

APPENDIX N

CGL Technical Report on Proposed Landscape Cover Soil



Providing Ground Solutions

Clark Smith Partnership

Western Access, Southall

*Technical Report on Proposed
Landscape Cover Soil*

Revision 1

February 2020



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1. INTRODUCTION AND BACKGROUND

Following discussions regarding the proposed landscaping soils on Western Access, Southall, Card Geotechnics Limited (CGL), on behalf of Clark Smith Partnership (CSP) and FM Conway Limited (FMC), has compiled the below concise technical note regarding the proposed cover soils with respect to risks to human health. The technical note is required to provide details on the proposed cover soil thickness, composition and quality and to assess suitability of site won soils, with respect to risks to human health, as cover soils for re-use within the scheme.

The Western Access scheme provides a new access road to the Southall Waterside development. The construction of the access road has included the merging of the River Crane and Yeading Brook and construction of two new bridges spanning the Grand Union Canal (GUC) and combined Yeading Brook channel. The site is located predominantly within the London Borough of Hillingdon, between Pump Lane and the GUC, with the eastern embankment, located at the western end of the main Southall Waterside site, within the London Borough of Ealing.

Landscaping soils are required across the development, including the slopes of the western and central embankment, flood compensation area (FCA), banks of the brook, and as fill behind the central embankment and eastern embankment retaining walls. The design and specification of the landscaping has been undertaken by Hyland Edgar Driver (HED)¹, on behalf of Berkeley West Thames (BWT) and soils are required to meet their specification in addition to being suitable from a human health perspective, as outlined in this technical note. Where available and suitable, it is the intention to re-use site won soils to form the cover soils to the west of the GUC with imported topsoil / subsoil to be used as cover soil to east GUC.

This technical note has been requested by the Environmental Health Officer at London Borough of Ealing and is also intended to be provided to London Borough of Hillingdon to confirm the proposed cover soil make-up and provide further details with regards to the quality of site won soils and the requirements for imported topsoil and subsoil to act as cover soils within the scheme. This assessment excludes the lagoon area, to the north of the Western Access, which is to be subject to a separate reconfiguration plan.

¹Hyland Edgar Driver (HED) (2018). *Southall Waterside – Western Access 100% Package, Soft Landscape Specification (Draft)*

2. LANDSCAPE COVER SOIL REQUIREMENTS

The CGL Remediation Scheme Addendum² (RSA) report sets out the requirements for re-use and import of soils, focusing on minimising impact to controlled waters, predominantly the Yeading Brook and River Crane, which were considered the principal receptors. The RSA established site specific re-use criteria, protective of controlled waters together with generic criteria for import of general fill and cover soils, which were considered suitably protective of both controlled waters and human health receptors. At the time of establishing and agreeing the RSA it was not clear that site won soils might be used as cover soils and, as such, site specific re-use criteria protective of human health were not derived.

The established re-use and import criteria for the scheme are represented in Appendix A.

Future human health receptors are considered to be limited at the site, particularly to the west of the GUC (or 'East Yeading Brook'), where access to the embankment slopes, FCA and banks of the Yeading Brook and River Crane is likely to be associated with future landscape and watercourse maintenance works and by occasional visitors. A hardstanding pathway, cycleway and verge are present along the length of the new Western Access roadway and the majority of pedestrian traffic is considered likely to use this route which provides entry to the Waterside development. The make-up of the hardstanding pavement, including sub-base, is a minimum 600mm thickness and is considered to provide a suitable pathway break to end users of the development from fill materials within the core of the embankment, noting that embankment fill materials have been verified and demonstrated to meet the established re-use criteria for the scheme^{3,4}. To the east GUC, a footpath is proposed across the landscaping fill to the north of the embankment, to allow access to the GUC towpath. Future access to other landscaped areas within the scheme is considered to be limited as noted above. On this basis, the conceptual site model for risks to human health across the scheme is considered to most closely align with that of a public parks / open space land use.

2.1 West GUC/East Yeading Brook (London Borough of Hillingdon)

To the west of the GUC, also including the area referred to as east Yeading Brook (EYB), site won low fertility topsoil, obtained from material stockpiled within the FCA, is to be re-used as cover soils across

² CGL (July 2017). *Western Access Remediation Scheme Addendum*. CGL Ref: CGN3732I. Aconex Ref: A720-E05-IW-CGL-EW-RP-0003.

³ CGL (October 2018). *Environmental Verification Report – London Borough of Hillingdon*. Western Access, Southall. CG28308.

⁴ CGL (October 2018). *Environmental Verification Report – London Borough of Ealing*. Western Access, Southall. CG28308.

the FCA, banks of the surface watercourses and embankment slopes and as landscape fill behind the central embankment retaining wall. A minimum 300mm thickness of site won cover soils (maximum of 300mm on the embankment slopes) are to be placed on existing soils on site which comprise embankment fill or in situ natural soils. The cover soils across west GUC are required to meet the re-use criteria established in the RSA together with criteria protective of human health. Given that site specific human health criteria have not been established for the scheme, and based on the conceptual site model for cover soils within the scheme, it is considered that generic criteria, for a public parks and open space land use category, in accordance with Land Quality Management (LQM) guidance⁵, are suitable for assessing compliance. In addition, it is considered that cover soils should meet the import criteria for general soils with respect to asbestos content (i.e. <0.001% by volume amosite and chrysotile and no detected fibres of crocidolite). Site won soils should be tested in line with the established import criteria suite of tests on a frequency in accordance with the established testing of site won soils, on the basis of one sample per 500m³. Where insufficient site won material is available to form the full thickness cover soils, and where imported soils are used to make-up the shortfall, these should comply with the RSA and the established import criteria for capping layer soils, presented in Appendix A.

In addition to these requirements the cover soils will need to meet the horticultural requirements established within the HED specification for the scheme¹.

A cross section through Chainage 190 in the central embankment, showing the required cover soil make-up, is provided in Appendix B.

2.2 East GUC (London Borough of Ealing)

To east of the GUC, landscape fill has been placed behind the retaining walls and abutment wing walls, north and south of the embankment and including the slope of the northern embankment. The landscape fill has been sourced from two locations. Made Ground fill, screened of deleterious material (metal, brick, concrete, plastics, textiles, tyres), was sourced from the FCA and placed as a base layer to the north of the wingwall adjacent to the GUC. This material is a soft to firm, brown, slightly sandy, gravelly clay with occasional cobbles of concrete/brick and rare fragments of textile. The upper section of the north bank, and the bank on the southern side of the highway were constructed using imported Made Ground from the Southall Waterside development, comprising soft to firm, orange brown very sandy and gravelly clay.

⁵ Land Quality Management (LQM) (2015). *The LQM/CIEH S4ULs for Human Health Assessment*

Cover soils are to be placed above these soils and will comprise imported topsoil. A minimum 300mm thickness of imported topsoil will be required to provide a suitable cover soil and this material will need to comply with the RSA requirements, in addition to specific horticultural parameters to meet the HED specification¹. In line with the RSA, imported topsoil will be obtained from a certified, reputable source(s) and accompanied by suitable test data. A minimum of three tests per source will be undertaken and a testing frequency of one sample per 150m³ of imported topsoil will be required. The test suite and resultant data will be required to meet the criteria for imported capping soils, as presented in Appendix A.

Based on the conceptual site model and description noted above, it is considered that underlying landscape fill, beneath the minimum 300mm imported topsoil, should meet the requirements of a public parks land use scenario and associated generic criteria.

The embankment east of the GUC was handed over to FMC following completion of remediation and verification by CA Blackwells on behalf of BWT. These works were reported separately in the associated verification report⁶ which confirmed that stabilised soils and an overlying marker layer were placed across this area as part of the works. These works were undertaken to comply with the requirements established for the main Waterside development site prior to embankment construction.

A cross section through Chainage 370, east GUC, showing the requirements for the landscape soils, is presented in Appendix B.

⁶ CA Blackwell (Contracts) Limited (2017). *C897 Southall Waterside Remediation Validation Report Area2. Ref. A721-E14-P2-CAB-REM-RP-003 P1*

3. ASSESSMENT OF SITE WON SOILS

CGL undertook sampling of site won topsoil stockpiles from machine dug trial pits in the FCA, the placed landscape fill either side of the east GUC wing walls, and the embankment fill west of the GUC, to assess risks to human health. Figures 1 and Figure 2, within Appendix C, present the sample locations, and photo sheets of the trial pit excavations are presented as Appendix D.

Laboratory results for both the FCA and landscape fill samples are presented within Appendix E and a data summary assessment sheet providing comparison to the relevant human health criteria, for the east GUC landscape soils, is presented as Appendix F.

