. Sets of Scrubbers.
5. Sets of Purifiers.
6. Store House.
7. Crushing House.
8. Gas delivery pipes and machinery.
9. Wells and pumps for topping up the gasholder tanks.
10. Coal, clinker and coal waste holding pens.
11. A large variety of small cylindrical tanks
12. Offices/stores
13. Associated hard landscaping.

1.2.5 Urban History and Other Heritage Resources within Blocks B and E

Limited development on the southern part of the KXC site took place in the late 18th century, stimulated by 'The New Road', to the south of KXC. The development was substantially one of low quality two storey terraced housing, the layout of which responded to field and property boundaries, the somewhat ad-hoc exploitation of soils for brick/tile making, the Fleet Sewer, and the Small Pox Hospital grounds (under King's Cross Station). Today, the orientations of the German Gymnasium and Stanley Building South, and their surrounding local roads, are based on this first phase development pattern.

There was further piecemeal expansion of the King's Cross residential area in the second and third decades of the 19th century, including the areas of terraced housing bordering Suffolk Street, Cheney Street, Ashby Street, Northampton Street and Norfolk Street south of the gas works, with Upper Edmond Street to the east. These streets were generally located towards the southern end of Development Zone B. This street pattern was diagonally placed across the previous agricultural field pattern.

The housing was typified by two storey structures and those on Suffolk Street West possibly having half basements. The houses generally fronted the roads and had rear extension kitchens and with 'privies' set at the bottom of small yards/gardens.

The existing housing between the two stations remained for a few more years. The erection in 1864-5 of the original five blocks of Stanley Buildings, an early project of Sir Sidney Waterlow's philanthropic and profit-restricted Improved Industrial Dwellings Company, responded to existing poor local housing conditions and the imminent dispossession of sites by the Midland Railway. The German Gymnasium, part of a contemporaneous redevelopment on Pancras Road, reflected other aspects of mid-Victorian Society.

Further platforms and sidings were added to the west of King's Cross Station before 1894 including new "docks" for express milk traffic and for horses and carriages (which subsequently became a Motor rail terminal). This facility was within Zone B at the south end. To improve road traffic circulation around the station, a new bridge

was built across the enlarged “throat” of the station, with a western approach along the southern edge of the gas works. This was officially named Battle Bridge Road in 1873, possibly in advance of its construction. These works, set at a lower level related to rail tracks entering from the north where joining with the main rail routes passing under the Regent’s Canal. The Milk Dock displaced the remaining pocket of back-street houses so that the railway extended west as far as Cheney Street

By 1894 most of the residential streets had been swept away leaving the Stanley Buildings to the west and the German Gymnasium at the south end of this KXC development area.

Pressure on land made it more difficult for railway workers to find decent affordable housing close to their place of work, and to that end the Great Northern Railway in 1891-2 erected a tenement-style block of flats along the new Battle Bridge Road called the Culross Buildings. It was accompanied by a mission hall, Culross Hall, one of three provided by the company for its employees’ spiritual needs. The Culross Buildings were totally unrelated to the few remaining earlier buildings in the area, such as the German Gymnasium (1864/5) and the Stanley Buildings (1864/5), and were demolished in 2008 pursuant to Conservation Area Consent 2004/2317/C.

1.3 Potential Archaeological Resources in Development Zones B and E

Potential archaeological resources related to the site are listed below:

Block/Plot Reference	Potential Industrial Remains
B3 and B5	Foundations of the Gasholder No 8 Brick wall to the north
B5	Gasholder No 8 foundations.
B3, B4, B5, B6	Gasholder No 8 buried infrastructure (with some connections to above ground features including an upstanding pump)
B1, B3, B4, B5, B6	Foundations and Infrastructure associated with the other gasholders – of particular note are wells for water used within the gasholder tanks.
Mostly B5 and B6	Buildings and related artefacts associated with the gas manufacturing process
Whole of Zone B	Soil formations associated with the gas works, some of which may be contaminated.
B3 and B5	Surface setts and sub surface make up of Battle Bridge Road
B1, B2 and B4	Basement and foundations of Culross Buildings
Zone E and Plot B1	Foundations and surrounding infrastructure to demolished Stanley Buildings
Generally Zones B and E	Made ground soil formations predating first phase urban development.

