
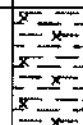

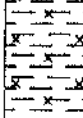



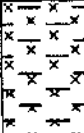
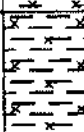
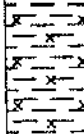


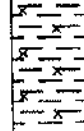
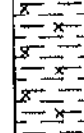
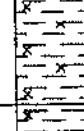
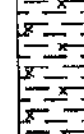
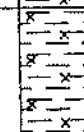
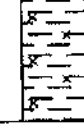

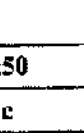


Site Kings Cross Project, Camley Street								
Boring Method Shell and auger, light cable percussion.						Record of Borehole		
Diameter 200/150				Date started 22/05/92		No. 7 Cont.		
Ground Level				O.D.		Sheet No. 3 of 4		
Samples in situ tests			Depth of casing	Depth to water	Date and Depth	Description	Legend	O.D.
Depth	Type	N						
20.00	SPT D	S40				Very stiff dark grey fissured silty clay with partings of silt.  L.C.C.L		
20.50	D							
21.00	U102			21				
21.50	D							
22.00	D			22				
22.50	U102					Very stiff light grey, brown and red heavily fissured silty clay. Some slickensided fissures.  W.R.H.C - C.L		
23.00	D			23				
24.00	U102			24				
24.50	SPT D	S52		26/525				
25.50	U102							
26.00	D			26				
27.00	U102 D			27				
27.50	D							
28.00	D			28				
28.50	U102							
29.00	D			29	Colour change to light grey and brown.			
29.50	D							
Remarks								

Site Kings Cross Project, Camley Street						Record of Borehole	
Boring Method Shell and auger, light cable percussion.						No. 7 Cont.	
Diameter 200/150				Date started 22/05/92		Sheet No. 4 of 4	
Ground Level				O.D.		O.D.	
Samples in situ tests			Depth of casing	Depth to water	Date and Depth	Description	Legend
Depth	Type	N					
30.00	U102						
30.50	SPT D	S68			1/6 31		
31.30	D					Stiff to very stiff black fissured silty clay with laminations of light grey sand. Some slickensided fissures.	
31.50	U102				32	Very stiff light brown, light grey, purple, red and light brown heavily fissured silty clay. Some slickensided fissures.	
32.50	D						
33.00	U102				33		
33.50	D						
34.00	D				34		
34.50	U102						
35.00	SPT D	S38 150 mm			35		
					2/6	End of borehole at 35.30 metres.	
					36		
					37		
					38		
					39		

Remarks Occasional slow seepages of water. Water sample taken.

Scale 1:50  
 Fig. 2 d



Site Kings Cross Project, Camley Street								
Boring Method Shell and auger, light cable percussion.							Record of Borehole	
Diameter 200					Date started 08/06/92		No. 8 Cont.	
Ground Level					O.D.		Sheet No. 3 of 4	
Samples insitu tests			Depth of casing	Depth to water	Date and Depth	Description	Legend	O.D.
Depth	Type	N						
20.00	D	S36						
20.50	D							
21.00	U102				21	Stiff dark grey fissured silty clay with partings of silt and sometimes fine sand. LC-CL		
21.50	SPT D				22			
22.00	D							
22.50	U102	S35						
23.00	D				23			
23.50	D							
24.00	U102				24			
24.50	SPT D				25			
25.50	U102							
26.00	D			26				
26.50	D							
27.00	U102			27				
27.50	D			11/6 28	Stiff brown with a little grey heavily fissured silty clay. Some slickensided fissures.			3.31
28.00	D					HF-CL?		
28.50	U102				Stiff light grey and red with a little brown fissured silty clay. Some slickensided fissures.			4.96
29.00	D			29		WRUNC-CL		
29.50	D							
Remarks								



B1 Hazard screening assessment

B1.1 Introduction

To simplify the assessment of risks, UK statutory guidance allows the use of authoritative and scientifically based guideline values for the initial hazard screening assessment, provided that such guideline values are available and are appropriate to the site circumstances of the pollutant linkages in question. The hazard screening assessment is used to identify Contaminants of Concern (CoCs) that may pose a risk of harm to human health, or a risk of significant pollution of groundwater at the site.