3.1 FCA Cover Soils

A total of six samples of soils (referred to as S1 to S6), obtained from varying depths from three stockpiles within the FCA (FCA stockpiles SP1 to SP3), were obtained on 19 October 2018 and analysed for the capping soils suite of tests. A plan showing the sampling locations is presented in Figure 1, within Appendix C. The samples were scheduled on an approximate frequency of one per 500m³. The FCA stockpiled material in SP1 to SP3 had been screened and riddled of deleterious material (metal, brick, concrete, plastics, textiles, tyres) and comprised a soft to firm brown very gravelly clay with occasional cobbles of brick and concrete.

The resultant test data (refer to Appendix E) were screened against both the established re-use criteria and, as an initial screen, the capping criteria for imported soils (which are based on a conservative residential without plant uptake land use scenario) and all samples were found to meet the criteria. On this basis the FCA soils from stockpiles FCA SP1 to SP3, are not considered to present an unacceptable risk to human health of future site users and are suitable for re-use as cover soils within the scheme.

3.2 East and West GUC Fill

Sampling of the placed landscape fill east of the GUC was undertaken on 15 October 2018. A total of five shallow trial pits (TP7 to TP10) were completed within the landscape fill to the north and south of the east GUC wingwalls. The trial pits were undertaken in conjunction with a similar sampling exercise of the newly constructed embankment to the west of the GUC (TP 1 to TP6 and TP12 and TP13), carried out on 15 and 19 October 2018, which focussed on testing for asbestos content within the core embankment fill. A plan showing the sampling locations in the east and west GUC fill is presented in Figure 2, within Appendix C.

3.2.1 East GUC Landscape Fill

Five samples were taken from the landscape fill to the east GUC wingwalls. Two samples were obtained from the Made Ground material, in TP7 and TP9, which had been sourced from the FCA. Three samples were taken from the material imported from the Southall Waterside development, one from TP8 on the north bank, and one each from TP10 and TP11 in the fill to the southern wingwall. The material imported from the Waterside development was noted to be a clayey orange brown sand and gravel with occasional cobbles of brick and concrete. Figure 2, within Appendix C presents the sample locations.

All the samples were taken from between 0.3m and 0.5m depth below the surface at various elevations across the fill slope, and were submitted for laboratory analysis for the capping soil suite. Throughout the excavation of the trial pits and soil sampling, there were no visual or olfactory indicators of contamination.

The results for the five samples from the east GUC trial pits (Trial Pits TP7 to TP11) were compared to both the CGL residential without plant uptake generic assessment criteria (GAC) and LQM Safe for Use Limits (S4ULs) for Public Parks for 1% soil organic matter (SOM). The results indicated the concentration benzo(a)pyrene in all five samples exceeded the CGL residential criteria but only one sample, from TP11, marginally exceeded the Public Park S4UL. In addition, the concentration of total cyanide in the sample from TP11 marginally exceeded the CGL residential GAC though the concentration of free cyanide was below the limits of detection (<0.5 mg/kg). It is noted that no S4ULs have been published for cyanide. As the concentration of total cyanide and benzo(a)pyrene only marginally exceeded the assessment criteria in one of the five samples (TP11) and the material will be capped with at least 300mm of clean, imported topsoil it is considered that the risk posed to human health from this material is minimal and the material is therefore suitable to remain in situ.

3.2.2 West GUC Landscape Fill

3.2.2.1 Central Embankment

In October 2018 asbestos containing material was visually identified on the northern slope of the central embankment between Yeading Brook and the Grand Union Canal, prior to placing cover soils. Following this, a remediation exercise was undertaken by FM Conway to inspect both the north and south slopes of the embankment and hand pick visual ACM fragments from the surface, as far as practicable. The inspection identified further ACMs on the northern slope, but none on the southern slope. Following the hand picking, samples of the embankment general fill were taken from locations TP1, TP2, TP3, TP12 and TP13, on the northern slope, and TP4, TP5 and TP6 on the southern slope of

the embankment. Asbestos was recorded only in samples from the north slope, as loose chrysotile fibres in TP1 and TP12, and as chrysotile bitumen in TP13. Asbestos quantification confirmed that two of these samples (TP1 and TP12) contained trace asbestos quantities of <0.001%. The sample from TP13 recorded 0.005% asbestos by volume at a depth of 0.3m below the surface of the embankment. Although this quantity is above the import criteria it should be noted that the embankment fill is formed of site won soils, and therefore the material is not required to meet the import criteria. Furthermore, as the asbestos is present within the general fill, it is not considered to present a risk to long term human health once the proposed 300mm of cover soils are placed across the embankment.

4. CONCLUSIONS

Based on review of the setting and the intended use of the scheme it is considered that, when assessing risks to human health, the site most closely aligns to a public parks and open space land use scenario and, as such, site won cover soils across the scheme should conform to these requirements. Imported capping soils, however, need to comply with the established criteria within the RSA, which are based on conservative residential criteria without plant uptake and, as such, are considered suitably protective.

Given the use of the site, the quality of the existing remediated soils used within the embankment and that natural soils underlie part of the scheme, cover soils meeting the human health criteria noted above, should comprise a minimum 300mm thickness of suitable soil. This thickness may need to be increased in specific locations to facilitate the HED landscape design.

Testing of site won soils including material from stockpiles within the FCA and placed landscape fill, east of the GUC, has demonstrated that the material is suitable for inclusion in the scheme. One sample from the landscape fill to the south of the east GUC embankment (from TP11) recorded marginally elevated concentrations of total cyanide and benzo(a)pyrene against public parks criteria. This material is not considered to present a risk to human health, however, as it is to be capped with a minimum 300mm imported, clean topsoil.

This technical note should be submitted to the relevant Environmental Health Officers at London Boroughs of Ealing and Hillingdon to confirm the intended cover soil measures and suitability of the existing materials to be used as cover soils at the site.

APPENDIX A

Soil Re-use and Import Criteria

Contaminant	Environmental Quality Standard Value (mg/l)	Level 3 Soil Re-use Criteria (mg/kg) [mg/l]
Total Ammonia	0.6	161 [120]
Benzene	0.01	2.22 [2.01]
Benzo(a)pyrene	0.00002	12.96 [0.004]
Cadmium	0.00025	12.05 [0.050]
Chromium VI	0.0034	23.99 [0.683]
Free Cyanide	0.001	0.085 (0.5)* [0.212]
Lead	0.0012	1,050.5 [0.241]
Mercury	0.00007	7.03 [0.0141]
Naphthalene	0.002	13.03 [0.403]
Phenol	0.0077	1.32 [1.59]

Note: * Free cyanide re-use criteria limited by the limit of detection of commercially available laboratories and has been set at 0.5mg/kg

Table 1. Maximum permissible concentrations for importing soils for general fill.

Determinant		Maximum permissible concentration ¹ (mg/kg) ²		Rationale
		6% SOM	1% SOM	
Arsenic		35	35	GAC ⁴
Beryllium		88	88	GAC ⁴
Cadmium		87	87	GAC ⁴
Chromium (III)		3,300	3,300	GAC ⁴
Chromium (VI)		6.3	6.3	GAC ⁴
Lead		310	310	C4SL ⁹
Mercury		250	250	GAC ⁴
Selenium		600	600	GAC ⁴
Copper		426 ³	426 ³	Site specific criteria protective of controlled waters ³
Nickel		402 ³	402 ³	Site specific criteria protective of controlled waters ³
Zinc		6730 ³	6730 ³	Site specific criteria protective of controlled waters ³
Vanadium		1100	1100	GAC ⁴
Benzo(a)pyrene		3.6	3.6	GAC ⁴
Benzo(a)anthracene		22	18	
Benzo(b)fluoranthene		23	23	
Benzo(k)fluoranthene		23	23	
Chrysene		230	220	
Dibenzo(a,h)anthracene		2.3	2.2	
Indeno(1,2,3-cd)pyrene		23	26	
Naphthalene		35	6.3	
TPH aliphatic ⁶	EC5-6	260	80	GAC ⁴
	EC>6-8	750	160	GAC ⁴
	EC>8-10	190	34	GAC ⁴
	EC>10-12	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>16-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
TPH aromatic ⁶	EC5-7	3.2	0.88	GAC ⁴
	EC>7-8	1,000 ⁷	870	GAC ⁴ / Hazardous waste threshold ⁷
	EC>8-10	310	55	GAC ⁴
	EC>10-12	1,000	290	GAC ⁴ / Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>16-21	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>21-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
Sum of TPH aliphatic & aromatic C5-C10		< 1,000	< 1,000	Hazardous waste thresholds ⁸ (C10+ MPC based on threshold for C25+)
Sum of TPH aliphatic & aromatic C10+		< 1,000	< 1,000	
Phenols		6,000	2,000	GAC ⁴
Cyanide		34	34	GAC ¹⁰
Asbestos		<0.001% amosite and chrysotile, no detected fibres of crocidolite		GAC ¹¹

Notes:

- These maximum permissible concentrations (MPCs) are for import of capping soils only. Refer to the main body of the report for details of the scheme re-use criteria for site-won soils.
- In mg/kg dry soil except pH and asbestos.
- Site specific assessment criteria protective of controlled waters derived using the Remedial Targets Methodology model.
- Generic Assessment Criteria generated 'in-house' based on CLEA model Version 1.06. Barium and total cyanide GACs are derived from previously endorsed human health risk assessment models and are conservative values with reference to Dutch Intervention Values.
- Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
- Speciated TPH values must not exceed GAC, or hazardous waste threshold, where indicated above. Assessment of TPH must be made against hazardous waste threshold to confirm imported soils do not classify as hazardous material.
- GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
- Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
- Published C4SL for lead (DEFRA, 2014).
- GAC for cyanide derived by Atkins based on acute exposure for a 0-6 year old child.
- CGL in house modelling based on CIRIA C733 – Asbestos in soil and Made Ground and Addison et al (1988).