Generally Zone B and E	Natural soil formations associated with the Fleet river and valley and generally of prehistoric times, back to the last glaciation.
------------------------	--

1.4 Archaeological Objectives

The strategy defined by IHCM (February 2010) outlines the Archaeological Watching Brief process and references a series of archaeological objectives and these are set out below:

The Archaeological Watching Briefs will collect and interpret data from the many site-based engineering components of the redevelopment scheme. The archaeological objectives shall be related to:

1. Determining the character of the site and landscape prior to first-phase industrial development, including information about the rural topography with evidence of prehistoric to post-medieval land use; the exploitation of soils for brick making; early commercial development as part of the rapidly expanding early to mid 19th century industrial fabric of London.
2. The mid 18th to early 19th century ‘early’ urban and commercial land uses, prior to the insertion of the mid 19th century railway buildings and associated railway facilities.
3. The character of foundations and soils of mid 19th to early 20th century.
4. Adding archaeological data to that obtained for CTRL and LUL development works that have been taking place for the last few years at King’s Cross and St. Pancras.
5. The Archaeological Watching Briefs will also provide specialist advice to the Developer (Argent), the Engineer, and the Principal Engineering Contractor on made ground and historic engineering features during the site works, if and when discoveries are made. The Archaeological Watching Brief will monitor site works to reduce the chance of accidental damage occurring to retained heritage buildings.
6. Updating Archaeological Watching Brief and local Excavation objectives (project design) from time to time, responding to findings and interpretation discussions between all concerned parties.
7. One or more interim reports on the findings are planned to be issued during the ground works development programme and a draft final report within six months following the completion of site works.

The watching brief/s and local excavations will follow both Institute of Field Archaeologists guidelines and the methodologies set out in English Heritage (GLAAS) Guidance Papers¹. All archaeological works will be monitored by GLAAS on behalf of London Borough of Camden and by IHCM on behalf of the developers.

¹ English Heritage, Greater London Archaeology Advisory Service, “Archaeological Guidance Papers: 1 Written Schemes of Investigation; 2 Desk-Based Assessments; 3 Standards and Practices in Archaeological Fieldwork in London; 4 Archaeological Reports; 5 Evaluations”, revised June 1998.

2 THE WATCHING BRIEF AND LOCAL EXCAVATIONS

All necessary site investigations and earthworks will be monitored by a suitably experienced archaeologist or archaeologists. The archaeologists will ensure that any archaeologically sensitive remains are recorded, and the relevant parties notified.

Pre-Construct Archaeology Ltd. is a Registered Archaeological Organisation with the Institute of Field Archaeologists.

The attending archaeologist will be provided with additional staff should the workload require it. The implementation of all groundworks will show due consideration for potential archaeological remains and the need to excavate/monitor them.

On completion of the fieldwork proper provision will be made for a full report on the results of the watching brief.

3 GROUNDWORKS

3.1 Method Statement

Areas of groundworks will be broken out by the engineering contractor, whereupon the attending archaeologist will monitor, identify, record and retrieve (as far as possible) archaeological remains that may be uncovered during the course of the invasive works, or, archaeologically excavate them should they be proved to be of high and moderate archaeological significance. Notification of progress will be made to all relevant parties (IHCM, Argent, the London Borough of Camden and GLAAS).

All methodologies set out here are understood as being possible given the likelihood that some contamination is present. This will be confirmed by the results of existing and ongoing site investigations. Prior to commencement PCA will be provided with copies of all ground soil contamination reports and any other appropriate reports in order to determine the level of PPE to be worn.

All gold and silver will be removed to a safe place and reported to the local coroner according to the procedures relating to Treasure Act 1996. Where removal cannot be effected on the same working day as the discovery suitable security measures will be taken to protect the finds from theft.

If significant archaeological remains are accidentally encountered during the course of the investigations, or other groundworks, with the agreement of relevant parties, digging will locally stop to allow the archaeological remains to be investigated and recorded by the archaeologist, if not to be preserved *in situ*. Further engineering excavation will then proceed until the desired formation level is achieved. Necessary horizontal and vertical trench faces will be cleaned before recording.

3.2 Access and Safety

Reasonable access to archaeological areas will be arranged for representatives of the London Borough of Camden and other representatives of English Heritage who wish to be satisfied, through site inspections, that the archaeological works are being conducted to proper professional standards and in accordance with the agreements made.

All relevant health and safety legislation, regulations and codes of practice will be respected. The groundworks contractor will be responsible for overall health and safety on the site.

It is assumed that there will be contaminants present at the site and therefore requiring appropriate level of PPE. The engineering contractor shall provide any additional protection for archaeological undertakings should more severe contamination be encountered. A gas monitor should also be provided. Some of the work may be located within the area of the former gasworks. Work in these areas will be undertaken wearing appropriate extra PPE as required. If the archaeologist believes the trench to be contaminated, they will not enter the trench and will seek a second opinion from PCA's health and safety officer.

If the site is considered to be 'confined space' then appropriately qualified staff must be employed as must the appropriate associated equipment.

3.3 Recording Systems

A unique-number site code system will be agreed with the Museum of London.

The recording systems adopted during the investigations will be broadly compatible with those most widely used elsewhere in the Borough. Where there is any doubt as to the appropriate recording technique the Museum of London recording manual will be used.

The site archive will be organised so as to be compatible with the other archaeological archives produced in the Borough. Individual descriptions of all archaeological strata and features excavated and exposed will be entered onto prepared *pro-forma*, for example, Test Pit Recording Sheets. If complex stratigraphy or structures are encountered *pro-forma* Single Context Recording Sheets will be

used. Sample recording sheets, sample registers, findings recording sheets, accession catalogues, and the photography record cards will follow the Museum of London equivalents. This requirement for archival compatibility extends to the use of computerised databases.