B1.2 Soil Quality

B1.2.1 Hazard Screening Guideline Values

The following guidelines have been used for the assessment of soil contamination at the site:

- UK Contaminated Land Exposure Assessment (CLEA) soil guideline values (SGVs) for commercial/industrial land-use.
- Arup Generic Assessment Criteria (GAC) derived for soils using CLEA UK for a commercial/industrial land-use were used where no SGVs are available.
- UK ICRCL Guidance Note 64/85 for asbestos on contaminated sites.

B1.2.2 CLEA Statistical Analysis

As recommended by the Department for Environment, Food & Rural Affairs (DEFRA) and the EA, Arup has carried out statistical tests (mean and maximum value tests) to quantify uncertainties associated with variation of contaminant concentrations across the site, and the sampling and chemical analysis of soil samples (see Section 4, Appendix A of CLR 7).

Mean Value Test

The mean value test compares the relevant screening guideline values with the upper 95<sup>th</sup> percentile (95% confidence limit) of the mean measured concentration and has been applied to the data set of soil chemical test results for the site. Where the data set passes the mean value test, this indicates that no further action is warranted.

Maximum Value Test

Measured contaminant concentrations that exceed the selected screening guideline values require some further consideration even when the mean value test has been passed. In considering whether further sampling and analysis is required, the maximum value test has been carried out to determine whether the maximum value in a sample set classifies as a statistical 'outlier'. Outliers are data points that do not fall within the expected distribution of measurements for the sample population.

If the maximum value is assessed to be a statistical outlier this could indicate the presence of a localised and/or largely undiscovered area of contamination (hotspot), or be the result of a measurement or recording error. Further work would be required, including more detailed information review and/or site investigation, to delineate contaminant hotspot areas.

B1.2.3 Soil Quality Assessment

Results of soil chemical testing from the CTRL site investigations have been compared to hazard screening guideline values derived as detailed above. The results and the screening values for the sample locations beneath the GW&B footprint are summarised below, and the laboratory results are included in full in the following spreadsheet.

Determinand	Units	No of Samples Tested	Range Measured	Screening Values	Number of Samples Exceeding Screening

					Value
Arsenic	(mg/kg)	61	1.6 – 414	500 <sup>1</sup>	0
Cadmium	(mg/kg)	61	0.5 – 13	1,400 <sup>1</sup>	0
Chromium	(mg/kg)	61	5 – 170	5,000 <sup>1</sup>	0
Hexavalent Chromium	(mg/kg)	25	2 – 6	–	–
Copper	(mg/kg)	61	16 – 1700	44,800 <sup>2</sup>	0
Lead	(mg/kg)	61	3 – 7,800	750 <sup>1</sup>	18
Mercury	(mg/kg)	61	0.1 – 14	480 <sup>1</sup>	0
Nickel	(mg/kg)	60	4 – 150	5,000 <sup>1</sup>	0
Selenium	(mg/kg)	52	0.1 – 5	8,000 <sup>1</sup>	0
Zinc	(mg/kg)	61	38 – 2,600	337,000 <sup>2</sup>	0
Total Cyanide	(mg/kg)	14	1 – 290	343 <sup>3</sup>	0
Free Cyanide	(mg/kg)	17	1 – 10	140 <sup>4</sup>	0
Thiocyanate	(mg/kg)	13	2 – 220	–	–
Total Phenol	(mg/kg)	40	0.3 – 2.7	21900 <sup>1</sup>	0
Gasoline Range Organics*	(mg/kg)	15	0.1 – 6.2	66.4 <sup>2</sup>	0
Diesel Range Organics*	(mg/kg)	21	0.1 – 1,400	641 <sup>2</sup>	2
Mineral Oils*	(mg/kg)	3	128 – 1539	641 <sup>2</sup>	1
Aromatic Hydrocarbons*	(mg/kg)	28	5 – 6,600	641 <sup>2</sup>	2
Benzene	(mg/kg)	5	<0.001 – 0.01	1.65 <sup>2</sup>	0
Toluene	(mg/kg)	8	0.003 – 0.2	150 <sup>1</sup>	0
Ethylbenzene	(mg/kg)	8	<0.001 – 0.02	48,000 <sup>1</sup>	0
m,p-Xylenes	(mg/kg)	8	<0.001 – 0.2	344 <sup>2</sup>	0
o-Xylene	(mg/kg)	8	<0.001 – 0.23	419 <sup>2</sup>	0
Naphthalene	(mg/kg)	15	0.02 – <10	293 <sup>2</sup>	0
Benzo(a)pyrene	(mg/kg)	14	1 – <10	29.6 <sup>2</sup>	0
Fluorene	(mg/kg)	14	1 – <10	59,400 <sup>2</sup>	0
Asbestos	%	17	<0.001	–	–
pH value	(pH units)	61	6.4 – 11.6	–	–