Table 1. Maximum permissible concentrations for imported capping layer soils.

Determinant		Maximum permissible concentration ¹ (mg/kg) ²		Rationale
		6% SOM	1% SOM	
Arsenic		35	35	GAC ⁴
Beryllium		88	88	GAC ⁴
Boron (water soluble)		5	5	Limit for phytotoxic effect ⁵
Cadmium		87	87	GAC ⁴
Chromium (III)		3,300	3,300	GAC ⁴
Chromium (VI)		6.3	6.3	GAC ⁴
Lead		310	310	C4SL ¹⁰
Mercury		250	250	GAC ⁴
Selenium		600	600	GAC ⁴
Copper		135 ³	135 ³	BS 3882:2015 Specification for Topsoil ³
Nickel		75 ³	75 ³	BS 3882:2015 Specification for Topsoil ³
Zinc		200 ³	200 ³	BS 3882:2015 Specification for Topsoil ³
Vanadium		1100	1100	GAC ⁴
Benzo(a)pyrene		3.6	3.6	GAC ⁴
Benzo(a)anthracene		22	18	GAC ⁴
Benzo(b)fluoranthene		23	23	
Benzo(k)fluoranthene		23	23	
Chrysene		230	220	
Dibenzo(a,h)anthracene		2.3	2.2	
Indeno(1,2,3-cd)pyrene		23	26	
Naphthalene		35	6.3	
TPH aliphatic ⁶	EC5-6	260	80	GAC ⁴
	EC>6-8	750	160	GAC ⁴
	EC>8-10	190	34	GAC ⁴
	EC>10-12	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>16-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
TPH aromatic ⁶	EC5-7	3.2	0.88	GAC ⁴
	EC>7-8	1,000 ⁷	870	GAC ⁴ / Hazardous waste threshold ⁷
	EC>8-10	310	55	GAC ⁴
	EC>10-12	1,000	290	GAC ⁴ / Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>16-21	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>21-35	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
Sum of TPH aliphatic & aromatic C5-C10		< 1,000	< 1,000	Hazardous waste thresholds ⁸ (C10+ MPC based on threshold for C25+)
Sum of TPH aliphatic & aromatic C10+		< 1,000	< 1,000	
pH		5-10	5-10	BS 3882:2015 Specification for Topsoil ³
Phenols		6,000	2,000	GAC ⁴
Cyanide		34	34	GAC ¹¹
Asbestos		No fibres detected ⁹		

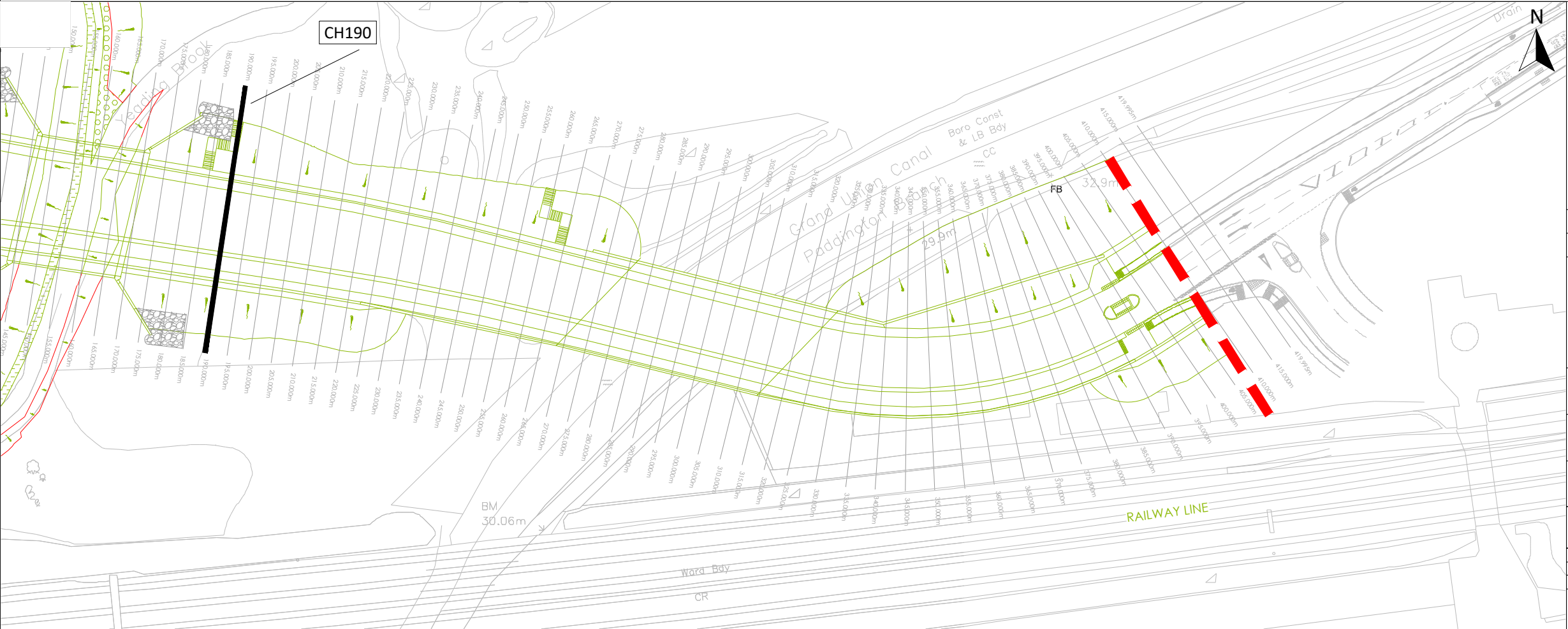
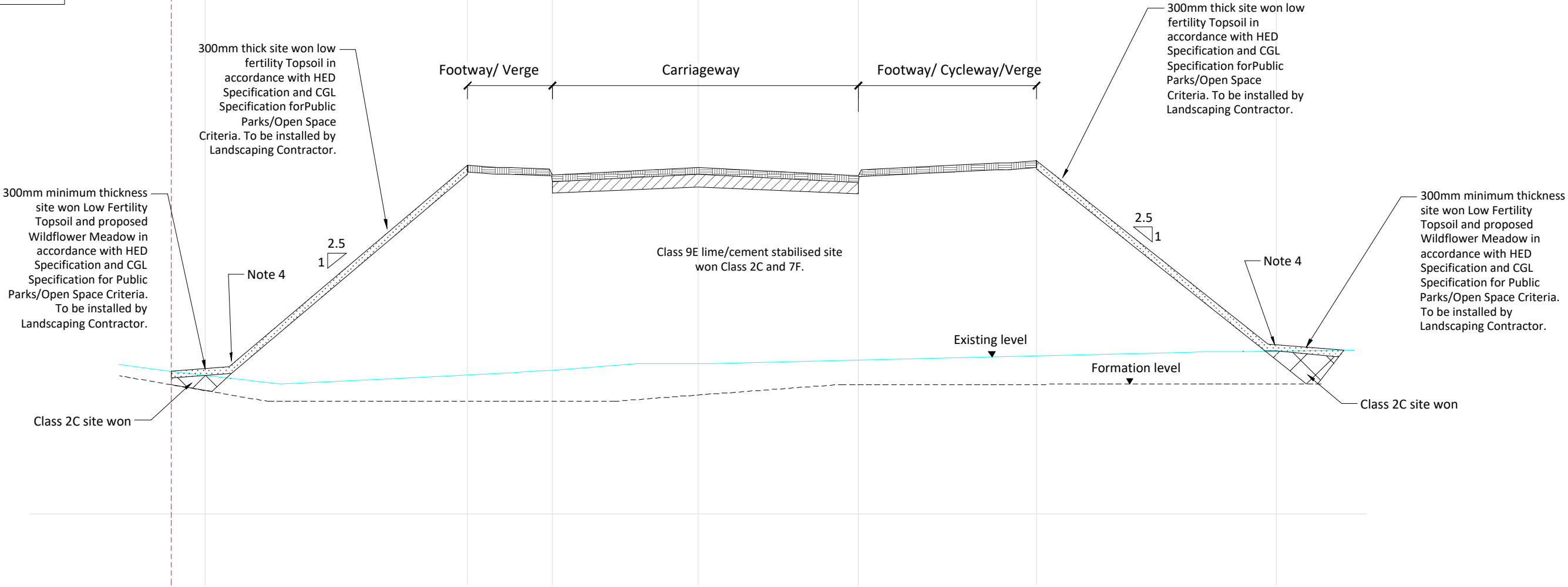
Notes:

