Pell Frischmann

Hammersmith Temporary Pedestrian and Cycle Bridge

Ground Investigation Report

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1 Introduction

1.1 Scope and Objective of the Report

This Ground Investigation Report (GIR) has been prepared for the Hammersmith Bridge refurbishment works, temporary footbridge.

The scope of works and content of the GIR have been defined in accordance with HD22/08 'Managing Geotechnical Risk' (2008). This guidance has since been superseded by CD622 'Managing Geotechnical Risk' (2019), which will be referred to where appropriate. The objectives of the GIR are as follows:

- "Describe the findings of the ground investigation works";
- "Define appropriate soil parameters for design"

An assessment of the geo-environmental risks posed by the ground conditions is not a part of the scope of this report, and is covered separately in the Phase II Land Contamination Risk Assessment Report, reference 102963-PEF-BAS-ZZZ-REP-GE-00003.

1.2 Description of the Project

Pell Frischmann Consultants Ltd (PFC) has been appointed by Transport for London (TfL) to undertake detailed design to refurbish the existing Hammersmith Bridge which carries the A306 Hammersmith Bridge Road across the River Thames. The suspension bridge was constructed in the 1880s and due to concerns about its condition, the maximum gross vehicle weight is restricted, the refurbishment project involves upgrading the bridge load carrying capacity. While the refurbishment works are being undertaken, a temporary footbridge is proposed adjacent to the existing bridge to carry pedestrian traffic across the Thames River, and the focus of this report will be in relation to interpretation of geotechnical conditions associated with the temporary footbridge.

1.3 Geotechnical Category of the Project

At this stage, it is considered that proposals for the scheme detailed above should be classified as Geotechnical Category 2: *"Projects which include conventional types of geotechnical structures, earthworks and activities with no exceptional geotechnical risks or unusual, difficult ground conditions"*.

2 Existing Information

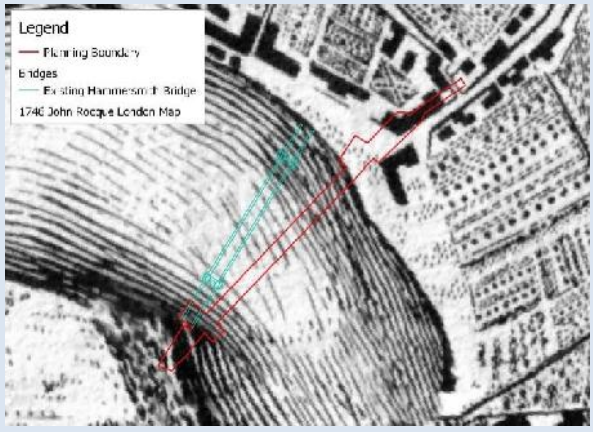
2.1 Desk Studies

Two reports were issued by Mott MacDonald in October 2018, a general desk study report and a qualitative assessment of foundations for the Hammersmith bridge refurbishment scheme. A Phase I Land Contamination Risk Assessment (ref: 102963-PEF-BAS-ZZZ-REP-EN-00010) was undertaken by Pell Frischmann in July 2020. A geotechnical and geo-environmental desk study was initially produced by Pell Frischmann (PFC) in October 2019 for the Hammersmith Bridge scheme as report reference 102963-PEF-BAS-ZZZ-REP-GE-00001 P03 and was subsequently revised in November 2019 and January 2020 to include additional historic borehole information. No significant changes have been made to the project since the desk studies were undertaken.

2.2 Topographical Maps (Historical and Recent)

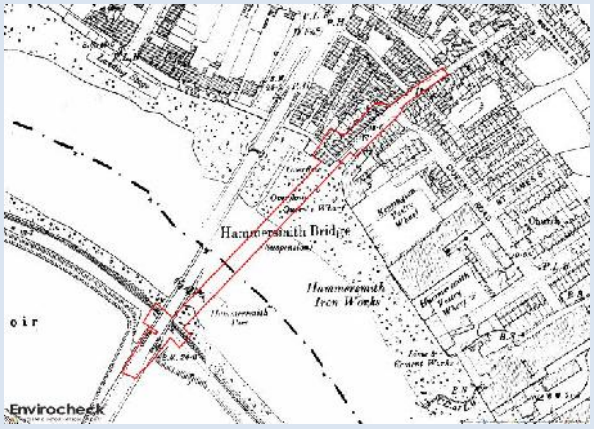
An extract of topographical maps consulted at the desk study stage are summarised in **Table 2.1.**

Table 2.1 Historical Maps Extracts



1746: The London 1746 map (published by the land surveyor John Rocque) indicates that the current Queen Caroline St was already built with indicative building locations marked within the site boundary on the north bank. The south bank of the site does not indicate any urban development.

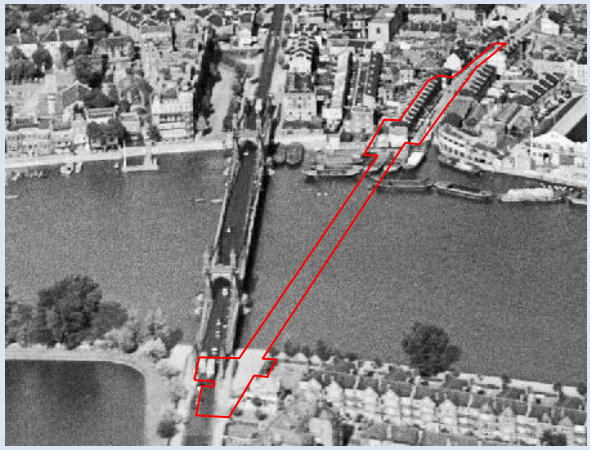
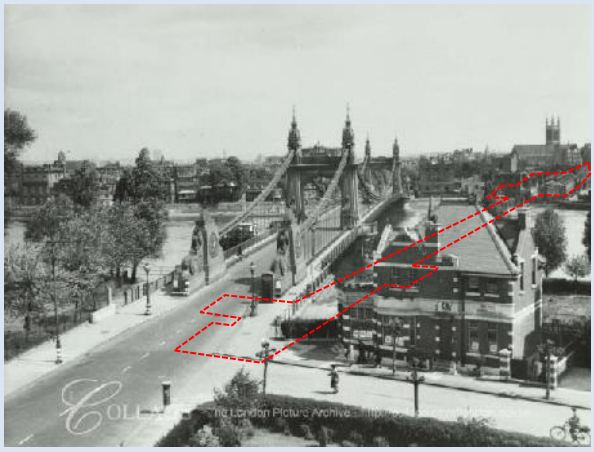
Off-site, most of surrounding land use appears to comprise developed agricultural or orchard land.



1896: On-site the map shows no notable changes. The new Hammersmith Bridge is shown (completed 1887) which shares the same alignment and foundation piers as its predecessor. No notable development is indicated on the south bank.

Off-site, the land use on the north bank is largely unchanged (wharfs to the SE are now named, inc. Queen's Wharf). Hammersmith Iron Works is shown 90m SE. A public house is shown on Queen Caroline St (immediately NW). Two foreshore overflows are shown NE of the Site. The only notable change on the south bank is the presence of a river channel structure named 'Hammersmith Pier' which bisects the site close to the southern shore.

Table 2.1 Historical Maps Extracts

	
1937: the aerial photograph provides a good view of the wharfs and residential dwellings within the site boundary on the north bank. Off-site, the imagery confirms the items described by the OS mapping.	**1940**: this 1940 ground level photo faces north from Barnes . The site boundary extends to the street level in the centre foreground of this image. Off-site, no relevant features noted.
	**2020** (left): The current mapping shows very limited change within the site boundary. Off-site, the most significant change is the redevelopment of the former Queen's Wharf and adjacent Riverside Studios to the southeast. Dated Google satellite imagery confirms that the previous Queens Wharf and Riverside studios were demolished after 2014 and redeveloped between 2015 and 2018 to form the new Riverside Studios complex, a combined arts, studio and performance centre including extensive upper tier residential apartments.

Key: N north, E east, S south, W west, NE north east, NNE north north east etc. Inc. including

2.3 Geological Maps and Memoirs

The British Geological Survey (BGS) on-line Geo-index search-engine and published BGS geological maps were used to initially identify the underlying geology of the area.

The British Geological Survey (BGS) 1:50,000 Scale Solid and Drift Edition geological map of the area (Sheet 72, Beverley, 1995) shows the superficial deposits to comprise of Alluvium on the south bank and under the river, and of River Terrace deposits on the north bank. These strata were described as follows:

- Alluvium: *Soft grey CLAY grading to loose grey slightly sandy SILT.*
- River Terrace Deposits: *Medium dense multi-coloured sandy to very sandy GRAVEL Sand is medium to coarse. Gravel is fine to coarse angular to rounded flint.*

Solid geology in the area is shown to comprise London Clay, broadly defined by the BGS Lexicon as;

> *"The London Clay mainly comprises bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay."*

2.4 Records of Mines and Mineral Deposits

One historic mine entry was recorded within 1000m of the site, located 530m South of the site boundary. The materials extracted came from the Kempton Park Gravel Formation and consisted of sand and gravel. The site is not within a Coal Mining Reporting Area.

2.5 Land Use Information

The historical land use and development of the study area has been established from the historical Ordnance Survey plans (1:2,500 and 1:10,000-scale) dating from between 1867 and 2019 provided within the Envirocheck report as well as the record of construction of the bridge (1827). The key developments are detailed below:

- 1827: The original suspension bridge with stone towers is built
- 1870: The bridge is monitored following concerns over crowd loading
- 1887: New Hammersmith Bridge is built using the existing piers and foundations with the following major changes:
    - Southern pier was underpinned 6ft (1.8m) below the existing founding level using a cofferdam.
    - Both abutments were widened from 41ft to 56ft (12.5m to 17m). The depths of the abutments were doubled from 46ft to 92ft (14m to 28m) using mass concrete.
    - Existing masonry chain tunnels were removed, and new chain tunnels formed within the concrete for the abutment extensions.
    - To reduce the weight of the piers, the stone towers were removed, and piers cut down so the iron framed pier towers could be constructed on top.
- 1939: IRA bomb detonated at midspan on the bridge. Stiffening girder and lower chain were damaged. The chains were bypassed using tensioned bars.
- 1952: Corroded cross-girders were repaired, and timber decking replaced.
- 1959: A structural assessment of the bridge finds that the stiffening girders and the towers are at significant risk. This is due to the saddles no longer being able to move freely as the roller bearings are seized up. The GVW allowance was reduced from 15T to 12T.
- 1966: Mast of a yacht collides with the bridge, raising the footway and fracturing an attached gas main.
- 1970: A structural assessment was undertaken and confirmed strengthening requirements. The weight limit of the bridge was reduced to 5T GVW.
- 1973: A contract was let out to replace stiffening girders, tower saddle roller bearing, timber decking and expansion joints. These works were completed in 1977 and the GVW allowance was increased to 12T.
- 1977: A pleasure cruiser collided with the bridge.
- 1984: Roller bearings on southern towers came off the plates and the saddles dropped 25mm. The bridge was closed while the saddles were jacked back into place. A GVW restriction of 3T was implemented with allowances for a single 16T bus per lane.

- 1996: Two powerful bombs were planted beneath the bridge, the detonators exploded but failed the bombs themselves did not ignite.
- 1997: Following a load test the bridge was closed to all traffic except emergency vehicles, taxis and pedestrians.
- 1997: Strengthening was undertaken by replacing the north tower roller bearings with elastomeric bearings, stiffening girders were strengthened and tower hangers were replaced.
- 1999: The deck panels, excluding the timber, were replaced. A 7.5T GVW restriction was put in place with a single 12T bus at any one time.
- 2000: A bomb was detonated on the bridge, damaging the cross-girder connection at the southern pier. This was repaired by replacing the damaged section of girder.

2.6 Pollution Events

It was identified at the desk study stage that there are three licensed discharge consents within 250m of the bridge site within the Thames River. These were related to sewage and storm water overflows. Also, there are six pollution incidents to controlled waters recorded within 250m of the site. The incidents occurred between 1990 and 1997 and were related to the discharge of unknown sewage. These were classified as having a minor impact to water as a result of the pollution.

2.7 Historic Ground Investigations

Figure 2.1 maps the existing borehole information available on the BGS website. Borehole 271 in the Thames channel is of particular interest as it shows a possible soil condition under the river within less than 100m of the site. This hole encountered London Clay from the river channel level that extended until 48m below drilling level where Lambeth Group soils were encountered through to the base of the hole. No strength testing was available from the logs, and the logs did not encounter groundwater within the boreholes.

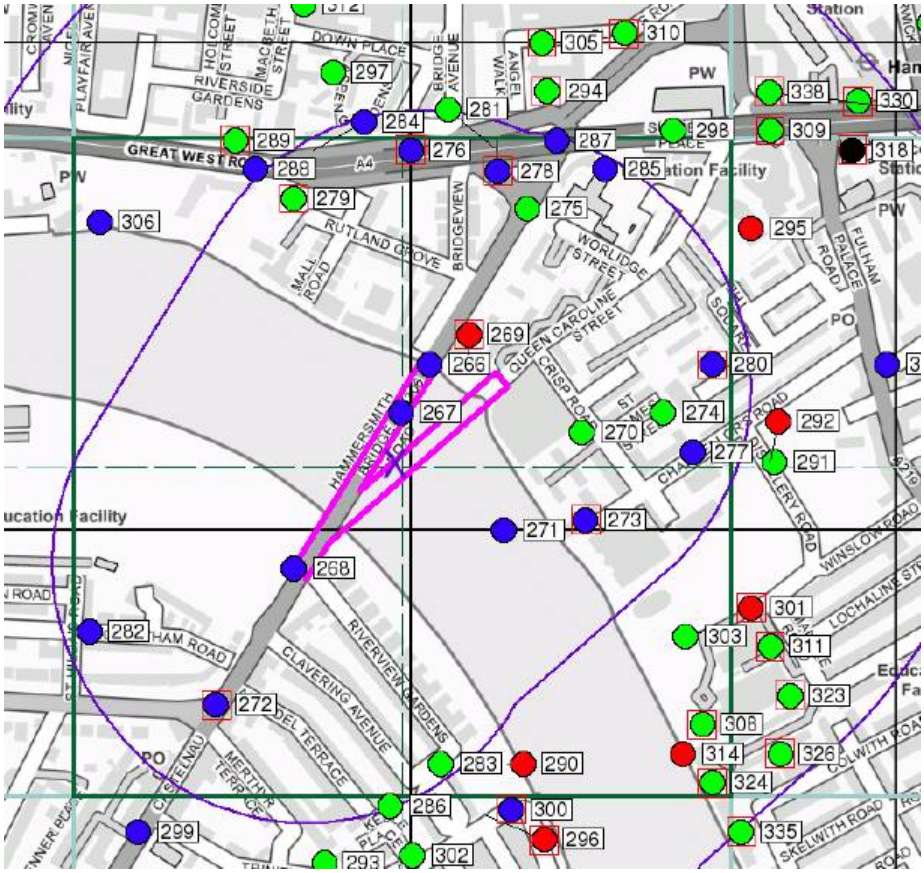


Figure 2.1 BGS Historic Boreholes

2.8 Consultation with Statutory Bodies and Agencies

The following entities were consulted via the Envirocheck report to search for information considered relevant to this report:

- Environment Agency;
- English Heritage;
- British Geological Survey (BGS);
- Coal Authority;
- Ordnance Survey, and;
- Public Health England.