Key:

1. CLEA Soil Guideline Values (SGV) for commercial/industrial use (2002 to 2005), SOM 1% assumed.

2. Arup generic assessment criteria (GAC) for commercial/industrial use using the CLEA UK software (2007), SOM 1% assumed.

\*PRO, DRO and Mineral Oil results have been screened against the lowest Arup GAC TPHCWG carbon band for SOM 1% which is present within the fraction analysed. PRO results have been screened against the Arup GAC for aliphatic TPHCWG carbon band C<sub>8</sub> to C<sub>10</sub> and mineral oil results have been screened against the Arup GAC for aromatic TPHCWG carbon band C<sub>10</sub> to C<sub>12</sub>.

3. Arup GAC for complex cyanide (low free cyanide concentrations and therefore cyanide is mostly complexed) using

information contained in TOX5
4. Arup GAC derived using acute toxicity information contained in TOX5

The hazard screening assessment indicates that the concentrations of four contaminants were above their screening criteria, in some of the samples, as follows:

- a. 18 samples from 11 locations contained elevated lead results;
- b. Two samples from neighbouring trial pits contained elevated DRO results;
- c. One sample recorded an elevated mineral oil result; and
- d. Two samples from two locations contained elevated aromatic hydrocarbons.

The significance of these exceedances is discussed in Section 4.3 of the report.

**B1.3 Groundwater Quality**

The EA set out advice to third parties with respect to pollution of controlled waters in a technical guide of the same name dated May 2005.<sup>4</sup> Groundwater results have been screened initially against Environmental Quality Standards (EQS) for freshwater as referenced in the technical guidance. Where no EQS's are available for a compound UK drinking water standards (DWS) have been used.

Four groundwater samples were taken from the following standpipes:

- OT3745A with a response zone in the Alluvium beneath the Made Ground
- SA7328 with a response zone in the top of the London Clay beneath the Made Ground
- SA7381 with a response zone in the Made Ground/London Clay
- TP7424 with a response zone in the Alluvium beneath the Made Ground

Perched groundwater has been sampled within the four standpipes and analysed for a wide range of determinands including heavy metals, inorganics and a range of hydrocarbons.