- These maximum permissible concentrations (MPCs) are for import of capping soils only. Refer to the main body of the report for details of the scheme re-use criteria for site-won soils.
- In mg/kg dry soil except pH and asbestos.
- British Standard BS3882:2015 Specification for Topsoil and requirements for use. Table 1. Values taken for pH 6-7.
- Generic Assessment Criteria generated 'in-house' based on CLEA model Version 1.06. Barium and total cyanide GACs are derived from previously endorsed human health risk assessment models and are conservative values with reference to Dutch Intervention Values.
- Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
- Speciated TPH values must not exceed GAC, or hazardous waste threshold, where indicated above. Assessment of TPH must be made against hazardous waste threshold to confirm imported soils do not classify as hazardous material.
- GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
- Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
- Laboratory screen by microscopy may be required subject to source of material.
- Published C4SL for lead (DEFRA, 2014).
- GAC for cyanide derived by Atkins based on acute exposure for a 0-6 year old child.

APPENDIX B

Landscape Soil Cross Sections at Chainages 190 & 370

Section - Chainage 190



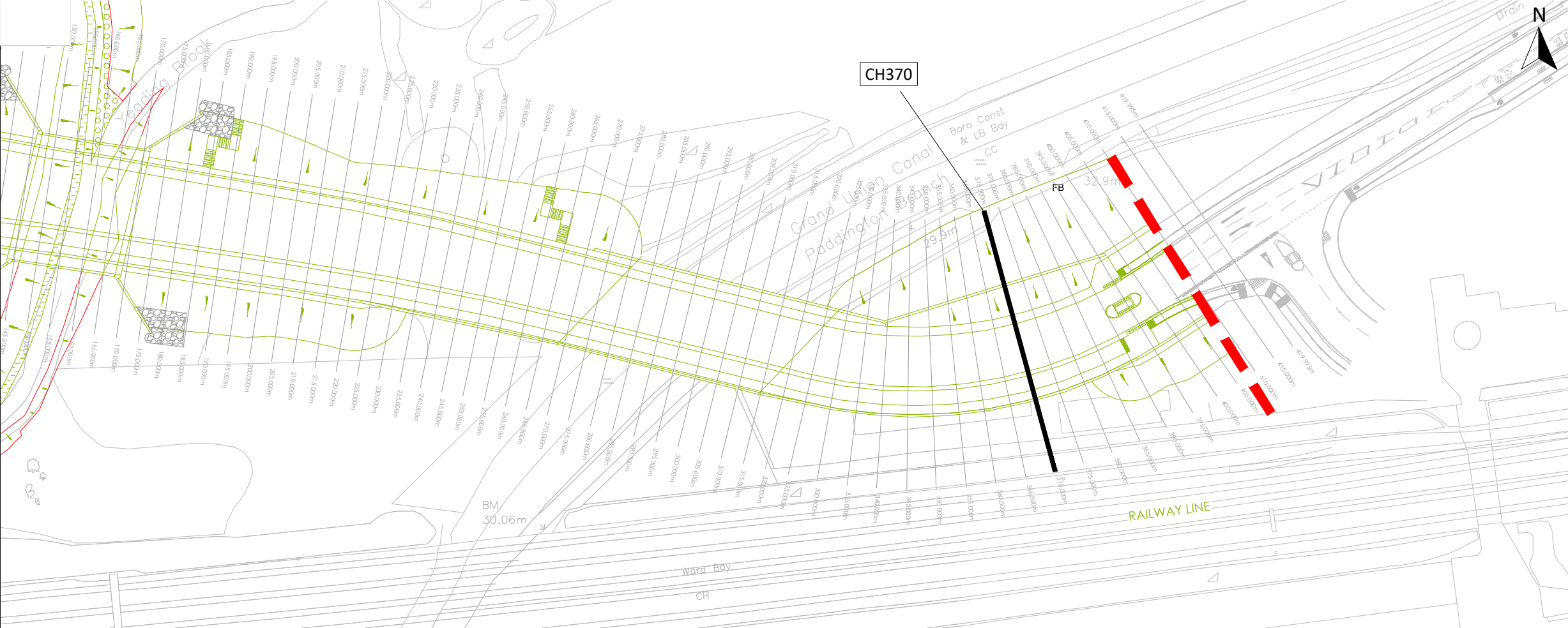
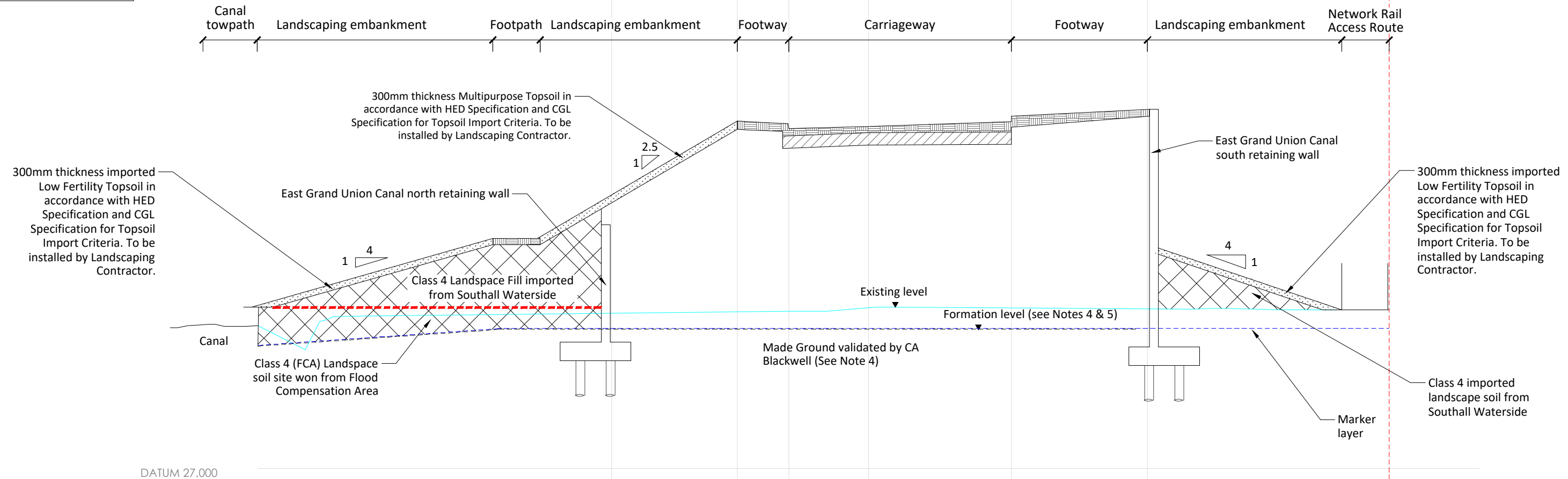
- Notes**
1. Do not scale from this drawing.
 2. All dimensions in mm unless otherwise stated.
 3. Levels shown are based upon CGL Drawing A720-E05-IW-CGL-EW-DR-0116 Revision C3.
 4. Finished ground level to fall at 1v:50h minimum from embankment toe.