The findings of these consultations are summarised in various other sections of this report and are covered in detail within the desk study.

2.9 Hydrogeology

According to the Envirocheck Report and the Environment Agency website, the superficial deposits underlying the site comprise a Secondary 'Undifferentiated' Aquifer associated with the alluvial deposits and a Secondary 'A' aquifer associated with the Kempton Park Gravel. The bedrock geology of London Clay is mapped as an Unproductive Aquifer.

The Envirocheck Report indicates that the site is not located within a Source Protection Zone (SPZ). There are no groundwater abstraction licenses within 1,000m of the site.

2.10 Flood Records

The Envirocheck report classifies the existing and temporary footbridge locations as being in a Zone 3 floodplain. Therefore, it is at high risk of flooding from the rivers and the sea and each year has a chance of flooding of greater than 3.3%. This considers the effect of any flood defences in the area which reduce, but do not stop, the chance of flooding as they can fail.

The area north of the abutment is classified as being of high risk of flooding from surface water, likely due to the presence of permeable granular Kempton Park Gravel soils overlying impermeable London Clay beneath.

2.11 Unexploded Ordnance

A detailed UXO desktop study was commissioned by Safelane Global and is included in Appendix B. The site was split into areas of LOW and MEDIUM risk, refer map below in **Figure 2.1.**

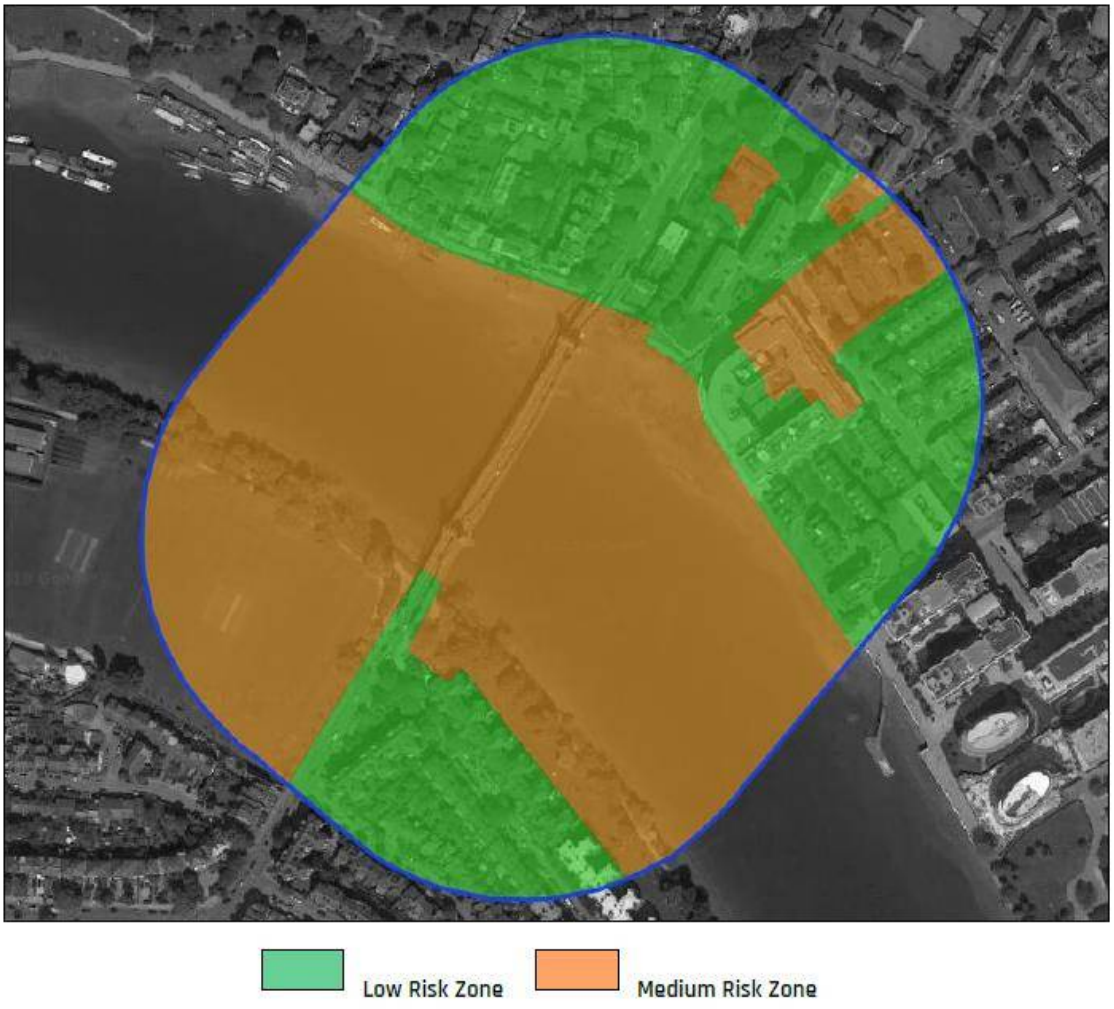


Figure 2.2 UXO Risk Map – SafeLane Global

3 Field and Laboratory Studies

3.1 Ground Investigations

Further to the proposals set out within the Desk Study, a project-specific ground investigation (GI) was procured by PFC and undertaken by Socotec during May 2020. The purpose of the works was to determine a geological ground model and characteristic geotechnical parameters of the encountered materials to facilitate earthworks and foundation design. The ground investigation locations are shown on **Figure 3.1** and the schedule of investigations are presented in **Table 3.1**.

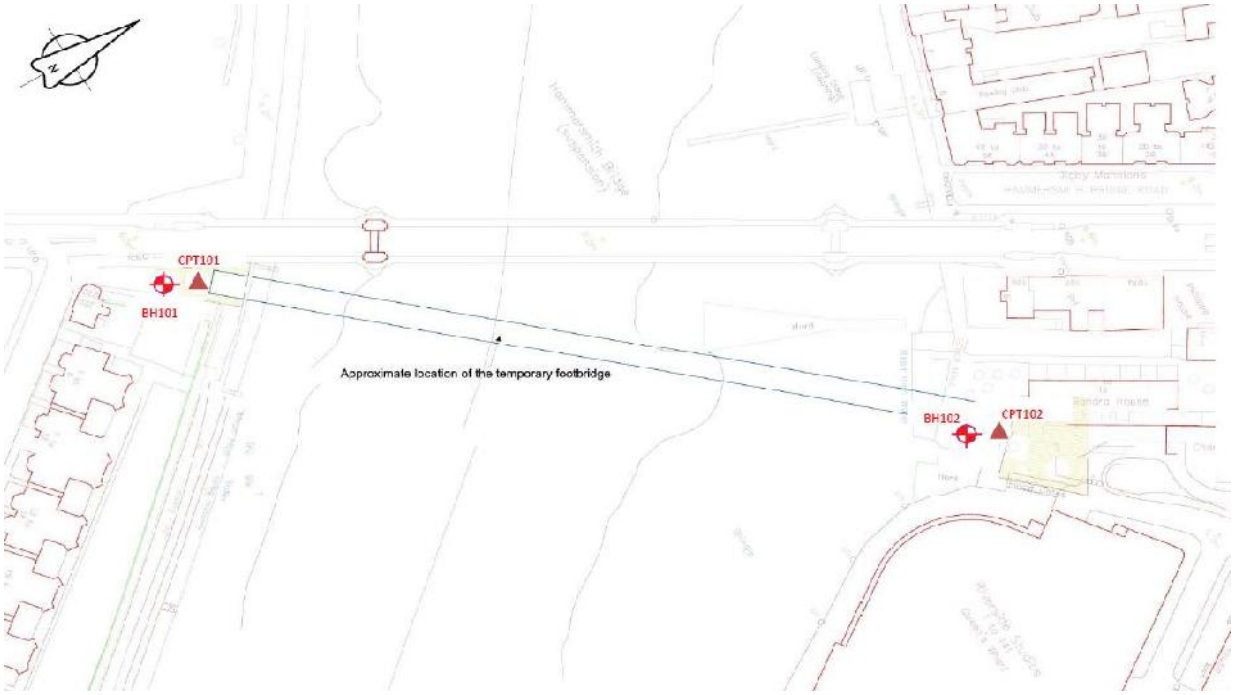


Figure 3.1 Ground Investigation Locations

3.1.1 Description of Fieldwork

The following exploratory holes were undertaken during the May 2020 ground investigation:

Table 3.1: Summary of Exploratory Holes undertaken by Socotec

Exploratory Hole ID	Easting	Northing	Ground Level (m AOD)	Hole Scheduled Depth	Hole Final Depth	Installation	Comments
BH101-SP	522920.27	177988.12	4.61	40.0m	40.38m	Groundwater and ground gas monitoring installed	Achieved target depth.
BH102-SP	523072.73	178148.02	4.95	40.0m	40.45m	Groundwater and ground gas monitoring installed	Achieved target depth.
CPT101	Unable to be drilled due to access issues						
CPT102	523073.39	178154.08	5.11	20.0m	16.8m	-	Pre-drilled to 6m by cable percussion rig

bgl = below existing ground level;

m AOD = metres above ordnance datum;

The GI was carried out in accordance with the following standards:

- BS 5930:2015
- BS EN 1997-2
- BS EN ISO 22475-1:2006
- BS EN ISO 22476-1:2012
- BS EN ISO 22476-3:2005+A1:2011

The Ground Investigation Factual Report produced by Socotec is presented in Appendix B of this report.

3.2 In-Situ Testing

In-situ testing comprised Standard Penetration Tests (SPTs) and Hand Shear Vane (HSV) tests in boreholes. SPT tests were undertaken within boreholes at regular intervals. Test results are discussed in the following sections per strata, and are presented on the relevant logs within the Socotec Factual Report included as Appendix B of this report.

3.3 Laboratory Testing

The following tests were scheduled by Pell Frischmann on samples recovered during the fieldworks in accordance with BS 1377 (1990), BS EN ISO 17892 (2014) Part 1 and 2.

Table 3.2: Summary of geotechnical laboratory testing

Type	Quantity	Comment
Water content determination	16	
Atterberg limit determination	16	
Particle size distribution analysis-wet sieve	8	
Particle size distribution analysis-sedimentation	4	
pH, water soluble sulphate content, acid soluble sulphate and total sulphur of soils	8	
Unconsolidated undrained triaxial compression testing	13	
Hand vane	13	
Determination of shear strength by direct shear	1	Requested test at BH101 5.7-6.2m not undertaken due to insufficient sample

4 Ground Summary

With reference to GI and historic borehole records and supported by the BGS geological maps, the following ground model has been developed, refer to Table 4.1.

Table 4.1: Ground Model

Deposit/Stratum	Thickness (m)		Elevation to top of Stratum (m AOD)	
	Minimum	Maximum	Highest	Lowest
Made Ground – Granular (MG-G)	1	1.8	4.95	4.61
Made Ground – Cohesive (MG-C)	0.5	1.5	3.21	3.05
Alluvium	0	2.80	1.71	1.71
River Terrace Deposits*	2.4	3.0	2.65	-1.09
London Clay**	30+	-	-0.35	-3.49

*also referred to as Kempton Park Gravel
**base unproven

The general ground model for this site includes 2-3m of Made Ground usually featuring Granular fill above cohesive Made Ground. On the north bank of the river, Alluvium is present below the Made Ground, but this layer is absent on the south bank. River Terrace deposits and London Clay are the underlying strata over the whole site.

5 Ground Conditions and Material Properties

5.1 Made Ground

5.1.1 Composition and Distribution

Made Ground was encountered in all investigation locations and ranged in thickness from 2.3m to 2.9m.

The Made Ground was encountered below concrete or grassed areas and was of mixed composition and description, though typically described as SAND and GRAVEL or gravelly, sandy CLAY and SILT. The Made Ground comprised brick, ceramics, concrete and glass. Sand and gravel were fine to coarse.

5.1.2 Classification Properties

Particle Size Distribution (PSD) analysis was undertaken on a total of 3 No. samples of Made Ground (2 No. at BH 101 and 1 No. at BH102). The results of the particle size distribution analysis for Made Ground are presented in **Table 5.1** & **Table 5.2**.

Table 5.1 indicates the Granular Made Ground is predominantly a mixture of sand and gravel with a low percentage of fine material. **Table 5.2** shows the Cohesive Made Ground to be made predominately of silt and clay particles and containing small quantities of sand and gravel.

Table 5.1: Granular Made Ground Particle Size Distribution Summary		
Soil Classification	**Content Distribution Range %**	**Average Content %**
Silt/Clay	10-35	25
Sand	25 - 35	30
Gravel	30 -65	45
Cobbles	0 - 0	0
2 No. tests conducted		

Table 5.2: Cohesive Made Ground Particle Size Distribution Summary	
Soil Classification	**Content Distribution %**
Silt/Clay	55
Sand	33
Gravel	12
Cobbles	0
1 No. test conducted	

5.1.3 In-Situ Testing

A total of 4 SPT tests were undertaken in Made Ground in boreholes BH101 and BH102. **Table 5.3** shows the SPT 'N' values for each borehole.

Table 5.3: Made Ground In-situ SPT Test Results			
Borehole	**Soil Type**	**Depth (m bgl)**	**SPT**
BH101	Made ground granular	1.2	6
BH102	Made ground granular	1.2	3
BH101	Made ground cohesive	2.0	4
BH102	Made ground cohesive	2.0	21

The SPT values presented in **Table 5.3** show overall low values for N, the higher value of 21 appears anomalous and will not be taken into account for the overall strength parameters The following representative "N" value is adopted for design for both the Granular Made Ground and the Cohesive Made Ground:

***N* = 5 blows per 300mm**

5.1.4 Atterberg Limit Testing

Atterberg Limit testing was conducted on 1 No. sample within the Cohesive Made Ground, the value of plasticity index (PI) was 12%.