The groundwater chemical test results are shown in full in Table 2 and are summarised below:

1. Concentrations of all the metals analysed were below the relevant EQS, with the exception of copper, lead and zinc.
  - Copper was elevated above the screening criteria of 0.028mg/l in three samples with concentrations ranging between 0.05mg/l and 0.16mg/l.
  - Lead and zinc concentrations were elevated above the respective screening criteria of 0.28mg/l and 0.25mg/l in one groundwater sample taken from London Clay with a lead concentration of 0.88mg/l and a zinc concentration of 1mg/l.
2. Concentrations of ammonia were elevated above the screening criteria in all three samples tested, with concentrations ranging between 1.3mg/l and 4.5mg/l.
3. Hydrocarbons were identified in the diesel range (>C<sub>10</sub>) ranging between 1mg/l and 3.3mg/l which all exceeded the DWS of 0.01mg/l.
4. One sample was tested for phenol and reported a concentration of 0.04mg/l which slightly exceeded the EQS of 0.03mg/l.
5. Two total sulphate results exceeded the EQS of 400mg/l with concentrations of 1400mg/l and 2370mg/l respectively.

The hazard screening assessment indicates that in general concentrations of heavy metals and inorganics are low and below the relevant screening criteria within the perched water. However, concentrations of TPH, copper, lead, zinc, sulphate, ammonia and sulphate are slightly elevated in relation to the screening criteria within certain standpipes. The significance of these exceedances is discussed in Section 4.3 of the report.

**B1.4 Leachability**

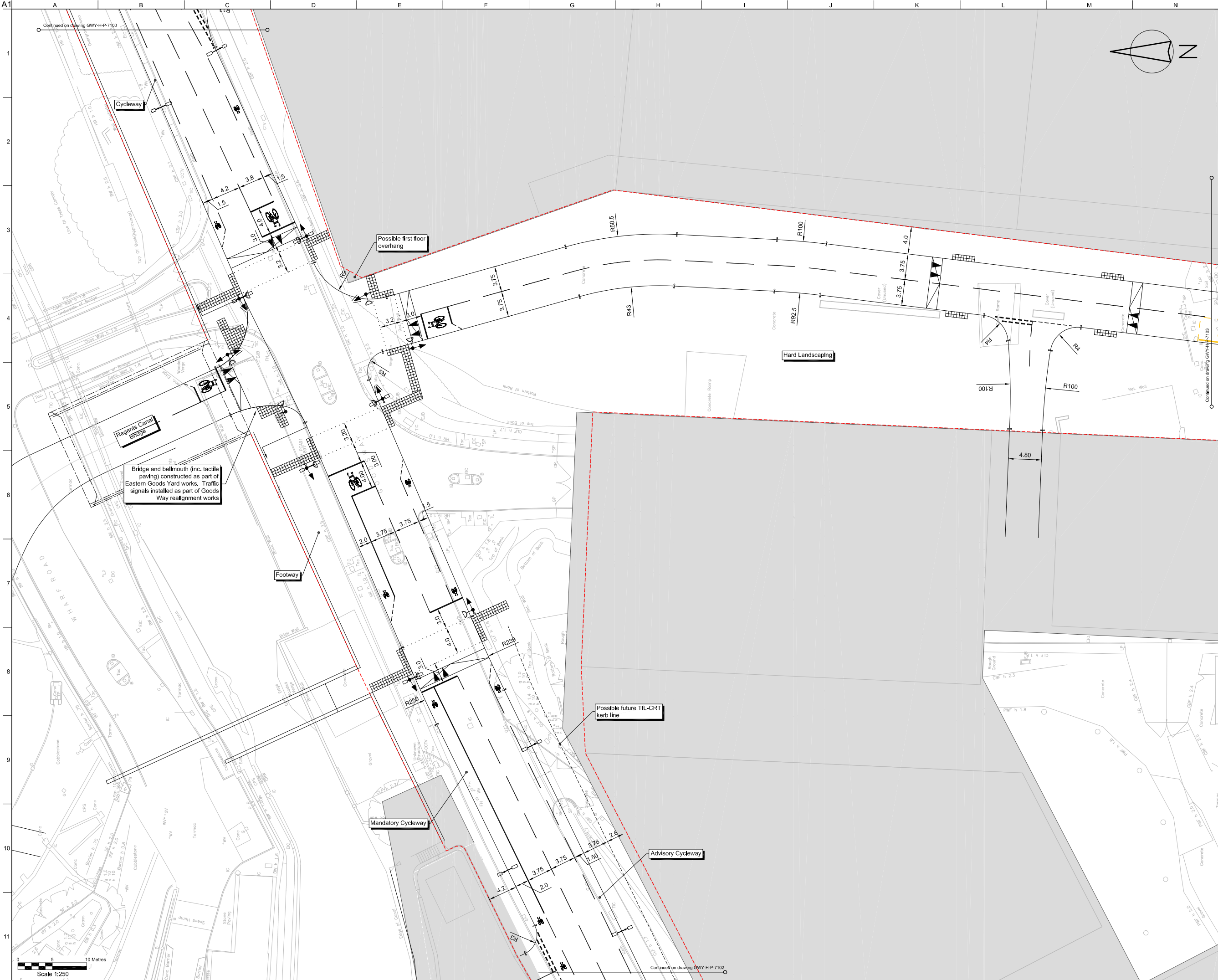
Five Made Ground samples were submitted for leachability analysis. The leachate was tested for metals only. The results provide a useful indication of general leachability. The metal leachability results have been screened against EQS. The results were all below the screening criteria suggesting a low metal leachability.