Project		Western Access	
Client		Clark Smith Partnership	
Drawing title		Landscape Soil - Chainage 190	
Scale(s)		Job No. CG/28308	
NTS			
Drawn	TSB	10/01/19	Dwg No. CGL-28308-DR-002
Checked	ALC	10/01/19	Rev. 0
Approved	RNS	10/01/19	

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Section - Chainage 370



- Notes**
1. Do not scale from this drawing.
 2. All dimensions in mm unless otherwise stated.
 3. Levels shown are based upon CGL Drawing A720-E05-IW-CGL-EW-DR-0116 Revision C3.
 4. Material beneath formation validated by CA Blackwell (June 2017) Validation Report Area 2. C897 Southall Waterside Remediation. Ref: 1024.A.C897.VAL A721-E14-P2-CAB-REM-RP-003 P1
 5. Marker layer installed by Blackwell at formation level.
 6. Finished ground level to fall at 1v:50h from embankment toe.



Project **Western Access**

Client **Clark Smith Partnership**

Drawing title **Landscape Soil - Chainage 370**

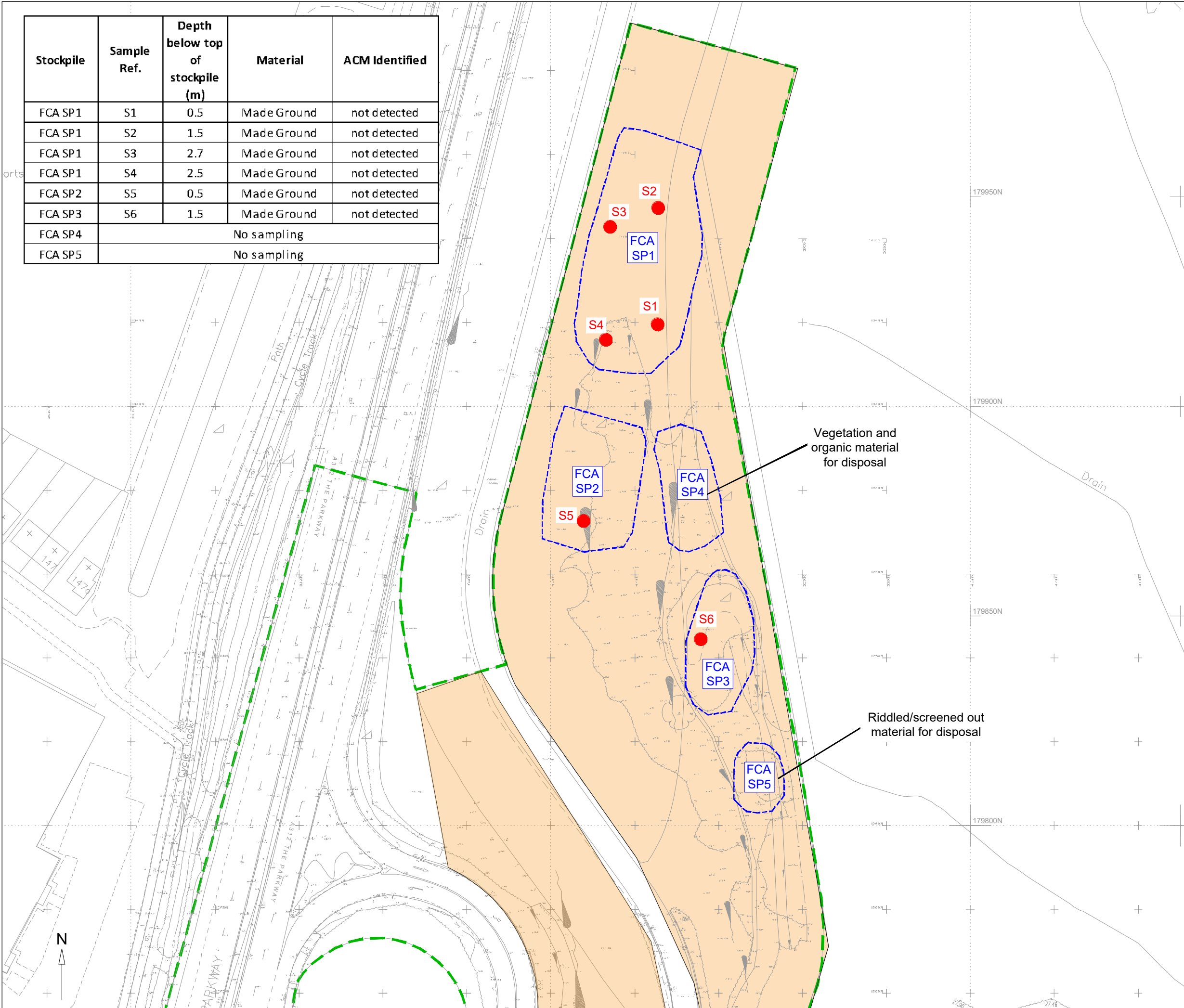
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Drawn	TSB	10/01/19	Dwg No.
Checked	ALC	10/01/19	CGL-28308-DR-001
Approved	RNS	10/01/19	Rev.
			0

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APPENDIX C

Sample Location Plans

Stockpile	Sample Ref.	Depth below top of stockpile (m)	Material	ACM Identified
FCA SP1	S1	0.5	Made Ground	not detected
FCA SP1	S2	1.5	Made Ground	not detected
FCA SP1	S3	2.7	Made Ground	not detected
FCA SP1	S4	2.5	Made Ground	not detected
FCA SP2	S5	0.5	Made Ground	not detected
FCA SP3	S6	1.5	Made Ground	not detected
FCA SP4	No sampling			
FCA SP5	No sampling			



KEY

Area 1 - River Crane incorporating Western Embankment & Flood Alleviation Zone

Approximate location of stockpiles

Approximate location of stockpile sample

- Notes.
1.

2.

3.