5.1.5 Undrained Shear Strength Parameters

The undrained shear strength for the Made Ground can be derived using correlations to the SPT N value and the plasticity index as presented in CIRIA 143. Using an average plasticity index of 12%, an f_1 factor of 7.0 is derived. Considering the limited laboratory testing a conservative values of 5.0 was adopted for design. With this factor the following undrained shear strength is derived for the cohesive Made Ground:

S_u = 25 *kPa*

5.1.6 Effective Stress Properties

The friction angle for Granular Made Ground can be estimated from the N value of the soil obtained from the SPT tests presented above (CIRIA 143). The friction angle for the granular made ground with an SPT value of 5 is taken to be:

Ø' = 28°

No effective cohesion shall be adopted for Granular Made Ground, therefore c'=0kPa.

Considering the SPT value and the description of the material the following material parameters are considered appropriate for design.

Ø' = 28°, c' = 0

5.1.7 Density

In the absence of field data, the bulk density of the Made Ground was estimated from the general description of the soil, the particle size distribution and case-based precedence as being 17 kN/m^3.

5.1.8 Stiffness

The undrained stiffness of the Made Ground has been derived using the following relationship to the undrained shear strength:

$$E_u = 250\ S_u \quad kPa$$

Thus, for the design undrained shear strength value the following stiffness is recommended:

$$E_u = 6{,}250 \quad kPa$$

The drained stiffness of the Made Ground is derived from the following relationship:

$$E' = 0.8\ E_u \quad kPa$$

$$E' = 5{,}000 \quad kPa$$

5.1.9 Summary of Soil Parameters

The recommended design parameters for Made Ground are summarised in **Table 5.4 & Table 5.5.**

Table 5.4: Granular Made Ground Recommended Design Parameters			
Unit Weight	γ_{bulk}	17	kN/m^3
Friction Angle	Ø'	28	°
Drained Stiffness	E'	5,000	kPa

Table 5.5: Cohesive Made Ground Recommended Design Parameters			
Unit Weight	γ_{bulk}	17	kN/m^3
Undrained Shear Strength	S_u	25	kPa
Undrained Stiffness	E_u	6,250	kPa

5.2 Alluvium

5.2.1 Composition and Distribution

Alluvium was only encountered on the South bank of the Thames River and was 2.8m thick. This stratum was described as very loose grey slightly sandy SILT to silty SAND.

5.2.1 Classification Properties

One particle size distribution (PSD) test was undertaken with an Alluvium sample. The results are presented in **Table 5.6.** The results confirm the Alluvium is predominately a cohesive material with 85% of the composition comprising clay and silt.

Table 5.6: Alluvium Particle Size Distribution Summary	
Soil Classification	**Content Distribution %**
Silt/Clay	85
Sand	13
Gravel	2
Cobbles	0
1 No. test conducted	

5.2.2 In-situ Testing

2 No. SPT tests were undertaken in-situ in the Alluvium stratum, the results of which can be found in Table 5.7.

Table 5.7: Alluvium In-situ SPT Test Results			
Borehole	**Soil Type**	**Depth (m bgl)**	**SPT**
BH101	Alluvium	4.0	8
BH101	Alluvium	5.0	9

Based on the readings obtained, the following representative "N" value is adopted:

***N* = 8 blows per 300mm**

5.2.3 Undrained Shear Strength

The c_u was determined using correlation with PI and SPT N. The SPT result was correlated to an equivalent s_u using the approach by Stroud based upon a relationship of s_u=4N, in the absence of test data regarding the PI value for Alluvium. This correlation gives a value of c_u of approximately 32kPa, which is considered a conservative estimation in the absence of additional test results.

$$S_u = 35\ kPa$$

This value was confirmed by the triaxial test undertaken in the laboratory which yielded a Su of 31kPa.

5.2.4 Density

Based on correlations presented in Figure 1 and Figure 2 of BS 8002 (2015), a medium shear strength term and general Engineer's descriptions of a firm consistency, a bulk (γ_{bulk}) and saturated unit weight (γ_{sat}) of 18kN/m^3 is considered appropriate for design for the Alluvium.

5.2.5 Effective Stress Properties

The peak friction angle for Alluvium can be estimated from the plasticity index of the soil and assuming an apparent cohesion of zero (BS 8002:2015). The peak friction angle is derived from the following relationship, without accounting for dilation:

$$\emptyset' = 42° - 12.5 \log_{10} I_p$$

Where:

I_p is the plasticity index (entered as a %), in the absence of recorded data, the plasticity index has been assumed to be 40%

Ø' = 25°

The following effective cohesion considered appropriate for the Alluvium, c' = 1kPa.

5.2.6 Coefficient of Volume Compressibility

Modulus of Volume Compressibility (m_v) values based upon SPT N values and Plasticity Indices were derived using Stroud's correlation of $m_v = 1/(f_2 xN)$ (Stroud (1975)). Assuming a PI of 40%, a factor (f_2) of 0.45 was assumed for the cohesive Head deposits

An m_v value based upon a characteristic cohesive shear strength value of 32kPa derived using Stroud's correlations of $m_v = 1/(f_2 xN)$ and $s_u = f_1 xN$ (Stroud (1975)) gives $m_v = 10/s_u = 0.30 m^2/MN$.

m_v = 0.30m²/MN

5.2.7 Stiffness

The stiffness of the Alluvium has been calculated using the following conventional correlations to undrained shear strength:

- Undrained Shear Strength:

E_u* = 250 *S_u* *kPa

- Drained Stiffness:

E'* = 0.8 *E_u* *kPa

Based on the design value for undrained shear strength stated in **Section 5.2.3**, the following stiffness values are recommended for design purposes:

- Undrained Shear Strength:

E_u* = 8,000 *kPa

- Vertical Drained Stiffness:

E'* = 6,400 *kPa

5.2.1 Summary of Soil Parameters

Table 5.8: Alluvium Recommended Design Parameters			
Unit Weight	γ_{bulk}	18	kN/m³
Undrained Shear Strength	S_u	35	kPa
Undrained Stiffness	E_u	8,000	kPa
Drained Stiffness	E'	6,400	kPa
Friction angle	Ø'	25	°
Effective cohesion	c'	1	kPa

5.3 River Terrace Deposits

5.3.1 Composition and Distribution

River Terrace Deposits (RTD) was typically encountered below Alluvium or, in the absence of Alluvium, below Made Ground. It was generally described as fine to coarse brown SAND with angular to rounded flint gravel. RTD was encountered in both boreholes on the site.

5.3.2 Classification Properties

Four Particle Size Distribution (PSD) tests were undertaken on bulk samples of RTD from exploratory holes BH101 and BH102. The results from these PSD tests are presented in **Table 5.9**.

Table 5.9: River Terrace Deposits Particle Size Distribution Summary

Soil Classification	Content Distribution Range %	Average Content %
Silt/Clay	0-22	7
Sand	25 - 52	37
Gravel	34 -75	56
Cobbles	0 - 0	0
4 No. tests conducted		

5.3.3 In-situ Testing

A total of 5no. SPTs were undertaken within RTD at the locations of exploratory holes BH101 and BH102

Table 5.10: River Terrace Deposits In-situ SPT Test Results

Borehole	Soil Type	Depth(m)	SPT
BH101	RTD	6.5	26
BH101	RTD	8	9
BH102	RTD	3	250
BH102	RTD	4	29
BH102	RTD	5	14

The SPT values presented in **Table 5.10** show overall low values for N, however, the N value of 250 obtained in BH102 is considered an outlier an is neglected. The following representative "N" value is adopted:

***N* = 20 blows per 300mm**

5.3.4 Density

Based on a typical characteristic range in SPT N value of 20 and the correlations presented in Figure 1 and Figure 2 of BS 8002 (2015), a bulk unit weight (γ_{bulk}) of 17kN/m^3 and a saturated unit weight (γ_{sat}) of 19kN/m^3 are considered appropriate for design for the RTD stratum.

5.3.5 Laboratory Testing

A series of shearbox tests were undertaken on a sample of River Terrace Deposits, the results of which are presented in **Figure 5.1.**

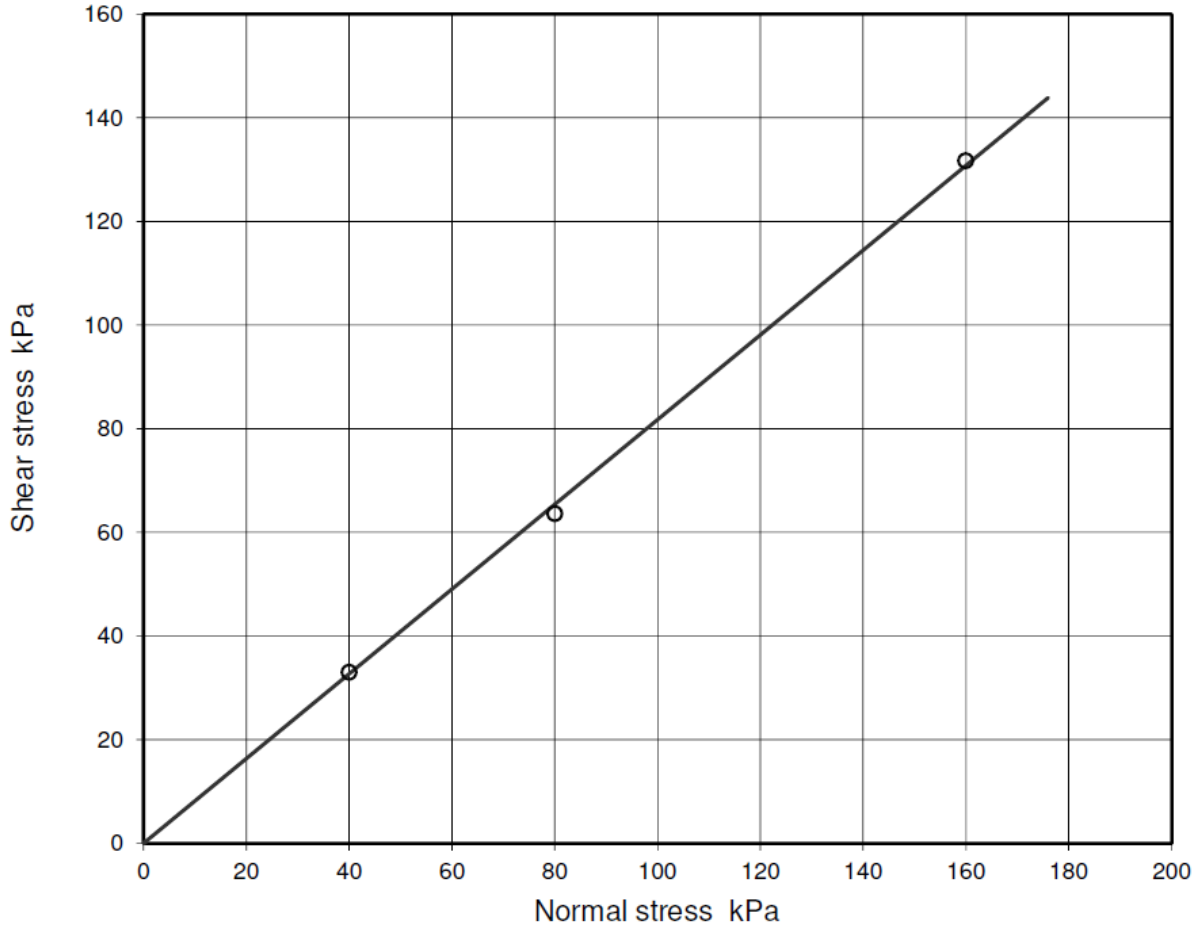


Figure 5.1 Shear Box Test Results

This test yielded the following results:

$$c' = 0 \text{ kPa}$$

$$\emptyset'_{pk} = 39.5°$$

5.3.6 Effective Stress Properties

From the shearbox test results the derived peak friction angle has been estimated to be 39.5 degrees with a c' value of 0kN/m².

Additionally, the peak effective friction angle of gravels can be derived in accordance with BS8002:2015 based on the description of the angularity of the grains, the grading of the soil and the relative density as follows:

$$\emptyset'_{pk} = 30° + \emptyset'_{ang} + \emptyset'_{psd} + \emptyset'_{dil}$$

Generally the logs described the Kempton Park Gravel as angular to rounded, and the grain size ranged from fine to coarse. Therefore the following effective friction angle is derived from Table 1 of BS8002:2015:

$$\emptyset'_{ang} = 2\ °$$

$$\emptyset'_{psd} = 2\ °$$

$$\emptyset'_{dil} = 2\ °$$

Considering the available sets of derived friction angles, the following peak strength parameters are recommended for design:

$$\emptyset'_{p} = 37\ °,\ c' = 0\ kPa$$

The peak friction value presented above will be mobilised at relatively small displacements, and the critical state friction angle may be more appropriate for general design. Deriving this as per BS8002 using the equation presented above, but omitting the contribution from dilation, critical state friction angle of 34° is derived and from the shear box test data a value of 31° is obtained. With regard to design it is recommended that the following critical state friction angle is adopted:

$$\emptyset'_{cs} = 32\ °$$

5.3.7 Stiffness

The stiffness of the Kempton Park Gravel has been derived using the following relationship between uncorrected SPT "N" value and stiffness (Stroud, 1989):

$$E' / N = 1.5\ MN/m^2$$

Based on the design line for SPT "N" the following stiffness value is recommended for design purposes:

$$E' = 30{,}000\ kPa$$

5.3.8 Summary of Soil Parameters

Table 5.11: River Terrace Deposits Recommended Design Parameters			
Unit Weight - Bulk	γ_{bulk}	17	kN/m^3
Unit Weight - Saturated	γ_{sat}	19	kN/m^3
Peak friction angle	$\emptyset'_{pk}$	37	°
Critical state friction angle	$\emptyset'_{cs}$	32	°
Effective cohesion	c'	0	kPa
Drained stiffness	E'	30	MPa

5.4 London Clay

5.4.1 Composition and Distribution

London clay was encountered in both boreholes and is expected to be encountered over the entire site based on preliminary analysis at the desk study stage. It was generally described as grey CLAY with occasional grey silt partings, fissures very closely spaced, tight.

5.4.1 Classification Properties

A total of 13no. moisture content and Atterberg Limit tests were undertaken on samples of London Clay. The moisture content was measured at between 22% and 35% with an average of 26%, the liquid limits were between 59% and 76% with an average of 66% and the Plasticity Indices (PI) of between 36% and 49% with an average of 40%. The results have been presented graphically in **Figure 5.2** and generally indicate the material to be a high plasticity clay.