<sup>4</sup> Environment Agency (May 2005). Environment Agency Technical Advice to Third Parties on Pollution of Controlled Waters for Part IIA.





**APPENDIX B**  
**Highways Plans**  
**approved under**  
**the Southern**  
**Infrastructure Works**  
**submission**



- Notes:
- Refer drawing GWY-H-P-7100 for general notes and key

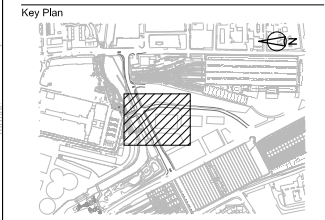
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Boulevard taxi access added				
P3	09/06/08	AH	AH	CNR
Gas Governor enclosure amended				
P2	25/04/08	AH	AH	CNR
Traffic calming added				
P1	01/04/08	AH	AH	CNR
First Issue				
Issue	Date	By	Chkd	Appd

**ARUP**

13 Fitzroy Street  
London W1T 4BQ  
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3824  
www.arup.com

Client  
**Argent (King's Cross) Ltd**

Job Title  
**Kings Cross Central**



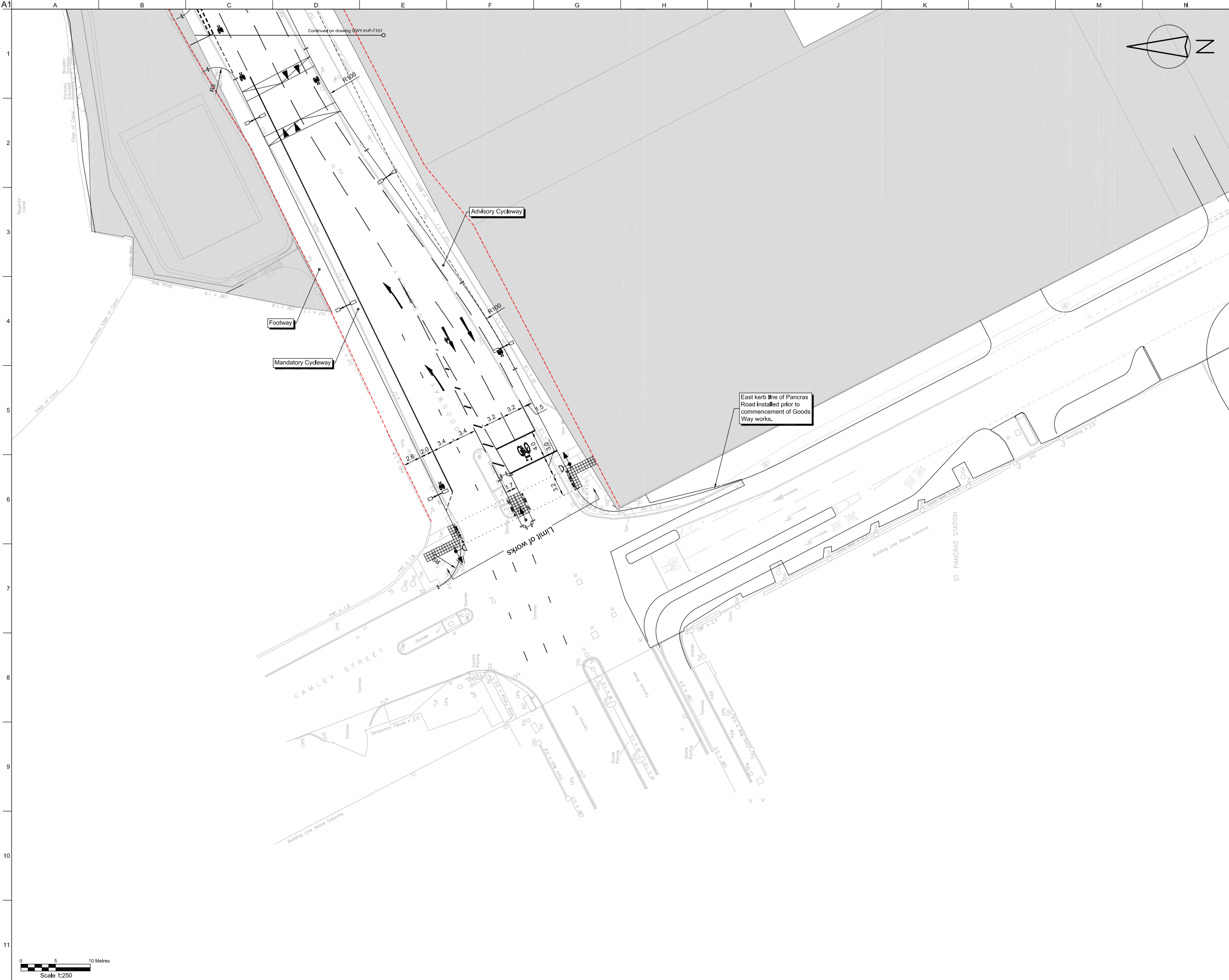
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Highway Layout  
Planning Submission  
Sheet 2 of 4**