4.
- Samples taken on 19/10/18

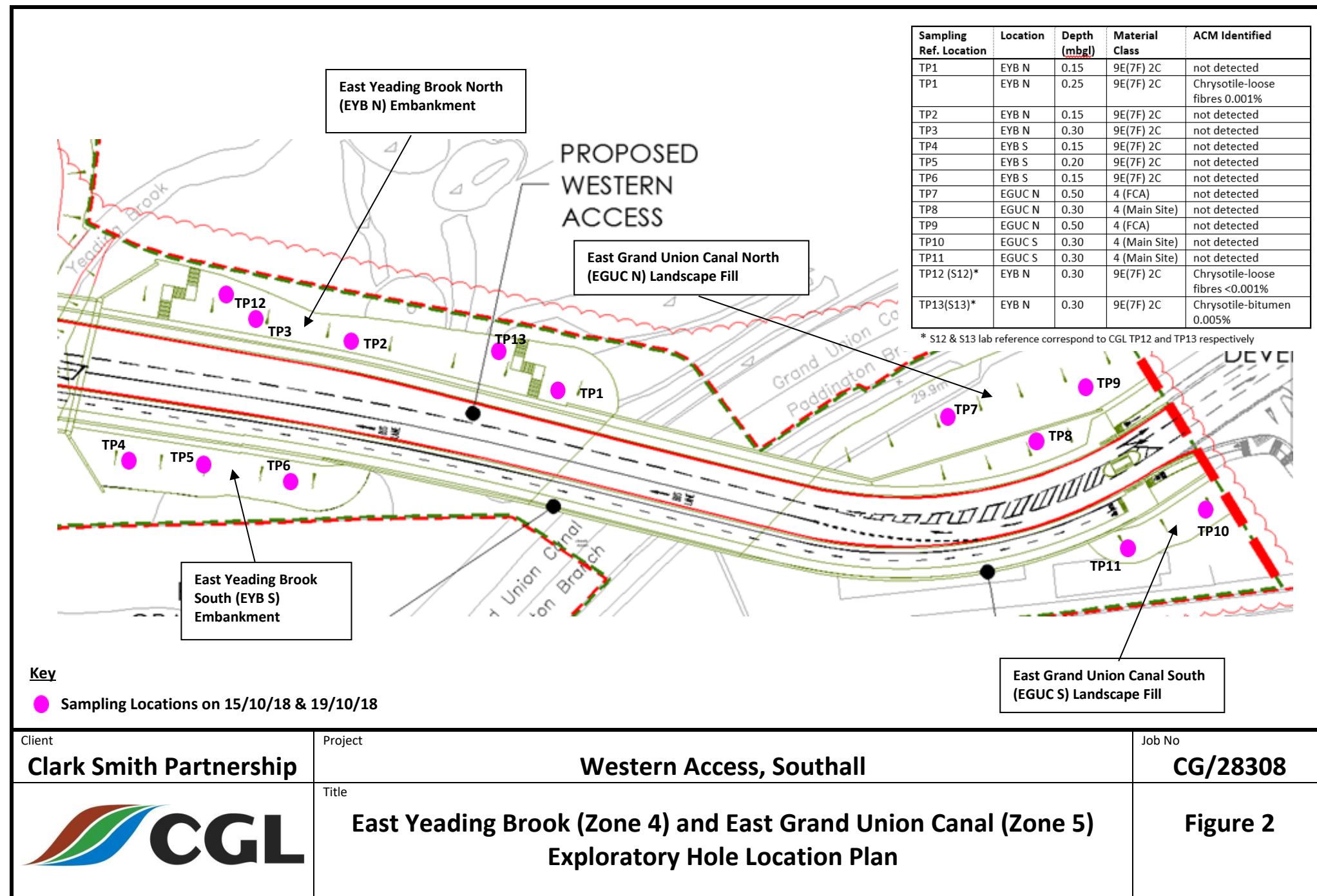
FCA = Flood Compensation Area

SP1 - 5 = Stockpiles 1 - 5

Drawing produced from: A724-E05-PA-VEC-HW-DR-0001

0	28/11/18	
Rev	Date	Comments
 Card Geotechnics Ltd 4 Godalming Business Centre Woolsack Way Godalming Surrey GU7 1XW T: 01483 310600		
Project Southall Western Access		
Client Clark Smith Partnership		
Drawing title Figure 1 - Flood Compensation Area (FCA) Layout		
Scale(s) NTS		Job No. CG/28308
Drawn TSB 03/12/18	Dwg No. CG/28308-DR-003	Rev. 0
Checked ALC 10/01/19		
Approved RNS 10/01/19		

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APPENDIX D

Photo Sheets

PHOTO SHEET 1

								
Photo 1. East GUC (west YB) north embankment looking west – Class 2C fill			Photo 2. TP2 in East GUC (west YB) north embankment looking west – Class 2C fill			Photo 3. East GUC (west YB) south embankment – Class 2C fill		
								
Photo 4 TP 5 in East GUC (west YB) south embankment – Class 2C fill			Photo 5. Flood Compensation Area topsoil stockpile SP1 for reuse on west GUC/East YB embankment			Photo 6. Flood Compensation Area topsoil stockpile SP2 for reuse on west GUC/east YB embankment		
Client Clark Smith Partnership		Project Western Access Southall				Job No CG/28308		
		Title West GUC (East YB) Embankment and FCA Landscape Cover Stockpiles				Appendix D		

PHOTO SHEET 2



Photo 7. North bank looking west- landscape fill



Photo 8. TP7 North bank base layer sourced from FCA Made Ground



Photo 9. TP 8 North bank upper layer imported from Southall Waterside development



Photo 10 South bank looking east- landscape fill



Photo 11. South bank - imported from Southall Waterside development



Photo 12. TP 11 South bank - imported from Southall Waterside development

Client Clark Smith Partnership	Project Western Access Southall	Job No CG/28308
	Title East Grand Union Canal Landscape Fill	Appendix D

APPENDIX E

Laboratory Results

**Anne Curtis**

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Analytical Report Number : 18-14692

Project / Site name:	Southall	Samples received on:	17/10/2018
Your job number:	CG-28303	Samples instructed on:	17/10/2018
Your order number:		Analysis completed by:	26/10/2018
Report Issue Number:	1	Report issued on:	26/10/2018
Samples Analysed:	7 bulk samples - 12 soil samples		

Signed

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number	1070329	1070330	1070331	1070332	1070333
Sample Reference	EYB N	EYB N	EYB N	EYB N	EYB S
Sample Number	TP1	TP2	TP1	TP3	TP4
Depth (m)	0.15	0.15	0.25	0.30	0.15
Date Sampled	15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	-	-
Moisture Content	%	N/A	NONE	-	-
Total mass of sample received	kg	0.001	NONE	-	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	0.001	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	0.001	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	-
Total Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Free Cyanide (low level)	mg/kg	0.5	ISO 17025	-	-	-	-	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	-	-	-
Ammoniacal Nitrogen as N	mg/kg	0.5	MCERTS	-	-	-	-	-
Organic Matter	%	0.1	MCERTS	-	-	-	-	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	-	-	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-	-
Coronene	mg/kg	0.05	NONE	-	-	-	-	-

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	-	-	-	-	-
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Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number	1070329	1070330	1070331	1070332	1070333
Sample Reference	EYB N	EYB N	EYB N	EYB N	EYB S
Sample Number	TP1	TP2	TP1	TP3	TP4
Depth (m)	0.15	0.15	0.25	0.30	0.15
Date Sampled	15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	-	-	-	-	-
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	-	-	-
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	-	-	-
Chromium (III)	mg/kg	1	NONE	-	-	-	-	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	-	-	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-	-

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	ug/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	ug/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	ug/kg	1	MCERTS	-	-	-	-	-
o-xylene	ug/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number	1070334	1070335	1070336	1070337	1070338
Sample Reference	EYB S	EYB S	EGUC N	EGUC N	EGUC N
Sample Number	TP5	TP6	TP7	TP8	TP9
Depth (m)	0.20	0.15	0.50	0.30	0.50
Date Sampled	15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	-	-
Moisture Content	%	N/A	NONE	-	-
Total mass of sample received	kg	0.001	NONE	-	-

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	8.7	11.2	9.3
Total Cyanide	mg/kg	1	MCERTS	-	-	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	-	-	-	-	-
Free Cyanide (low level)	mg/kg	0.5	ISO 17025	-	-	< 0.5	< 0.5	< 0.5
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-	-	1800	3000	2200
Ammoniacal Nitrogen as N	mg/kg	0.5	MCERTS	-	-	< 0.5	0.6	< 0.5
Organic Matter	%	0.1	MCERTS	-	-	2.2	4.6	2.9

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	0.30	0.40	0.20
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.43	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	0.72	0.95	0.42
Fluorene	mg/kg	0.05	MCERTS	-	-	0.78	1.1	0.45
Phenanthrene	mg/kg	0.05	MCERTS	-	-	7.9	9.3	5.2
Anthracene	mg/kg	0.05	MCERTS	-	-	2.0	2.4	1.3
Fluoranthene	mg/kg	0.05	MCERTS	-	-	16	20	14
Pyrene	mg/kg	0.05	MCERTS	-	-	13	18	12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	7.3	7.9	6.5
Chrysene	mg/kg	0.05	MCERTS	-	-	5.6	8.1	6.0
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	8.0	9.5	7.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	3.6	4.6	4.0
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	7.7	8.7	7.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	3.6	3.8	3.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	0.58	0.85	0.84
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	4.3	4.6	4.3
Coronene	mg/kg	0.05	NONE	-	-	1.1	< 0.05	1.8

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	-	-	82	100	75
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Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number				1070334	1070335	1070336	1070337	1070338
Sample Reference				EYB S	EYB S	EGUC N	EGUC N	EGUC N
Sample Number				TP5	TP6	TP7	TP8	TP9
Depth (m)				0.20	0.15	0.50	0.30	0.50
Date Sampled				15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	-	-	5.7	2.0	4.4
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	-	13	12	13
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	160	110	210
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	0.86	0.31	0.91
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	2.4	1.5	3.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	-	0.7	0.4	0.9
Chromium (hexavalent)	mg/kg	1.2	MCERTS	-	-	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	-	-	34	28	36
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	34	29	37
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	-	85	54	100
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	-	120	52	150
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	-	0.9	< 0.3	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	-	29	19	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	50	45	48
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	-	240	130	310

Monoaromatics

Benzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Toluene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
p & m-xylene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
o-xylene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	5.2	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	5.0	31	5.6
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	13	67	20
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	120	450	130
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	140	550	150

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	2.8	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	13	40	17
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	93	210	130
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	210	1100	360
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	320	1400	510

Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number				1070339	1070340			
Sample Reference				EGUC S	EGUC S			
Sample Number				TP10	TP11			
Depth (m)				0.30	0.30			
Date Sampled				15/10/2018	15/10/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	8.4	9.8			
Total mass of sample received	kg	0.001	NONE	1.2	1.3			

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-			
Asbestos Quantification Total	%	0.001	ISO 17025	-	-			

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.7	9.5			
Total Cyanide	mg/kg	1	MCERTS	32	38			
Free Cyanide	mg/kg	1	MCERTS	-	< 1			
Free Cyanide (low level)	mg/kg	0.5	ISO 17025	< 0.5	< 0.5			
Total Sulphate as SO ₄	mg/kg	50	MCERTS	6400	6600			
Ammoniacal Nitrogen as N	mg/kg	0.5	MCERTS	1.9	2.3			
Organic Matter	%	0.1	MCERTS	3.2	3.2			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	2.4	3.6			
Acenaphthylene	mg/kg	0.05	MCERTS	1.7	2.3			
Acenaphthene	mg/kg	0.05	MCERTS	1.8	2.0			
Fluorene	mg/kg	0.05	MCERTS	2.5	3.5			
Phenanthrene	mg/kg	0.05	MCERTS	12	15			
Anthracene	mg/kg	0.05	MCERTS	4.2	5.2			
Fluoranthene	mg/kg	0.05	MCERTS	24	30			
Pyrene	mg/kg	0.05	MCERTS	25	30			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	11	13			
Chrysene	mg/kg	0.05	MCERTS	8.7	11			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	11	15			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	5.4	5.6			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	10	13			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.5	5.6			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.97	1.3			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.3	6.6			
Coronene	mg/kg	0.05	NONE	2.3	1.1			