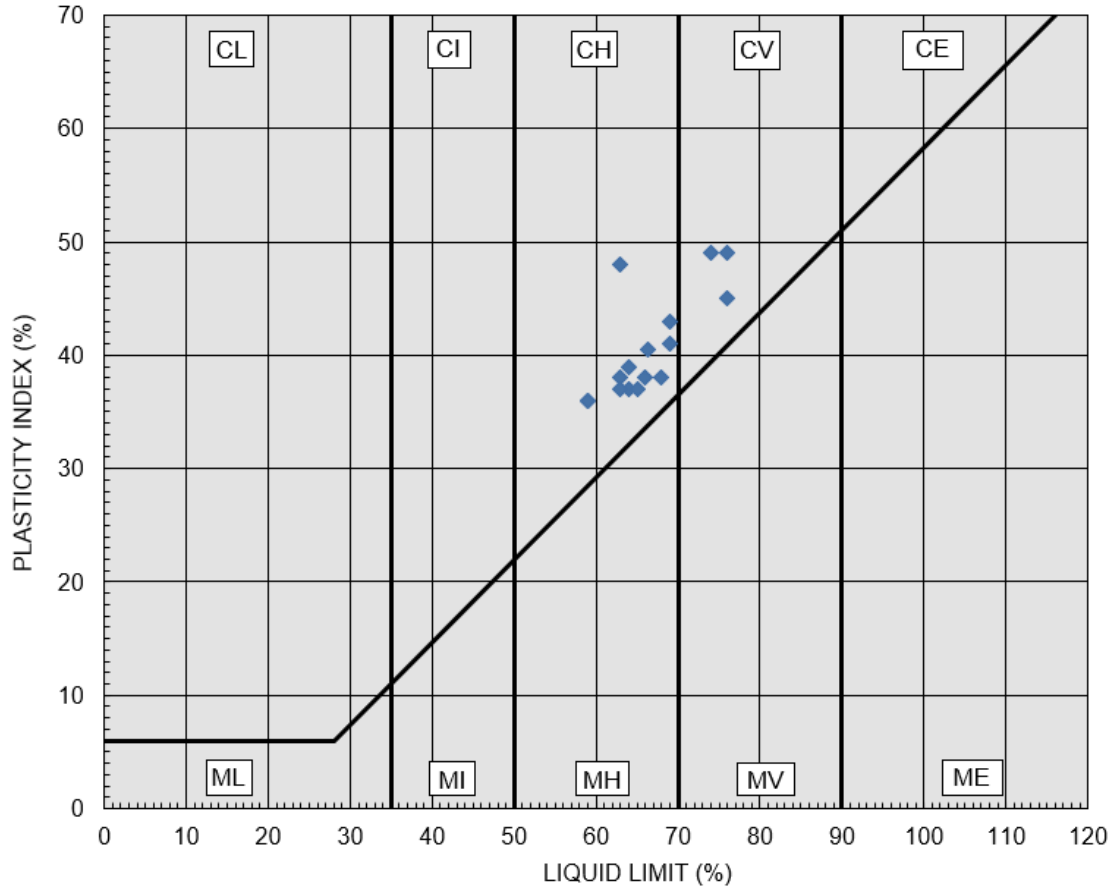


Figure 5.2 Atterberg limits in London Clay

5.4.2 In-situ Testing

A total of 23no. SPTs were undertaken within the London Clay in boreholes BH101 and BH102. The results are presented graphically in **Figure 5.3** which typically indicate an increase in strength with depth.

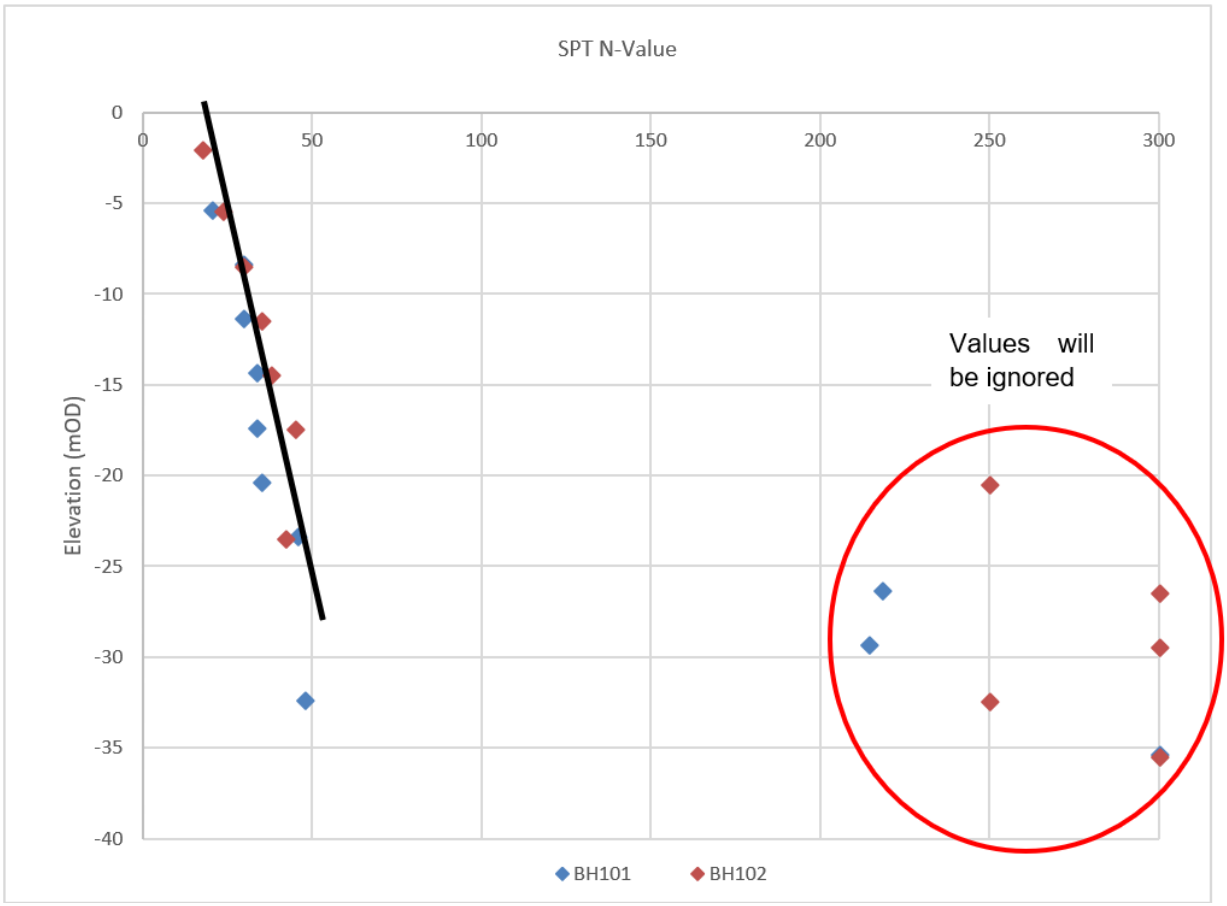


Figure 5.3 London Clay SPT results

Based on these results, the N value of London Clay will be expressed in function of depth: N=20+Z where Z is the depth below a datum elevation of 0.0mOD.

***N* = (20 + z) blows per 300mm**

where z is the depth below surface of the stratum

5.4.1 Laboratory Testing

The laboratory tests undertaken on London Clay samples consisted of 13 hand shear vane tests on samples taken at various depths which all returned an undrained shear strength value of 140 kPa (the maximum value for this test). A total of 12 triaxial compression tests were also undertaken on samples of London Clay, the results of which have been included in **Figure 5.4**.

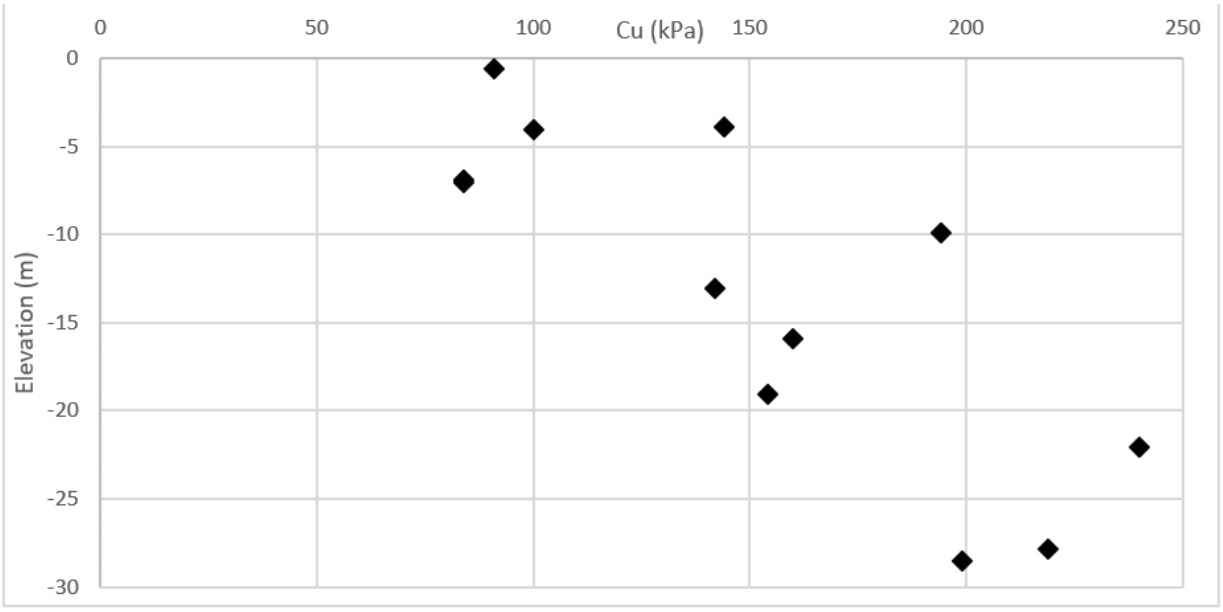


Figure 5.4 Traxial Results - London Clay

5.4.2 Undrained Shear Strength

Values for undrained shear strength have been obtained via the hand vane tests, the triaxial loading tests, the CPTs and the SPTs undertaken in situ. **Figure 5.5** summarises the data collected in each of those tests to interpret them visually.

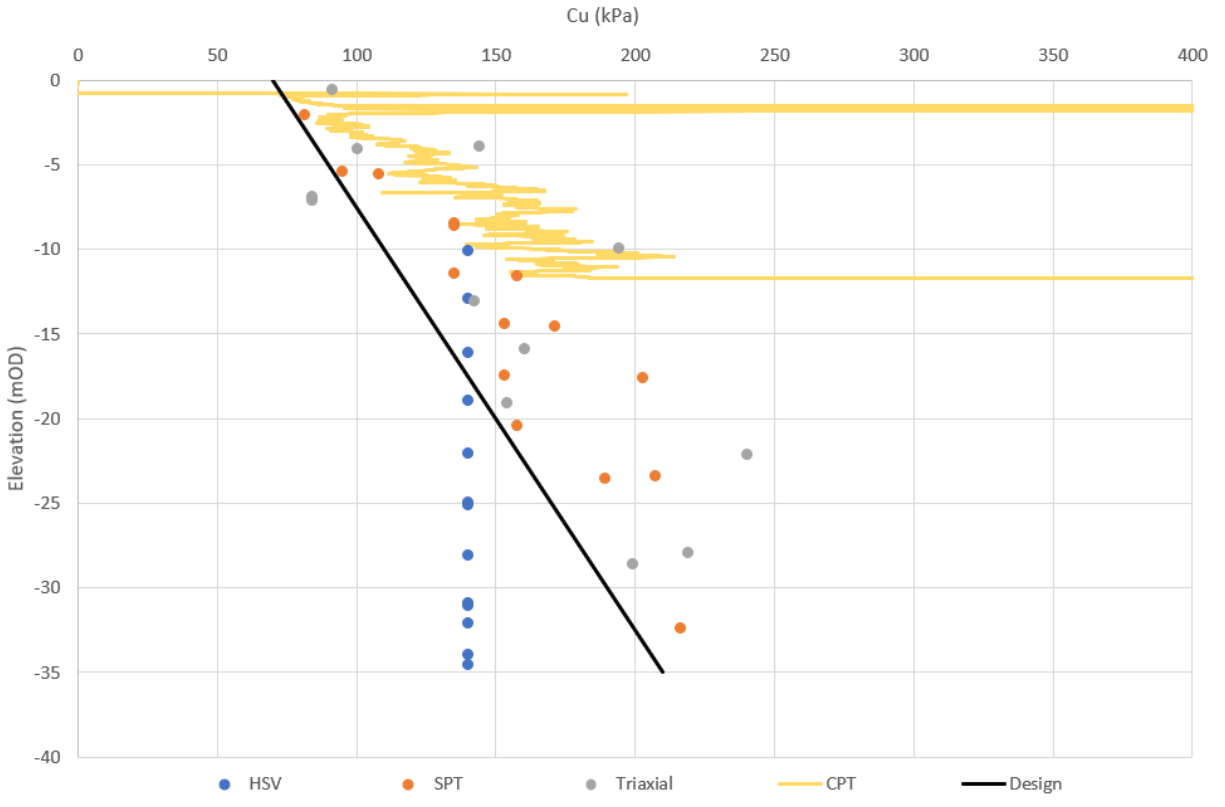


Figure 5.5 Summary of Undrained Shear Strength Results in London Clay

The following gives a summary of s_u determined using correlation with PI and SPT N values. The SPT result was correlated to an equivalent s_u using the approach by Stroud based upon a relationship of s_u=4.7N, derived from an average PI of 40%. This correlation suggests a s_u value of 70 + 4.7z kPa indicating the soil to typically be a stiff clay becoming very stiff to hard with depth.

This interpretation of undrained shear strength confirms the results obtained in the 11no. triaxial tests performed on London Clay samples which yielded results varying from 84 to 240kPa with an average of 156kPa.

A series of hand vane shear tests were also carried out on 13 samples of London Clay and all yielded an undrained shear strengths greater than the maximum value of the test of 140kPa.

The following relationship for undrained shear strength is proposed for design:

$$\boldsymbol{Su = 70 + 4.7z \text{ kPa}}$$

where z is the depth below surface of the stratum.

5.4.3 Density

Based on correlations presented in Figure 1 and Figure 2 of BS 8002 (2015), a high shear strength term and general Engineer's descriptions of a very stiff consistency, a bulk unit weight (γ_{bulk}) and saturated unit weight (γ_{sat}) of 20kN/m^3 is considered appropriate for design for the London Clay.