A 'site location plan' indicating the site north and based on current Ordnance Survey data (reproduced with the permission of the Controller of HMSO) will be prepared. The location of the OS bench marks used and the site TBM will also be indicated.

Some record of the full extent in plan of any archaeological deposits encountered will be made; these plans will be on polyester based drawing film, will be related to the site grid and at a scale of 1:10 or 1:20. 'Single context planning' will be used on deeply stratified sites. The results will be digitised.

Sections will be drawn to scale or measured sketches will be made according to the relative safety of individual test pits.

The OD height of all principal strata and features will be calculated and indicated on the appropriate plans and sections, following transfer of information from the engineering contractor.

If the site complexity is such as to justify its use the 'Harris Matrix' stratification diagram will be used to record stratigraphic relationships. This record will be compiled and fully checked during the course of the excavations.

A photographic record of the investigations will be prepared. This will include black and white prints and colour transparencies (on 35mm film), illustrating in both detail and general context the principal features and finds discovered. The photographic record will also include 'working shots' to illustrate more generally the nature of the archaeological operation mounted.

3.4 Treatment of Finds

Different sampling strategies may be employed according to the perceived importance of the deposit or feature under investigation. Close attention will be given to sampling for date and structure. Sample size will take into account the frequency with which material is likely to occur.

All finds retrieval policies of the Museum of London will be adopted and all identified finds and artefacts will be retained unless the Museum of London policy states otherwise.

All finds will be treated in a proper manner and will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out in the United Kingdom Institute for Conservation's 'Conservation Guidelines No.2' and the Museum of London's 'Standards for the Preparation of Finds to be Permanently Retained by the Museum of London'. All metal objects will be x-rayed and then selected for conservation.

Lodging of the site paper archive with the Museum of London. Artefacts are to be retained by the landowners or their nominated agency pending consideration of the potential for museum displays on and off site.

3.5 Reports and archives

A report will be written up summarising the results of the archaeological watching brief on the investigation and earthworks, incorporating the data from the one or more phases of watching brief. The site and area historical, archaeological and geological background, site methodologies, results and any recommendations for further work will be set out and illustrated as appropriate. Copies of the report will be submitted via IHCM to English Heritage, the Borough's Planning Department, the Camden Local Studies Library and Argent.

The integrity of the site archive will be maintained. The finds and records will be available for public consultation. Appropriate guidance set out in the Museum and Galleries Commission's 'Standards in the Museum Care of Archaeological Collections' (1992) and the Society of Museum archaeologist's draft 'Selection and

Retention and Dispersal of Archaeological Collections' (1992), will be followed in all circumstances.

If the finds are not to be donated to the appropriate Museum, arrangements will be made for a comprehensive record of all relevant materials (including detailed drawings, photographs and descriptions of individual finds), which can instead constitute the archaeological archive, but see 3.4.4 above.

The minimum acceptable standard for the site archive is defined in the '**Management of Archaeological Projects 5.4' and 'Appendix 3'**. It will include all materials recovered, (or the comprehensive records of such materials as referred to above) and all written, drawn, and photographic records relating directly to the investigations. It will be quantified, ordered, indexed, and internally consistent before transfer to the Museum of London. It will also contain a site matrix, a site summary and brief written observations on the artefactual and environmental data.

United Kingdom Institute for Conservation guidelines for the preparation of excavation archives for long-term storage (1990) will be followed.

A short summary of the results of the work, even if negative, will be submitted to the Greater London SMR and NAR (using the appropriate archaeological report forms), and for publication in the appropriate academic journals including the 'Excavation Round-Up' of the **London Archaeologist**. Such publications will meet the minimum requirements set out in Appendix 7, '**Management of Archaeological Projects'** 1991, and derive from a 'phase 2 review' as defined in the same document.

4 RESOURCES AND PROGRAMMING

It is imperative that all soil excavation be undertaken under the supervision of an archaeologist in order not to cause unnecessary damage to identified archaeological deposits.

Accommodation, as well as welfare facilities and tool storage, will be required for the watching brief archaeologist and excavation team. It is assumed that these will be provided by the groundworks contractor at or near the site.

The site works will be inspected and monitored by Richard Hughes, IHCM, on behalf of Argent and Kim Stabler, English Heritage (GLAAS), on behalf of English Heritage and the London Borough of Camden.

The Health and Safety policies of Pre-Construct Archaeology Limited will be followed and in accordance with all statutory regulations. Full acknowledgement will be made to existing site policies and procedures.

The archaeological works will be supervised by a member of staff who has undertaken similar exercises.

5 TIMETABLE

Once confirmed, IHCM will advise Pre-Construct Archaeology Ltd and other relevant parties prior to commencement.



ARGENT

5 Albany Courtyard
London
W1J OHF

T +44 (0)20 7339 0400
www.kingscrosscentral.com