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	130	160			
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Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number				1070339	1070340			
Sample Reference				EGUC S	EGUC S			
Sample Number				TP10	TP11			
Depth (m)				0.30	0.30			
Date Sampled				15/10/2018	15/10/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.9	3.2			
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	15	13			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	110			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.52	0.54			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	1.7			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (III)	mg/kg	1	NONE	37	35			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	37	35			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	49	38			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	80	91			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.4	2.1			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	21			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	43			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	83	89			

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	1.4	4.6			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	29	45			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	60	94			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	270	280			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	360	420			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	8.6	8.1			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	96			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	310	290			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	850	710			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	1200	1100			



Analytical Report Number: 18-14692
Project / Site name: Southall
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1070331	EYB N	0.25	170	Loose Fibres	Chrysotile	0.001	0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.



Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number				1070341	1070342	1070343	1070344	1070345
Sample Reference				EYB N	EYB N	EYB N	EYB N	EYB N
Sample Number				S1	S2	S3	S4	S5
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				15/10/2018	15/10/2018	15/10/2018	15/10/2018	15/10/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Bulk Analysis)	Units	Limit of detection	Accreditation Status					
Asbestos Identification Name	Type	N/A	ISO 17025	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected



Analytical Report Number: 18-14692

Project / Site name: Southall

Lab Sample Number				1070346	1070347			
Sample Reference				EYB N	EYB N			
Sample Number				S6	S7			
Depth (m)				None Supplied	None Supplied			
Date Sampled				15/10/2018	15/10/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Bulk Analysis)				Units	Limit of detection	Accreditation Status		
Asbestos Identification Name	Type	N/A	ISO 17025	No Asbestos Detected	No Asbestos Detected			



Analytical Report Number : 18-14692

Project / Site name: Southall

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1070329	EYB N	TP1	0.15	-
1070330	EYB N	TP2	0.15	-
1070331	EYB N	TP1	0.25	-
1070332	EYB N	TP3	0.30	-
1070333	EYB S	TP4	0.15	-
1070334	EYB S	TP5	0.20	-
1070335	EYB S	TP6	0.15	-
1070336	EGUC N	TP7	0.50	Brown clay and sand with gravel.
1070337	EGUC N	TP8	0.30	Brown loam and sand with gravel.
1070338	EGUC N	TP9	0.50	Brown loam and clay with gravel and brick.
1070339	EGUC S	TP10	0.30	Brown loam and sand with gravel.
1070340	EGUC S	TP11	0.30	Brown loam and sand with gravel.

Analytical Report Number : 18-14692

Project / Site name: Southall

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method,10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in Bulks	Asbestos Identification in bulk material with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	W	ISO 17025
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Free cyanide (Low level) in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests ^{***}	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE

Iss No 18-14692-1 Southall CG-28303

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 18-14692

Project / Site name: Southall

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

**Anne Curtis**

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Analytical Report Number : 18-15303

Project / Site name:	Southall	Samples received on:	22/10/2018
Your job number:	CG-28308	Samples instructed on:	22/10/2018
Your order number:		Analysis completed by:	31/10/2018
Report Issue Number:	1	Report issued on:	31/10/2018
Samples Analysed:	8 soil samples		

Signed

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-15303

Project / Site name: Southall

Lab Sample Number				1073402	1073403	1073404	1073405	1073406
Sample Reference				FCA SP1	FCA SP1	FCA SP1	FCA SP1	FCA SP2
Sample Number				S1	S2	S3	S4	S5
Depth (m)				0.50	1.50	2.70	2.50	0.50
Date Sampled				19/10/2018	19/10/2018	19/10/2018	19/10/2018	19/10/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	17	17	15	12
Total mass of sample received	kg	0.001	NONE	1.1	1.3	1.2	1.2	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.8	7.6	7.4	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide (low level)	mg/kg	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Total Sulphate as SO ₄	mg/kg	50	MCERTS	620	710	650	620	1300
Ammoniacal Nitrogen as N	mg/kg	0.5	MCERTS	< 0.5	44	31	24	< 0.5
Organic Matter	%	0.1	MCERTS	3.0	4.9	4.6	4.3	3.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.29
Acenaphthene	mg/kg	0.05	MCERTS	0.25	0.33	0.48	0.25	0.45
Fluorene	mg/kg	0.05	MCERTS	0.28	0.33	0.64	0.31	0.53
Phenanthrene	mg/kg	0.05	MCERTS	3.1	4.1	6.6	3.5	5.7
Anthracene	mg/kg	0.05	MCERTS	0.63	0.78	1.4	0.72	1.4
Fluoranthene	mg/kg	0.05	MCERTS	6.1	9.0	13	6.7	15
Pyrene	mg/kg	0.05	MCERTS	5.1	7.3	10	5.2	12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.0	4.2	6.1	3.2	7.5
Chrysene	mg/kg	0.05	MCERTS	3.1	4.3	5.5	2.9	6.5
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	4.2	5.9	7.1	3.8	9.3
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	2.1	3.6	1.8	4.5
Benzo(a)pyrene	mg/kg	0.05	MCERTS	3.5	4.7	6.4	3.3	8.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.1	2.5	3.3	1.8	4.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.53	0.76	0.93	0.49	1.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.1	2.6	3.8	1.8	5.2
Coronene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	0.81

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	35	49	69	36	83
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Analytical Report Number: 18-15303

Project / Site name: Southall

Lab Sample Number	1073402	1073403	1073404	1073405	1073406
Sample Reference	FCA SP1	FCA SP1	FCA SP1	FCA SP1	FCA SP2
Sample Number	S1	S2	S3	S4	S5
Depth (m)	0.50	1.50	2.70	2.50	0.50
Date Sampled	19/10/2018	19/10/2018	19/10/2018	19/10/2018	19/10/2018
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	3.7	3.4	4.6	3.4	5.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	11	9.1	12	13
Barium (aqua regia extractable)	mg/kg	1	MCERTS	130	190	220	190	190
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.60	0.68	0.70	0.69	0.67
Boron (water soluble)	mg/kg	0.2	MCERTS	1.8	2.1	1.7	1.9	2.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.8	0.9	0.7	0.9
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	23	25	24	26	24
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24	25	24	26	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	51	95	120	110	80
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	140	170	160	250
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	1.0	0.8	1.0	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29	21	27	26	31
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.8	2.0	< 1.0	2.9	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	35	28	36	39
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	220	260	200	290

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	13
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	12	11	9.3	150
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	12	11	< 10	160

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	3.5	5.1	3.8	14
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	15	30	50	30	58
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	20	53	95	51	110
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	36	86	150	84	180

Analytical Report Number: 18-15303

Project / Site name: Southall

Lab Sample Number				1073407	1073408	1073409		
Sample Reference				FCA SP3	EYB N	EYB N		
Sample Number				S6	S12	S13		
Depth (m)				1.50	0.30	0.30		
Date Sampled				19/10/2018	19/10/2018	19/10/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	-	-		
Moisture Content	%	N/A	NONE	14	-	-		
Total mass of sample received	kg	0.001	NONE	1.2	-	-		

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	Chrysotile		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Detected		
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	0.005		
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	0.005		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.3	-	-		
Total Cyanide	mg/kg	1	MCERTS	< 1	-	-		
Free Cyanide (low level)	mg/kg	0.5	ISO 17025	< 0.5	-	-		
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1800	-	-		
Ammoniacal Nitrogen as N	mg/kg	0.5	MCERTS	< 0.5	-	-		
Organic Matter	%	0.1	MCERTS	3.0	-	-		

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-		
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.21	-	-		
Acenaphthylene	mg/kg	0.05	MCERTS	0.40	-	-		
Acenaphthene	mg/kg	0.05	MCERTS	0.33	-	-		
Fluorene	mg/kg	0.05	MCERTS	0.42	-	-		
Phenanthrene	mg/kg	0.05	MCERTS	3.9	-	-		
Anthracene	mg/kg	0.05	MCERTS	0.99	-	-		
Fluoranthene	mg/kg	0.05	MCERTS	9.0	-	-		
Pyrene	mg/kg	0.05	MCERTS	8.2	-	-		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	5.0	-	-		
Chrysene	mg/kg	0.05	MCERTS	4.4	-	-		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.9	-	-		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.0	-	-		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.3	-	-		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.8	-	-		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.83	-	-		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.4	-	-		
Coronene	mg/kg	0.05	NONE	0.85	-	-		