5.4.4 Effective Stress Properties

The peak friction angle for London Clay can be estimated from the plasticity index of the soil (40) and assuming an apparent cohesion of zero (BS 8002:2015). The critical state friction angle is derived from the following relationship:

$$\boldsymbol{\phi'_{cs} = 42° - 12.5 \log_{10} I_p}$$

Where:

I_p is the plasticity index (entered as a %)

$$\boldsymbol{\phi'_{cs} = 23°}$$

Considering a contribution from dilation of 2° the following peak friction angle is proposed.

$$\boldsymbol{\phi'_{pk} = 25°}$$

Based on previous experience the following effective cohesion for the London Clay is proposed:

c'_{cs} = 0kPa for the critical state

c'_{pk} = 2kPa for the peak state

5.4.5 Compaction and Consolidation

5.4.5.1 Coefficient of Volume Compressibility

Modulus of Volume Compressibility (m_v) values based upon SPT N values and Plasticity Indices were derived using Stroud's correlation of $m_v = 1/(f_2 x N)$ (Stroud (1975)). With a PI of 40%, a factor (f_2) of 0.45 was derived for the London Clay and the resultant m_v values were determined and plotted against depth in **Figure 5.6**. The results show a decrease in values of mv as depth increases.

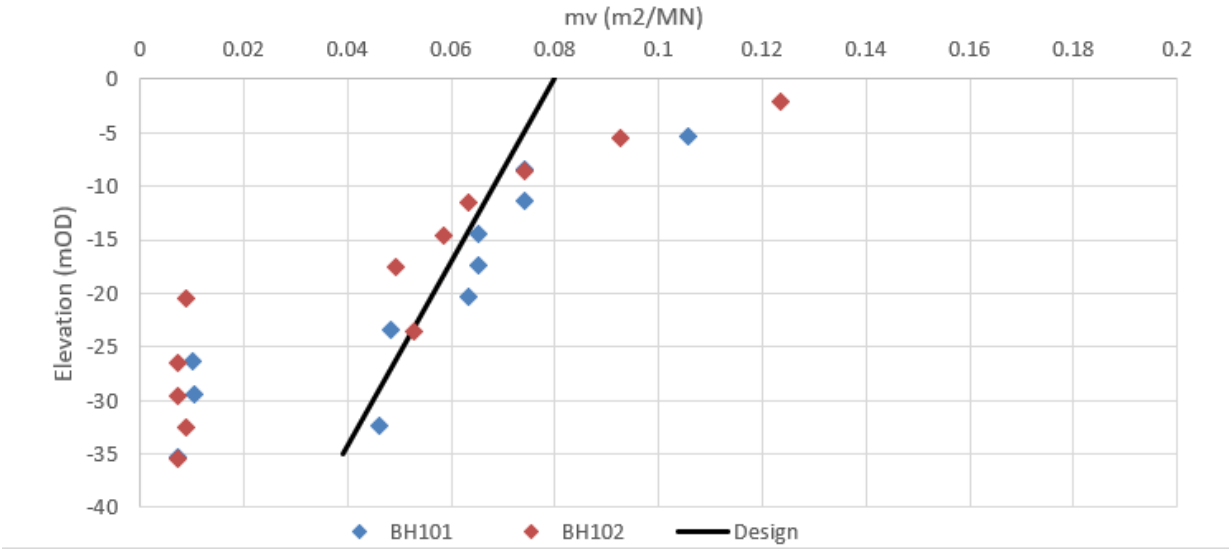


Figure 5.6 Coefficient of Volume Compressibility Values for London Clay

Given the wide range of values of mv shown in **Figure 5.6** the following design trend for m_v can be generally adopted for the London Clay; however, this may need to be assessed separately during design on a case by case basis.

$$\mathbf{m_v = 0.08 – z/875\ m^2/MN}$$

where z is the depth below the surface of the stratum

5.4.5.2 Coefficient of consolidation

A coefficient of consolidation (c_v) value can be derived from the relationship:

$$\mathbf{c_v = k / \gamma_w m_v}$$

Based on an estimated Coefficient of Permeability (k) value for the cohesive London Clay of 5 x 10^{-10} m/s (Craig, 1992 and CIRIA 504) and an mv ranging from 0.04 to 0.08 m^2/MN

$$\mathbf{c_v\ max = 7\ m^2/year}$$

$$\mathbf{c_v\ min = 2\ m^2/year}$$

5.4.6 Stiffness

The stiffness of the London Clay has been calculated using the following conventional correlations to undrained shear strength:

- Vertical Undrained Stiffness:

$$E_u = 450\ S_u\ kPa$$

- Horizontal Undrained Stiffness:

$$E_u = 1000\ S_u\ kPa$$

- Drained Stiffness:

$$E' = 0.8\ E_u\ kPa$$

Based on the design line for undrained shear strength stated in **Section 5.4.1**, the following stiffness values are recommended for design purposes:

- Vertical Undrained Stiffness

$$E_u = 31{,}500 + 2{,}115\ z\ kPa$$

- Horizontal Undrained Stiffness

$$E_u = 70{,}000 + 4{,}700\ z\ kPa$$

- Vertical Drained Stiffness

$$E' = 25{,}000 + 1{,}692\ z\ kPa$$

- Horizontal Drained Stiffness

$$E' = 56{,}000 + 3{,}760\ z\ kPa$$

5.4.7 Summary of Soil Parameters

Table 5.12: London Clay Recommended Design Parameters

Unit Weight	γbulk	20	kN/m3
Undrained Shear Strength	Su	70 + 4.7z	kPa
Undrained Vertical Stiffness	Eu	31,500 + 2,115 z	kPa
Drained Vertical Stiffness	E'	25,000 + 1,692 z	kPa
Undrained Horizontal Stiffness	Eu	70,000 + 4,700 z	kPa
Drained Horizontal Stiffness	E'	56,000 + 3,760 z	kPa
Peak friction angle	Ø'pk	25	°
Peak effective cohesion	c'pk	2	kPa
Critical state friction angle	Ø'cs	23	°
Critical state effective cohesion	c'cs	0	kPa
Where z is the depth below the surface of the stratum			

5.5 Ground Aggressivity

The proposed foot and cycle bridge is a temporary structure and therefore corrosion and attack on buried concrete from aggressive ground is not anticipated to be significant. To evaluate the class of ground aggressivity to concrete, testing was carried out on 8 No. samples. To determine the sulphate and ground aggressivity class, characteristic values of water soluble sulphate, total potential sulphate and pH were derived in accordance with BRE (2005). The characteristic values are presented in the table below for the deep foundation strata (London Clay).

It should be noted that this testing was specific to the London Clay and although anticipated to be less onerous, the upper layers of Made Ground and River Terrace Deposits (if in contact with the proposed foundation solution) will provide a different groundwater condition and aggressivity risk. However it is also noted that the proposed temporary nature of the structure is such that any significant degradation of concrete is unlikely to occur during the proposed life of the structure.

Table 5.13: Soil Aggressivity Characteristic Results and Concrete Classification

Strata	Depth Range (mbgl)	No. Samples	Water Soluble SO4 (mg/l)	Total Potential Sulphate (%)	pH	Sulphate Class	ACEC Class
London Clay	6 – 22	8	250	1.74	8.35	DS-4	AC-3s

For deep foundations where concrete will be in contact with London Clay, the results indicate a requirement for a concrete mix design sulphate class of DS-4 with an aggressive chemical environment for concrete class (ACEC) of AC-3s.

5.6 Summary of Engineering Properties

Table 5.14 below summarises the ground model and characteristic soil parameters that can be used in design at the site.

Note: Geotechnical parameter selection is dependent on the actual context of the design; in this respect it is recommended that a Geotechnical Engineer reviews all final parameter selection within any detailed design stage calculations being carried out by other discipline engineers. Where available, a Geotechnical Design Report (GDR) for the particular design application should also be referenced in preference to this table of suggested geotechnical design parameters.

Table 5.14: Design Soil Parameters

Deposit/Stratum	γ_{BULK} (kN/m^3)	γ_{SAT} (kN/m^3)	ϕ'_{peak} (°)	ϕ'_{crit} (°)	S_u (kPa)	c' (kPa)	m_v (m^2/MN)	c_v (m^2/year)	E_u (MPa)	E'_d (MPa)	BRE Class
Made Ground	17	17	-	28	25	0	-	-	6.25	5.0	-
Alluvium	18	18		25	35	1	0.3	-	8.0	6.4	-
River Terrace Deposits	17	19	37	32	-	0	-	-	-	30	-
London Clay	20	20	25	23	70+4.7 z	0 - 2	0.04 - 0.08	2 - 7	V:32+2z H: 70+4.7z	V:25+1.7z H:56 + 3.8z	DS-4, AC3s

Z is the depth below the datum elevation 0.0mOD

6 Groundwater Monitoring

A summary of the groundwater strikes is provided within Section 4. Groundwater monitoring standpipes were installed in exploratory holes BH101, BH102. A summary of the groundwater monitoring instruments and response zones are presented in below.

Table 6.1: Groundwater Summary

Exploratory Hole Reference	Screen Depth (mbgl)	Date	Groundwater depth (m bgl)	Groundwater depth (m OD)	Strata water encountered within
BH101(1)	3.0 - 6.0	20/05/2020	2.45	2.16	River Terrace Deposits
		17/06/2020	3.40	1.21	
BH101(2)	1.0 - 1.5	20/05/2020	Dry	Dry	Made Ground
		17/06/2020	Dry	Dry	
BH102(1)	2.3 - 5.3	20/05/2020	4.93	0.02	River Terrace Deposits
		03/06/2020	5.11	-0.16	
		17/06/2020	5.02	-0.07	
BH102(2)	0.7 - 1.5	20/05/2020	Dry	Dry	Made Ground
		03/06/2020	Dry	Dry	
		17/06/2020	Dry	Dry	

The groundwater monitoring results show that no groundwater was recorded within the Made Ground. Groundwater was recorded within the Kempton Park Gravel generally at approximately 5.0m bgl on the north Side of the river and generally at 2.5m - 3.4m bgl on the south Side.

7 Geotechnical Risk Register

A geotechnical risk register (Table 7.2) has been updated for the scheme in order to identify potential hazards, the probability of the hazard occurring, impact and risk rating. In addition, an estimate of cost implications if the risk occurred prior to the implementation of risk control measures is provided (Table 7.1).

It is a very simple qualitative risk assessment and should not be viewed as definitive. This Risk Assessment reflects the current level of understanding of the geotechnical aspects of the scheme and will be subject to revision. It is a generalised risk register that covers the main risks for construction. Risk rating is defined by the following relationship:

Risk rating (R) = Probability (P) x Impact (I).

Table 7.1: Risk Assessment Criteria and Rating

Risk (R) = Probability (P) x Impact (I)

Probability (P)		**Impact (I)**	
Very likely	5	Very high	5
Probable	4	High	4
Possible	3	Medium	3
Unlikely	2	Low	2
Negligible	1	Very Low	1

Table 7.2: Geotechnical Risk Register

Hazard / Risk	Cause	Consequence(s)	Pre-Control			Mitigation	Post-Control		
			P	I	R		P	I	R
Unforeseen ground conditions	-Inadequate site investigation data /unusual ground conditions -Ground contamination.	-Increased geotechnical risk -Conservative design approach -Delay in construction -Further site investigation required -Damage to pavement / structure -Additional cost of remediation	3	3	9	-Appropriate ground investigation coverage with contamination risk assessment. -Appropriate design parameters and design methods.	1	1	1
Excessive settlement of foundations	-Weak, compressive ground -Poor subgrade.	-Structural damage due to excessive deformation -Potential cost of remedial measures -Delay in construction	3	4	12	-Adequate and appropriate ground investigation. -Adopt appropriate geotechnical parameters for design. -Appropriate design.	2	2	4
Fluvial action and erosion	- Scour of river foundations	- Settlement and instability of river structures.	3	4	12	-Bathymetric study of the river channel profile -Scour assessment of bridge foundations from river channel action	1	2	2
Pollution of Environment	-Disturbance of contaminated sediment on river bed during piling and contamination with river water. - creation of cross/contamination vertical pathways	-Potential contamination of river water -Impact on adjacent ecology -Legal liability for nuisance, etc.	2	2	4	-Use of appropriate construction method to minimise/reduce risk of developing pathway for contaminants	2	2	4
Damage to known and unmarked services	-Inaccurate / no service plans. -Damage caused by construction activity. -Ground investigation works within easements specified by service providers.	-Damage to utilities -Health and safety risk to site personnel and general public -Buildability constraints and issues -Utilities temporarily unavailable -Environmental impact from spillages such as oil or sewerage -Litigation	3	4	12	- Services plans to be sourced / produced prior to construction works commencing. - Protect or divert services prior to construction works beginning on site. - All work locations to be scanned for services prior to work commencing. - Be aware of easements specified by utility owner/provider.	1	4	4

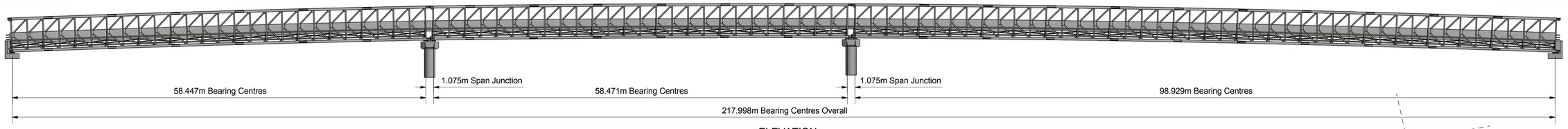
Appendix A
Drawings

Apex End of Bridge
Free Bearing

South Side of Thames

Base End of Bridge
Fixed Bearing

North Side of Thames



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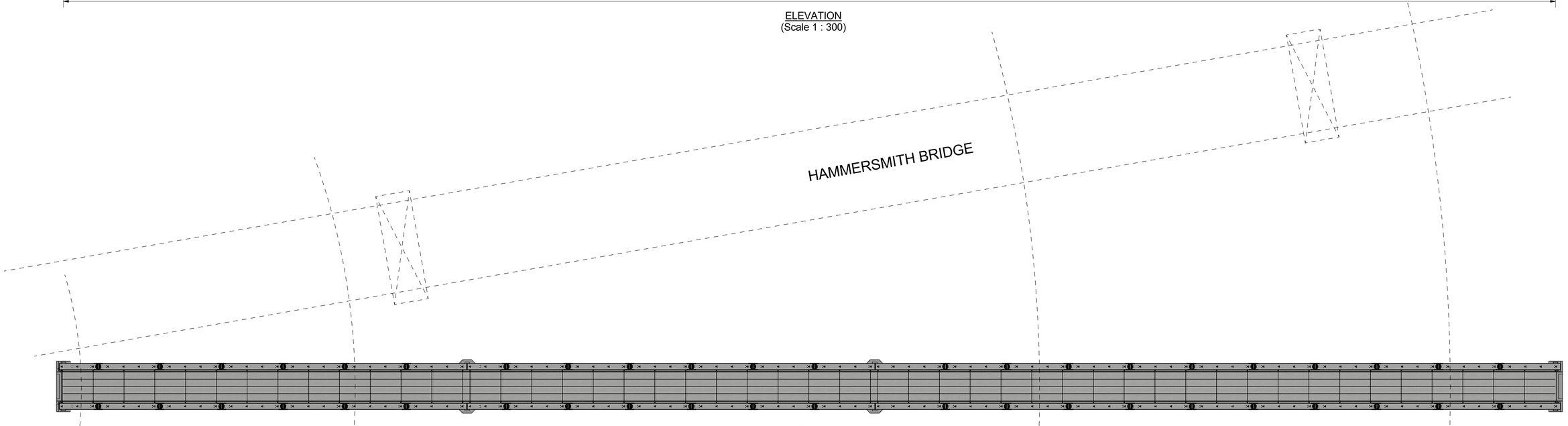

PLAN
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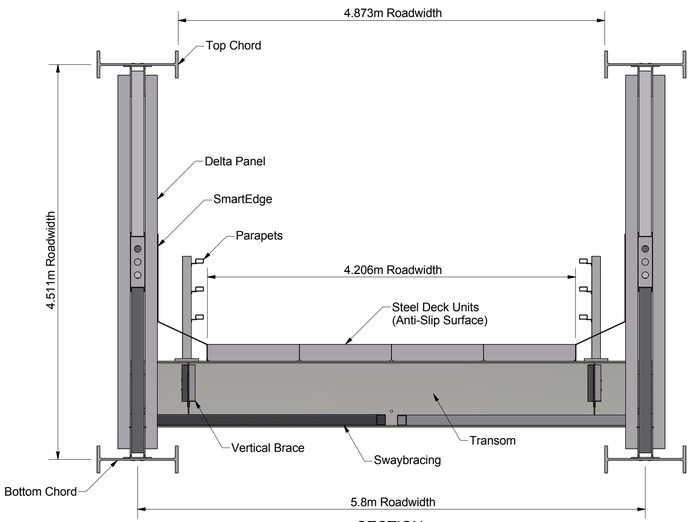

SECTION
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Revision	Details	Drawn By	Checked By	Auth By	Date
A	Original	PAP	NMI	-	27/08/2019

Preliminary

This drawing is indicative only.
All details may be subject to change at final design stage.