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Discipline  
**Infrastructure**

Drawing Status  
**Preliminary**

Job No <b>67940</b>	Drawing No <b>GWY-H-P-7101</b>	Issue <b>P4</b>
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- Notes:
- Refer drawing GWY-H-P-7100 for general notes and key

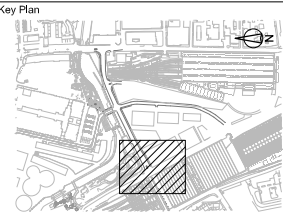
P3	09/06/08	AH	AH	CNR
Gas Governor enclosure amended				
P2	25/04/08	AH	AH	CNR
Traffic calming added				
P1	01/04/08	AH	AH	CNR
First Issue				
Issue	Date	By	Chkd	Appd

ARUP

13 Fitzroy Street  
London W1T 4BQ  
Tel +44 (0)20 7638 1531 Fax +44 (0)20 7580 3924  
www.arup.com

Client  
Argent (King's Cross) Ltd

Job Title  
Kings Cross Central



Drawing Title  
Goods Way and Boulevard  
Highway Layout  
Planning Submission  
Sheet 3 of 4

Scale at A1  
1:250

Discipline  
Infrastructure

Drawing Status  
**Preliminary**

Job No <b>67940</b>	Drawing No <b>GWY-H-P-7102</b>	Issue <b>P3</b>
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