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	55	-	-		
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Lab Sample Number				1073407	1073408	1073409		
Sample Reference				FCA SP3	EYB N	EYB N		
Sample Number				S6	S12 (TP12)	S13 (TP13)		
Depth (m)				1.50	0.30	0.30		
Date Sampled				19/10/2018	19/10/2018	19/10/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Heavy Metals / Metalloids								
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.4	-	-		
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	-	-		
Barium (aqua regia extractable)	mg/kg	1	MCERTS	110	-	-		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.69	-	-		
Boron (water soluble)	mg/kg	0.2	MCERTS	1.9	-	-		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	-	-		
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	-	-		
Chromium (III)	mg/kg	1	NONE	32	-	-		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33	-	-		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	56	-	-		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	74	-	-		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.7	-	-		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	-	-		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	-		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	46	-	-		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	-	-		

Monoaromatics

Benzene	ug/kg	1	MCERTS	< 1.0	-	-		
Toluene	ug/kg	1	MCERTS	< 1.0	-	-		
Ethylbenzene	ug/kg	1	MCERTS	< 1.0	-	-		
p & m-xylene	ug/kg	1	MCERTS	< 1.0	-	-		
o-xylene	ug/kg	1	MCERTS	< 1.0	-	-		
MTBE (Methyl Tertiary Butyl Ether)	ug/kg	1	MCERTS	< 1.0	-	-		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	11	-	-		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	21	-	-		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	150	-	-		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	180	-	-		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.3	-	-		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	12	-	-		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	47	-	-		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	200	-	-		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	260	-	-		



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Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1073408	EYB N	0.30	139	Loose Fibrous Debris	Chrysotile	< 0.001	< 0.001
1073409	EYB N	0.30	139	Bitumen	Chrysotile	0.005	0.005

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.



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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1073402	FCA SP1	S1	0.50	Brown loam and clay with gravel and vegetation.
1073403	FCA SP1	S2	1.50	Brown loam and clay with gravel and vegetation.
1073404	FCA SP1	S3	2.70	Brown loam and clay with gravel and vegetation.
1073405	FCA SP1	S4	2.50	Brown loam and clay with gravel and vegetation.
1073406	FCA SP2	S5	0.50	Brown loam and clay with gravel and vegetation.
1073407	FCA SP3	S6	1.50	Brown clay and sand with gravel and rubble.
1073408	EYB N	S12	0.30	-
1073409	EYB N	S13	0.30	-

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Ammoniacal Nitrogen as N in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the discrete analyser (colorimetric) salicylate/nitroprusside method,10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Free cyanide (Low level) in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS

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Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

APPENDIX F

Data Assessment Summary

Appendix F: East GUC data assessment summary – potential soil risks to human health

Determinand	CGL Residential Without Plant Uptake GAC (1% SOM)	Note on SSL ¹	Measured range (mg/kg)	S4UL ² Public Park GAC (1% SOM)	Number of Exceedances (Location)
Antimony	*	-	2.0 to 5.7	NA ³	0 of 5
Arsenic	35	-	12 to 15	NA	0 of 5
Barium	*	-	110 to 210	NA	0 of 5
Beryllium	88	-	0.31 to 0.91	NA	0 of 5
Boron (water soluble)	*	-	1.5 to 3.1	NA	0 of 5
Cadmium	87	-	<0.2 to 0.9	NA	0 of 5
Chromium (III)	3,300	-	28 to 37	NA	0 of 5
Chromium (VI)	6.3	-	<1.2	NA	0 of 5
Copper	9,400	-	38 to 100	NA	0 of 5
Lead ⁴	310	-	52 to 150	NA	0 of 5
Mercury (inorganic)	250	-	<0.3 to 2.1	NA	0 of 5
Nickel	190	-	19 to 29	NA	0 of 5
Selenium	600	-	<1.0	NA	0 of 5
Vanadium	1,100	-	42 to 50	NA	0 of 5
Zinc	20,000	-	83 to 310	NA	0 of 5
Benzene	0.88	-	<0.001	NA	0 of 5
Toluene	870	(c)	<0.001	NA	0 of 5
Ethylbenzene	520	(c)	<0.001	NA	0 of 5
m-xylene ⁵	220	-	<0.001	NA	0 of 5
o-xylene	230	-	<0.001	NA	0 of 5
p-xylene	210	-	<0.001	NA	0 of 5
Phenol ⁶	2,000	-	<0.001	NA	0 of 5
Cyanide⁷	34	-	<1 to 38⁸ [<0.5]⁹	_¹⁰	1 of 5 (TP11)
TPH aliphatic EC5-6	80	-	<0.001	95,000	0 of 5
TPH aliphatic EC>6-8	160	-	<0.001	150,000	0 of 5
TPH aliphatic EC>8-10	34	-	<0.001	14,000	0 of 5
TPH aliphatic EC>10-12	5,800	(b)	<1.0 to 5.2	21,000	0 of 5
TPH aliphatic EC>12-16	6,400	(b)	5.0 to 45	25,000	0 of 5
TPH aliphatic EC>16-35	130,000 [8.6]	(a)	133 to 517	450,000	0 of 5
TPH aromatic EC5-7	0.88	-	<0.001	76,000	0 of 5
TPH aromatic EC>7-8	870	-	<0.001	87,000	0 of 5
TPH aromatic EC>8-10	55	-	<0.001	7,200	0 of 5
TPH aromatic EC>10-12	290	-	<1.0 to 8.6	9,200	0 of 5
TPH aromatic EC>12-16	2,500	(b)	<2.0 to 96	10,000	0 of 5
TPH aromatic EC>16-21	1,900 [60]	(a)	93 to 310	7,600	0 of 5
TPH aromatic EC>21-35	1,900 [4.8]	(a)	210 to 1,100	7,800	0 of 5
Naphthalene	6.3	-	0.2 to 3.6	6,200	0 of 5
Benzo(a)pyrene	3.6 [0.9]	(c)	7.5 to 13	11	1 of 5 (TP11)
Acenaphthylene	5,800	(c)	<0.05 to 2.3	29,000	0 of 5
Acenaphthene	2,500	(b)	0.42 to 2.0	29,000	0 of 5
Fluorene	3,000	(b)	0.45 to 3.5	20,000	0 of 5
Phenanthrene	1,300 [17]	(a)	5.2 to 15	6,200	0 of 5
Anthracene	32,000	(b)	1.3 to 5.2	150,000	0 of 5
Fluoranthene	4,900 [19]	(a)	14 to 30	6,300	0 of 5
Pyrene	3,700 [2.2]	(a)	12 to 30	15,000	0 of 5
Benzo(a)anthracene	18 [1.7]	(a)	6.5 to 13	49	0 of 5
Chrysene	220 [0.4]	(a)	5.6 to 11	93	0 of 5
Benzo(b)fluoranthene	23 [1.2]	(a)	7.5 to 15	13	0 of 5

¹ – = green; (a) = amber i.e. GAC set to model output, [SSL provided in square brackets]; (b) = red i.e. SSL exceeded & considered to affect interpretation. GAC calculated in accordance with CLEA Software Handbook; (c) = GAC limited to SSL.

² Land Quality Management, (2015). *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham.

³ Not applicable as below CGL residential without plant uptake GAC and therefore not assess further

⁴ Published C4SL.

⁵ Concentrations for total xylenes should be compared against m-xylene for fresh spills and to o-xylene for all other cases.

⁶ GAC relates to phenol (C₆H₅OH) only.

⁷ Assessment criteria for cyanide derived by Atkins based on acute exposure for a 0-6 year old child.

⁸ Concentration of total cyanide

⁹ Concentration of free cyanide

¹⁰ No S4UL values published for cyanide

Determinand	CGL Residential Without Plant Uptake GAC (1% SOM)	Note on SSL ¹	Measured range (mg/kg)	S4UL ² Public Park GAC (1% SOM)	Number of Exceedances (Location)
Benzo(k)fluoranthene	23 [0.7]	(a)	3.6 to 5.6	370	0 of 5
Indeno(1,2,3-c,d)pyrene	26 [0.06]	(a)	3.5 to 5.6	150	0 of 5
Dibenzo(a,h)anthracene	2.2 [0.004]	(a)	0.58 to 1.30	1.10	0 of 5
Benzo(g,h,i)perylene	230 [0.02]	(a)	4.3 to 6.6	1,400	0 of 5