Scale: As shown
Do not scale from this drawing
Original sheet size = A1 (841x594mm)

Title:

Mabey Delta Bridging

General Arrangement for a Multi Span (6.5/SJ/6.5/SJ/11 Bay) 218m Bridge
4.2m Roadwidth - 9130289 Construction - Steel Deck Units with Anti-Skid
Complete with SmartEdge & P2 Type Parapets

Ramboll UK Ltd — United Kingdom

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Mabey Bridge
Unit 9 Lydney Harbour Estate, Harbour Road
Lydney, Gloucestershire, GL15 4EJ
☎: +44 (0)1291 623801
www.mabeybridge.com

Drawing No: 23677-P-100

Rev. A

Appendix B
Socotec Factual Report

HAMMERSMITH BRIDGE

FACTUAL REPORT ON GROUND INVESTIGATION

Report No G0015-20

July 2020

Issue No 1

Carried out for:
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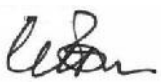
Report No G0015-20

June 2020

ISSUE No DATE	STATUS	PREPARED BY	CHECKED BY	APPROVED BY
1 June 2020	Draft report	NAME and QUALIFICATIONS S Nicol MSc	NAME and QUALIFICATIONS L W Brown MSc CEng MICE	NAME and QUALIFICATIONS L W Brown MSc CEng MICE
		SIGNATURE	SIGNATURE	SIGNATURE
1 July 2020	Final report	NAME and QUALIFICATIONS S Nicol MSc	NAME and QUALIFICATIONS L W Brown MSc CEng MICE	NAME and QUALIFICATIONS L W Brown MSc CEng MICE
		SIGNATURE 	SIGNATURE 	SIGNATURE 

SOCOTEC UK Limited was formerly known as Environmental Scientifics Group Limited. The Certificate of Incorporation on Change of Name was filed on 16 October 2017.

CONTENTS

1 INTRODUCTION

SOCOTEC UK Limited was commissioned in February 2020 by Pell Frischmann Consulting Engineers Ltd (PFCE), to carry out a ground investigation for the construction of a temporary pedestrian footbridge during the refurbishment of Hammersmith Bridge, London. The investigation was required to obtain geotechnical and geo-environmental information.

The scope of the investigation was specified by PFCE and comprised the following:

- Two cable percussion boreholes to a depth of 40m;
- Two CPTs to be undertaken in close proximity to the above boreholes. It was agreed that these would be performed through the bases of cable percussion boreholes pre-drilled through superficial materials. A third proposed CPT was temporarily postponed by the Client.

The investigation was performed in accordance with the contract specification, and the general requirements of BS 5930 (2015), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant related standards identified below. The boreholes were drilled between 4th and 15th May 2020. The CPT work was undertaken on 19th May 2020.

This report presents the factual records of the fieldwork, monitoring and laboratory testing. The information is also presented as digital data as defined in AGS (2017).

2 SITE SETTING

2.1 Location and Description

The fieldwork took place on two separate sites on the north and south banks of the Thames, in the vicinity of the existing Hammersmith Bridge.

On the north side (Hammersmith) the site was an essentially level grassed area. The approximate National Grid Reference was TQ231782.

On the south side (Richmond) the site was immediately adjacent to the existing bridge towards the bottom end of an access ramp towards the Thames footpath. The approximate National Grid Reference was TQ229780.

2.2 Published Geology

Reference to the BGS GeoIndex Onshore online viewer (2020) shows the site lies close to the boundary of Alluvium and the Kempton Park Gravel Member, a River Terrace Deposit. These superficial materials are underlain by the London Clay Formation.

3 FIELDWORK

3.1 General

The exploratory hole locations were selected by PFCE and set out from local features. The co-ordinates and ground levels of the positions were surveyed by SOCOTEC to National Grid and Ordnance Datum, and are presented in the logs in Appendix B. The approximate exploratory hole locations are shown on the Site Plan in Appendix A.

3.2 Exploratory Holes

The exploratory holes are listed in the following table.

TABLE 1 : SUMMARY OF EXPLORATORY HOLES

TYPE	BH	DEPTH (m)	INSTALLATION	REMARKS
Cable Percussion Drilling	BH101	40.38	Two 50mm diameter standpipes installed to 1.50m and 6.00m respectively	
	BH102	40.45	Two 50mm diameter standpipes installed to 1.50m and 5.30m respectively	
	CPT101 (pre-drill)	8.50		
	CPT102 (pre-drill)	6.00		
Cone Penetration Testing	CPT101			CPT test could not be undertaken due to limited access
	CPT102	16.80		
	CPT103			CPT103 was temporarily removed due to the restricted access at its proposed location as the site compound for the works to Hammersmith Bridge was at the time of the investigation located on the north side of the bridge

The exploratory hole logs are presented in Appendix B. These include descriptions of the strata encountered together with details of the equipment and methods used, sampling and field testing carried out, water depths and other field observations. Explanation of the terms and abbreviations used on the logs is given in the Key to Exploratory Hole Records in Appendix B, along with other explanatory information. Soil and rock material descriptions are in accordance with BS EN ISO 14688-1 (2018), BS EN ISO 14689 (2018) and the guidance of BS 5930 (2015).

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011) and the SPT hammer energy ratio certificate is included in Appendix B. The results are presented on the logs as uncorrected N values.

The CPT results are included as a stand-alone report in Appendix B.

On completion of the fieldwork, geotechnical samples were transported to the Maidstone office of SOCOTEC for temporary retention, with those required for testing being transferred to the

SOCOTEC laboratory at Carcroft, near Doncaster. Geoenvironmental samples were transported from site directly to the SOCOTEC laboratory at Bretby, near Burton-on-Trent.

3.3 Groundwater and Gas Monitoring

Gas and groundwater monitoring instrumentation was installed in selected boreholes, as requested by the Client. Details are shown on the logs and summarised in Appendix C. Records of monitoring carried out by SOCOTEC during and after the fieldwork period are also presented in Appendix C and summarised in the table below.

TABLE 2 : SUMMARY OF MONITORING

TYPE	DATE	REMARKS
Gas/Groundwater Monitoring Visit	03/06/20	Access not available to BH101
Gas/Groundwater Monitoring Visit	17/06/20	

4 LABORATORY TESTING

4.1 Geotechnical Testing

Geotechnical laboratory testing was scheduled by the Client and was carried out in accordance with BS 1377 (1990), BS EN ISO 17892 (2014) Part 1 and 2 and ISRM (2007) unless otherwise stated within the test report. The testing is summarised below and the results are presented in Appendix D.

TABLE 3 : SUMMARY OF GEOTECHNICAL LABORATORY TESTING

TYPE	QUANTITY	REMARKS
Water Content Determination	16	
Atterberg Limit Determination	16	
Particle Size Distribution Analysis – wet sieve	8	
Particle Size Distribution Analysis – sedimentation	4	
pH, Water Soluble Sulphate Content, Acid Soluble Sulphate and Total Sulphur of soils	8	
Unconsolidated Undrained Triaxial Compression Testing	13	
Hand Vane	13	
Determination of shear strength by direct shear	1	Requested test at BH101 5.7-6.2m not undertaken due to insufficient sample

4.2 Geoenvironmental Testing

Geoenvironmental laboratory testing was scheduled by the Client on the soil samples recovered during the fieldwork and water samples taken by SOCOTEC from the installations. The testing is summarised in the table below and the results are presented in Appendix E.

TABLE 4 : SUMMARY OF GEOENVIRONMENTAL LABORATORY TESTING

TYPE	QUANTITY	REMARKS
Suite A – Soils	14	
Suite A – Water	1	

5 REFERENCES

AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.

BGS England and Wales Sheet 270 : 1975 : South London. 1:50000 geological map (solid and drift) (Bedrock and Superficials). British Geological Survey.

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BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution.

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BS EN ISO 14688-1:2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description.

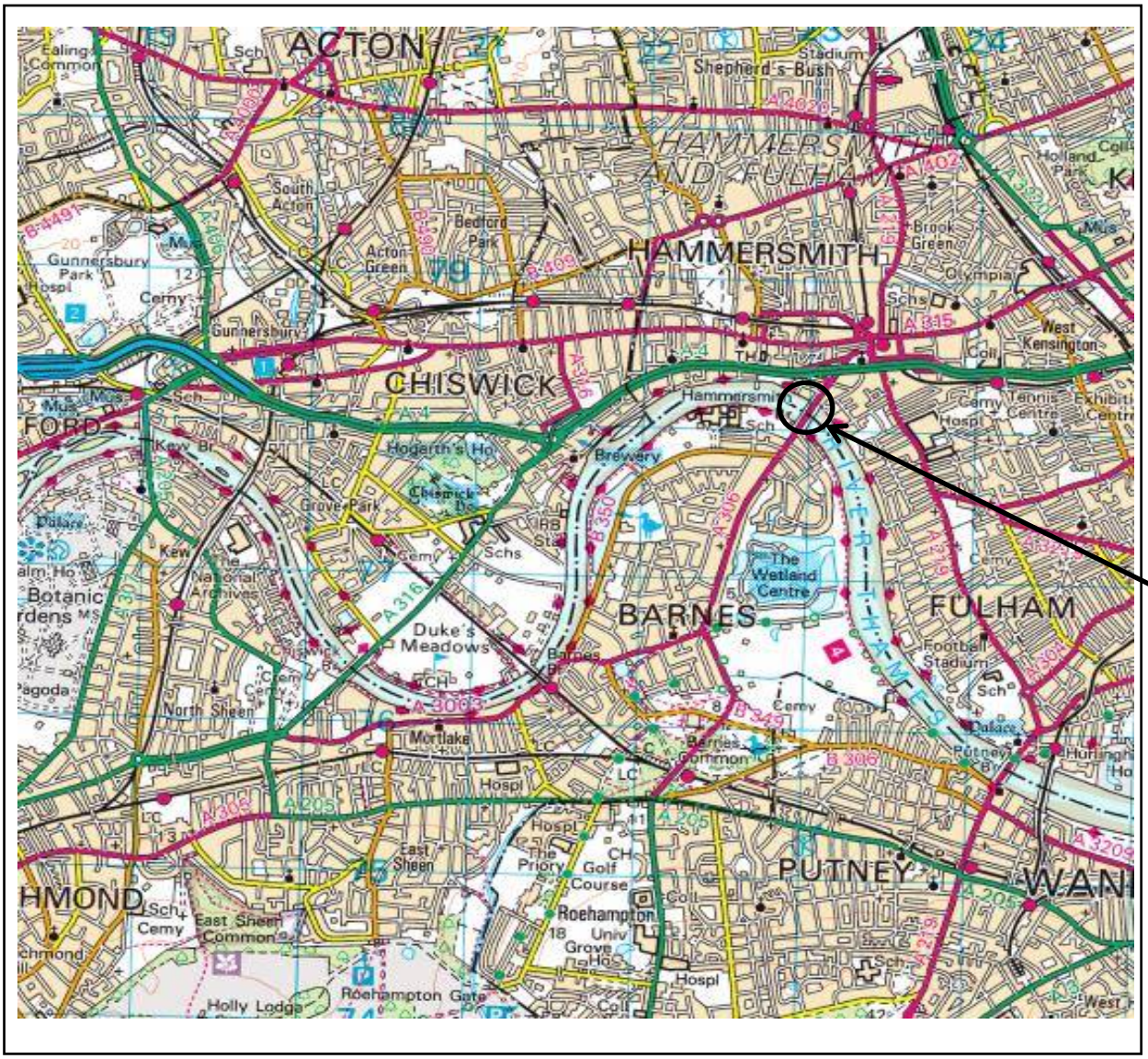
BS EN ISO 14688-2:2018 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification.

BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.

BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

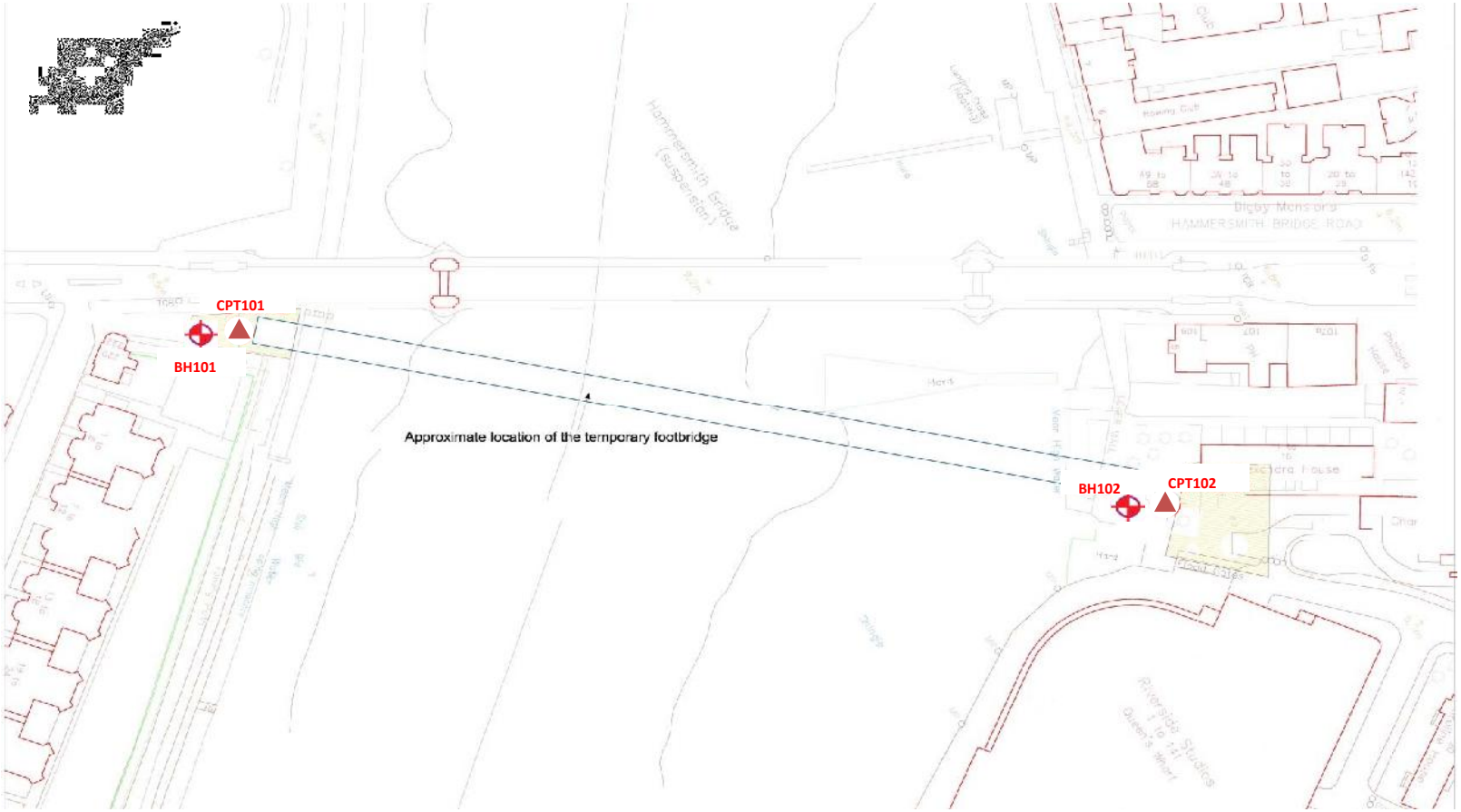
APPENDIX A
FIGURES AND DRAWINGS

Site Location Plan



Notes: Scale 1:50 000	**Project** Hammersmith Bridge, London **Project No.** G0015-20 **Carried out for** Pell Frischmann	**Figure** A1

Borehole Location Plan



Project	Hammersmith Bridge, London	Figure
Project No.	G0015-20	A2
Carried out for	Pell Frischmann	

APPENDIX B
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
SPT Hammer Energy Ratio Report	SPT Hammer Ref EQU2383
Borehole Logs	BH101 & BH102, CPT101 & CPT102 (pre-drill)
CPT Report	No. M0012-20

Key to Exploratory Hole Records

SOCOTEC

SAMPLES

Undisturbed

U	Driven tube sample	nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample from dynamic (windowless) sampling. Full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
C / CS	Core sample (from rotary core) taken for laboratory testing.	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that, while an attempt was made to take a tube sample, there was no recovery.

Samples taken from borehole installations (ie water or gas) after hole construction are not shown on the exploratory hole logs.

Specimens for point load testing undertaken on site (or other non-lab location) are not shown on the log.

IN SITU TESTS

SPT S or SPT C — Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011.
The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930:2015

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacing measurements are presented.
NI	The term non-intact (NI) is used where the core is fragmented.
NA	Used where a measurement is not applicable (eg. If, SCR and RQD in non-rock materials).

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss

GROUNDWATER

▼	Groundwater entry
▽	Depth to groundwater after standing period

Key to Exploratory Hole Records

INSTALLATION Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

Standpipe/ piezometer The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe
SPIE	Standpipe piezometer
PPIE	Pneumatic piezometer
EPIE	Electronic piezometer

Plain Pipe 

Slotted Pipe 

Piezometer Tip 

Inclinometer or Slip Indicator The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:

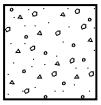
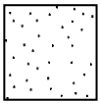
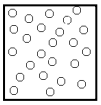
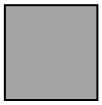
ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator

Settlement Points or Pressure Cells The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

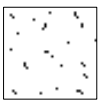
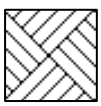
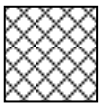
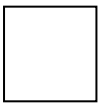
The type of instrument installed is indicated by a code in the Legend column:

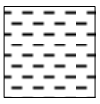
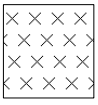
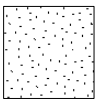
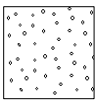
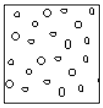
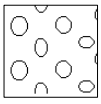
ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

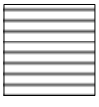
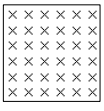
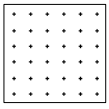
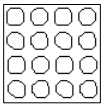
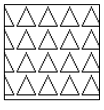
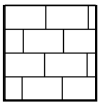
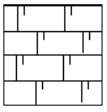
INSTALLATION / BACKFILL LEGENDS A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.

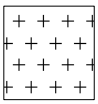
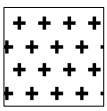
Macadam 
Concrete 
Grout 
Bentonite 
Sand 
Gravel 
Arisings 

STRATUM LEGENDS The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols may be used.

Macadam 
Concrete 
Topsoil 
Made Ground / Fill 
Peat 
Void or No Information 

Clay 
Silt 
Sand 
Gravel 
Cobbles 
Boulders 
Coal 

Mudstone 
Siltstone 
Sandstone 
Conglomerate 
Breccia 
Limestone 
Chalk 

Igneous (Fine) 
Igneous (Med) 
Igneous (Coarse) 
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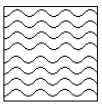
Metamorphic (Med) 
Metamorphic (Coarse) 
Tuff 

Notes:

See report text for full references of standards.

Updated October 2017

Project Hammersmith Bridge, London

Project No. G0015-20

Carried out for Pell Frischmann

Key

Key to Exploratory Hole Records

SOCOTEC

NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1:2002+A1:2013 and 14689-1:2003 respectively as amplified by BS 5930:2015.

2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.

3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs. However, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.

6 Observations of discernible groundwater entries during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

7 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

REFERENCES

1 BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution

2 BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock. Part 1 Identification and description. British Standards Institution

3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution

4 BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution

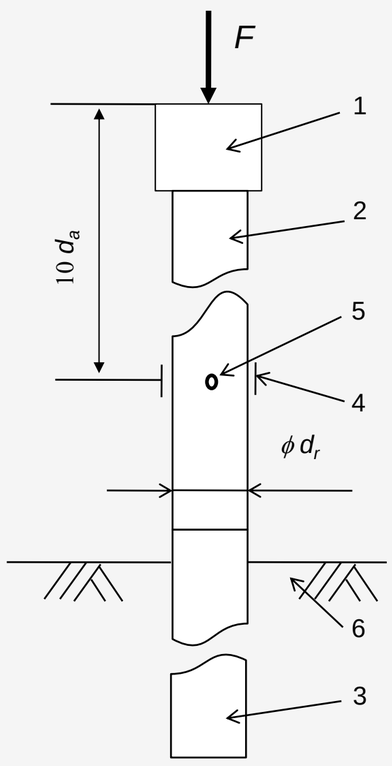
SPT Calibration Report

Hammer Energy Measurement Report

Type of Hammer	SPT HAMMER
Test No	EQU2383
Client	GAP DRILLING
Test Depth (m)	4.70
Mass of hammer	m = 63.5kg
Falling height	h = 0.76m
E_{theor} =	$m \times g \times h$ = 473J

Characteristics of the instrumented rod

Diameter	d_r = 0.052 m
Length of instrumented rod	0.558 m
Area	A = 11.61 cm²
Modulus	E_a = 206843 MPa



Key

1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

F Force
d_r Diameter of rod

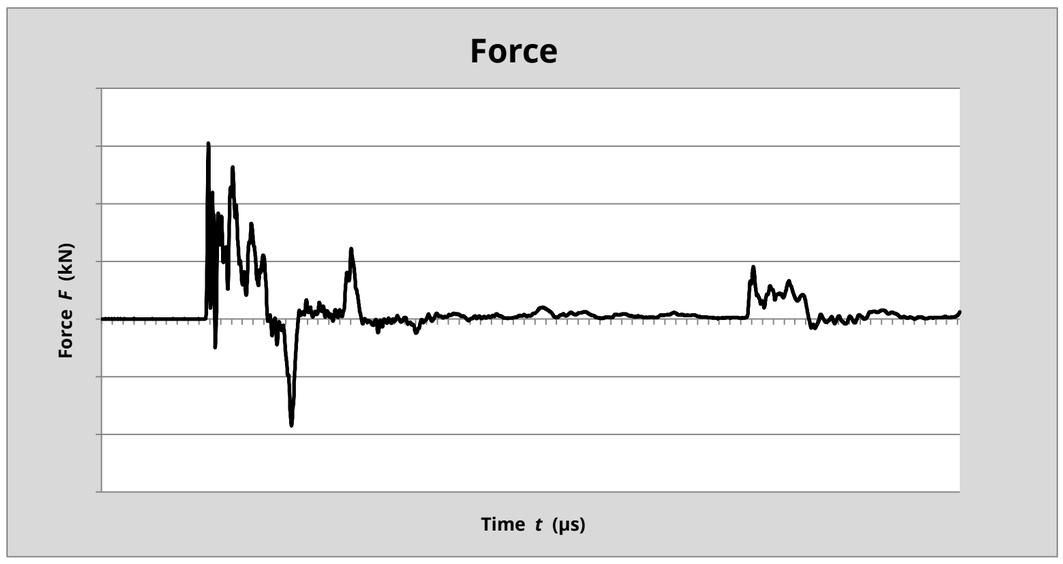
Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

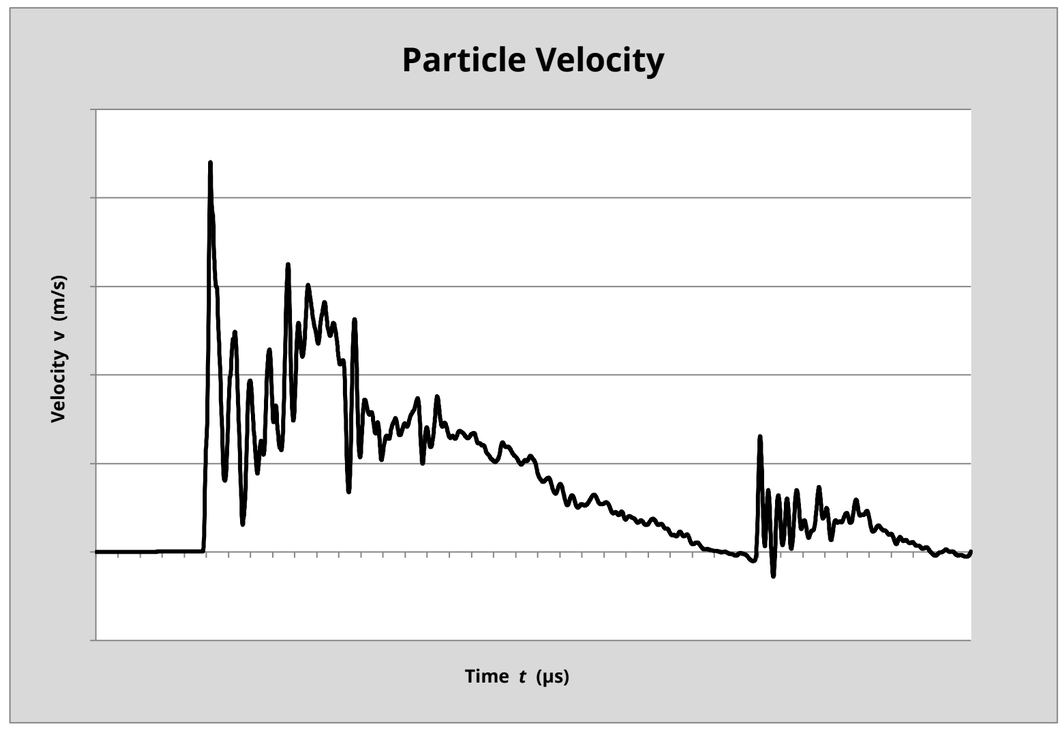
DATE OF TEST	VALID UNTIL	HAMMER ID
15/08/2019	14/08/2020	DD15

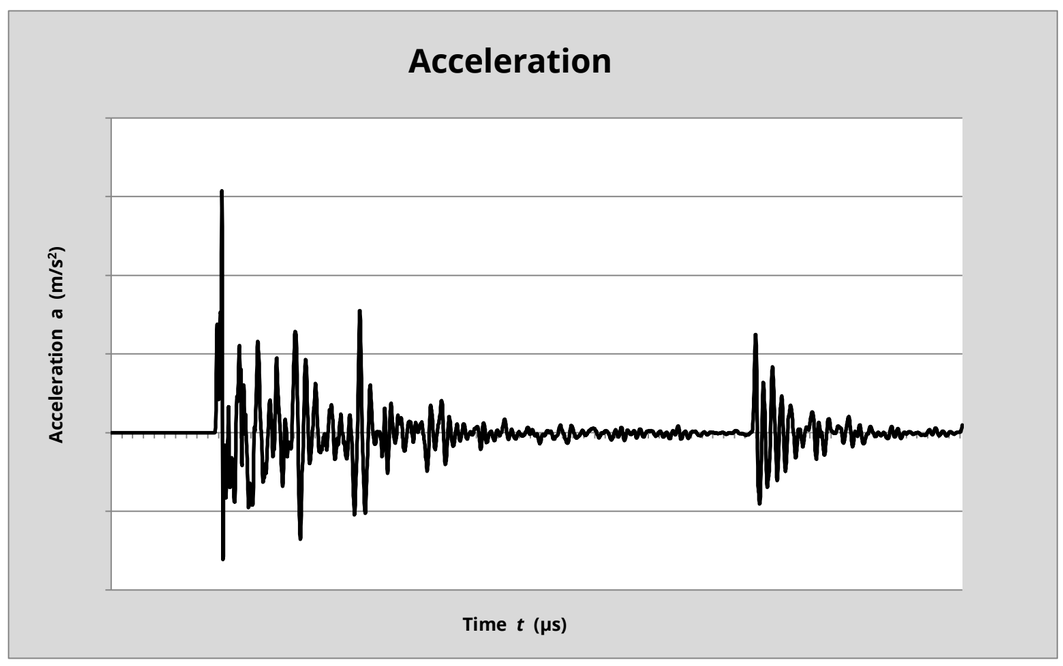
Observations:
1.

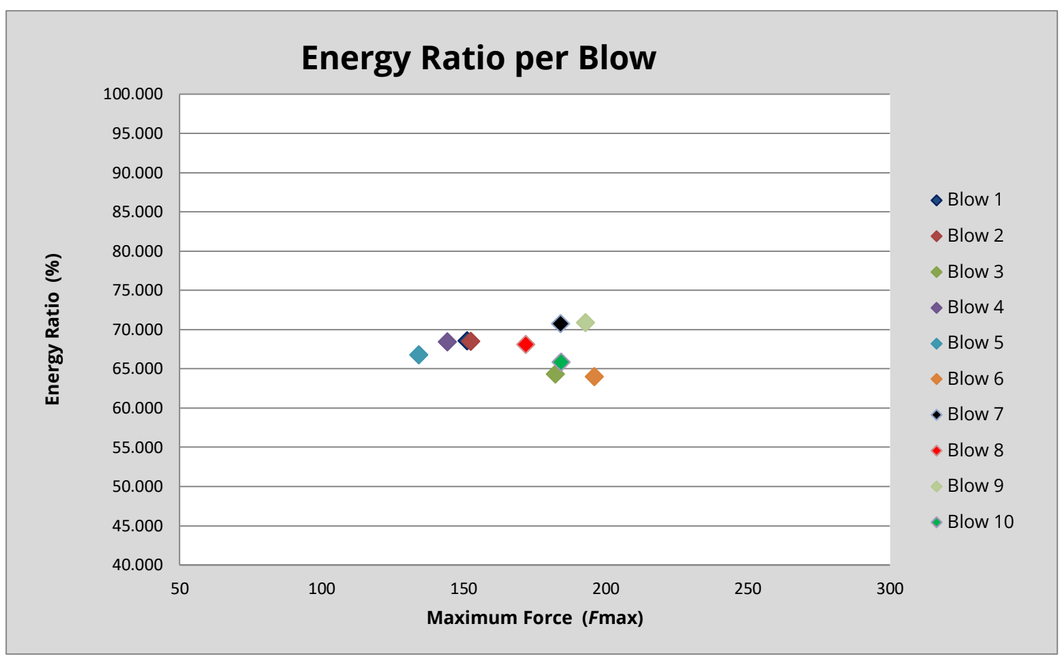
E_{meas} = **0.319** kN-m

E_{theor} = **0.473** kN-m









Energy Ratio (Er) = $\frac{E_{meas}}{E_{theor}}$ **67.40%**

Equipe SPT Analyzer Operator	Certificate prepared by	Certificate checked by	Certificate date
KS	21/08/2019	21/08/2019	**21/08/2019**

 Equipe Group, The Paddocks, Home Farm Offices, The Upton Estate, Banbury, Oxfordshire, OX15 6HU
Tel: +44 (0)1295 670990 Fax: +44 (0)1295 678232 Email: info@equipegroup.com

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.61 mOD
Logged	DB	12/05/2020	D150	0.00	40.38	200	9.00	**Coordinates (m)**	E 522920.27
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.38m. No groundwater strikes recorded.					**National Grid**	N 177988.12
Approved	LWB	15/05/2020							

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water
			12/05/20	1230
0.20 - 0.70	B 2		0.00	Dry
0.30	PID	0.0 ppmv (1)		
0.30	ES 1			
0.50	PID	0.0 ppmv (2)		
0.50	ES 3			
0.70 - 1.20	B 4			
1.00	PID	0.0 ppmv (3)		
1.00	ES 5			
1.20 - 1.65	SPTS	N=6 (1,1/1,2,1,2)	0.00	Dry
1.20	D 6			
1.50	PID	0.0 ppmv (4)		
1.50	ES 7			
2.00 - 2.45	SPTS	N=4 (1,0/1,1,1,1)	2.00	Dry
2.00	PID	0.0 ppmv (5)		
2.00	ES 8			
2.00	D 9			
2.40 - 2.80	B 10			
2.50	PID	0.0 ppmv (6)		
2.50	ES 11			
2.90	D 12			
3.00 - 3.45	UT 13	6 blows		
3.00 - 3.40	B 15			
3.40 - 4.00	B 17			
3.45 - 3.50	D 14			
4.00 - 4.45	SPTS	N=8 (1/1,2,2,3)	3.50	Dry
4.00	D 16			
4.50	PID	0.0 ppmv (7)		
4.50	ES 18			
			12/05/20	1700
			4.50	Dry
5.00 - 5.45	SPTC	N=9 (1,2/2,2,2,3)		
5.00 - 5.50	B 19		13/05/20	0800
			4.50	3.30
5.70 - 6.20	B 20			
6.50 - 6.95	SPTC	N=26 (3,5/7,8,5,6)	6.50	3.60
6.50 - 6.95	B 21			
7.50	D 22			
8.00 - 8.45	SPTS	N=9 (3,4/2,2,2,3)	8.00	Damp
8.00	D 23			
8.10 - 8.50	B 24			
8.50 - 8.95	UT 58	25 blows		
8.50	D 25			
8.95 - 9.00	D 26			
9.50	D 27			

Strata Description

Main	Detail	Depth, Level (Thickness)	Legend	Backfill
Light orange brown slightly sandy silty fine to coarse angular to predominantly rounded flint GRAVEL. (MADE GROUND)		(0.15) 0.15 +4.46		
Brown gravelly silty fine to coarse SAND with low cobble content. Gravel is fine to coarse angular to rounded flint, brick and concrete. Cobbles are red brick. (MADE GROUND)	0.50 With rare glass fragments (10-15mm) and occasional red ceramic tile fragments (10-20mm)	(1.25) 1.40 +3.21		
Soft locally firm orange mottled brown sandy gravelly CLAY. Occasional glass, pottery and bivalve shell (oyster?) fragments. (MADE GROUND/REWORKED LONDON CLAY?)		(0.60) 2.00 +2.61		
Soft grey brown slightly gravelly sandy SILT with rare red brick cobbles Gravel is fine to coarse angular and subangular red brick. (MADE GROUND)	2.40 Becoming very sandy.	(0.90) 2.90 +1.71		
Soft grey CLAY grading to loose grey slightly sandy SILT. (ALLUVIUM)		(2.80) 5.70 -1.09		
Medium dense multicoloured sandy to very sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse angular to rounded flint. RIVER TERRACE DEPOSITS)		(2.40) 8.10 -3.49		
Firm quickly becoming stiff to very stiff fissured locally thinly laminated grey CLAY with occasional light grey silt partings. Fissures very closely spaced, tight. (LONDON CLAY)	7.80 Becoming slightly clayey. 8.10-8.40 Firm slightly sandy. Sand is fine.			

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks
0.00 - 6.00	50mm standpipe installed.
0.00 - 1.50	50mm standpipe installed.
5.70 - 8.10	Water added to assist drilling.

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

17/07/2020 11:16:06

Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH101

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.61 mOD
Logged	DB	12/05/2020	D150	0.00	40.38	200	9.00	**Coordinates (m)**	E 522920.27
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.38m.					**National Grid**	N 177988.12
Approved	LWB	15/05/2020	No groundwater strikes recorded.						

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00 - 10.45 10.00	SPTS D 28	N=21 (3,3/4,5,5,7)	8.00	Dry	Firm quickly becoming stiff to very stiff fissured locally thinly laminated grey CLAY with occasional light grey silt partings. Fissures very closely spaced, tight. (LONDON CLAY)				
11.00	D 29								
11.50 - 11.95	UT 59	40 blows							
11.95 - 12.00	D 30								
12.50	D 31								
13.00 - 13.45 13.00	SPTS D 32	N=30 (4,4/6,7,8,9)	9.00	Dry					
14.00	D 33								
14.50 - 14.95	UT 60	40 blows							
14.95 - 15.00	D 34					14.70-16.00 With occasional lenses of fine grey sand.			
15.50	D 35						(14.40)		
16.00 - 16.45 16.00	SPTS D 36	N=30 (2,5/6,7,8,9)	9.00	Dry					
17.00	D 37								
17.50 - 17.95	UT 61	50 blows							
19.00 - 19.45 19.00	SPTS D 38	N=34 (3,6/7,8,9,10)	9.00	Dry					

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH101

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.61 mOD
Logged	DB	12/05/2020	D150	0.00	40.38	200	9.00	**Coordinates (m)**	E 522920.27
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.38m. No groundwater strikes recorded.					**National Grid**	N 177988.12
Approved	LWB	15/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
20.00	D 39				Firm quickly becoming stiff to very stiff fissured locally thinly laminated grey CLAY with occasional light grey silt partings. Fissures very closely spaced, tight. (LONDON CLAY)				
20.50 - 20.90	UT 62	55 blows							
20.90 - 20.95	D 40								
21.50	D 41								
22.00 - 22.45	SPTS	N=34 (4,6/7,8,9,10)	9.00	Dry					
			13/05/20 9.00	1700 Dry					
			14/05/20 9.00	0800 Dry	Very stiff fissured grey CLAY with occasional light grey silt partings. Fissures are very closely spaced, tight. (LONDON CLAY)	22.50 Rare iron pyrite nodule (15mm x 7mm).	22.50 -17.89		
23.00	D 42								
23.50 - 23.90	UT 63	70 blows							
23.90 - 23.95	D 43								
24.50	D 44								
25.00 - 25.45 25.00	SPTS D 45	N=35 (4,5/6,9,9,11)	9.00	Dry					
26.00	D 46								
26.70 - 27.15	UT 64	70 blows				26.40-26.60 Light grey mudstone band.			
27.15 - 27.20	D 47								
27.50	D 48								
28.00 - 28.45 28.00	SPTS D 49	N=46 (6,9/8,12,12,14)	9.00	Dry		27.80 Rare iron pyrite nodule (10mm x 16mm).			
29.00	D 50								
29.50 - 29.95	UT 65	80 blows							
29.95 - 30.00	D 51								

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH101

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.61 mOD
Logged	DB	12/05/2020	D150 Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.38m. No groundwater strikes recorded.	0.00	40.38	200	9.00	**Coordinates (m)**	E 522920.27
Checked	LB	**End**						**National Grid**	N 177988.12
Approved	LWB	15/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
					Very stiff fissured grey CLAY with occasional light grey silt partings. Fissures are very closely spaced, tight. (LONDON CLAY)				
30.50	D 52								
31.00 - 31.45 31.00	SPTS D 53	51 (6,8/11,11,13,16 for 70mm)	9.00	Dry			(17.88)		
32.00	D 54								
32.50 - 32.85	UT 66	80 blows							
32.85 - 32.90	D 55								
33.50	D 56								
34.00 - 34.45 34.00	SPTS D 57	50 (7,9/11,13,13,13 for 70mm)	9.00	Dry					
35.00	D 67								
35.50 - 35.95	UT 68	80 blows							
35.95 - 36.00	D 69								
36.50	D 70								
37.00 - 37.45 37.00	SPTS D 71	N=48 (5,7/9,12,12,15)	9.00	Dry		37.00-37.30 Band of light grey mudstone.			
38.00	D 72								
38.50 - 38.95	UT 73	80 blows							
38.95 - 39.00	D 74								
39.50	D 75								

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH101

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.61 mOD
Logged	DB	12/05/2020	D150	0.00	40.38	200	9.00	**Coordinates (m)**	E 522920.27
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.38m. No groundwater strikes recorded.					**National Grid**	N 177988.12
Approved	LWB	15/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date / Casing	Time / Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
40.00 - 40.38 40.00	SPTS D 76	50 (6,9/13,17,20 for 0mm)	9.00 14/05/20 9.00 15/05/20 9.00	Dry 1700 Dry 0800 Dry	Very stiff fissured grey CLAY with occasional light grey silt partings. Fissures are very closely spaced, tight. (LONDON CLAY) END OF EXPLORATORY HOLE		40.38 -35.77		

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH101

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.95 mOD
Logged	SN	04/05/2020	D150	0.00	40.45	200	7.00	**Coordinates (m)**	E 523072.73
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.45m					**National Grid**	N 178148.02
Approved	LWB	07/05/2020	No groundwater strikes recorded.						

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
			04/05/20	0800	Grass over firm grey slightly gravelly sandy CLAY. Gravel is medium chert. (TOPSOIL)		0.10 (0.10) +4.85		
			0.00	Dry					
0.30	PID	0.0 ppmv (1)							
0.30	ES 1								
0.30 - 0.70	B 2						(0.60)		
0.50	PID	0.0 ppmv (2)							
0.50	ES 3						0.70 +4.25		
0.70 - 1.20	B 4								
1.00	PID	0.0 ppmv (3)			Brown gravelly to very gravelly SAND with low to medium cobble content. Sand is fine to coarse. Gravel is predominantly subangular to subrounded medium to coarse brick concrete chert. (MADE GROUND)				
1.00	ES 5								
1.20 - 1.65	SPTS	N=3 (1,1/1,0,1,1)	0.00	4.40	Very loose grey sandy silty GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse brick, concrete and mortar with minor glass and chert. (MADE GROUND)				
1.20 - 1.65	D 6						(1.20)		
							1.90 +3.05		
2.00 - 2.45	SPTS	N=21 (1,2/3,6,6,6)	2.00	3.80	Recovered as firm brown slightly gravelly locally sandy CLAY. Sand is fine to medium. Gravel is predominantly subrounded medium chert with minor brick and charcoal(?) fragments. (DISTURBED GROUND)		(0.40)		
2.00	PID	0.0 ppmv (4)							
2.00	ES 7						2.30 +2.65		
2.00 - 2.45	D 8								
3.00 - 3.44	SPTC	50 (3,6/11,15,15,9 for 60mm)	3.00	2.80	Medium dense to very dense brown and orangish brown SAND and GRAVEL. Sand is predominantly medium. Gravel is rounded to subangular medium to coarse chert/flint. (RIVER TERRACE DEPOSIT)				
3.00	PID	0.0 ppmv (5)							
3.00	ES 9								
3.00 - 3.50	B 10						(2.20)		
4.00 - 4.45	SPTC	N=29 (5,4/6,7,8,8)	4.00	Dry					
4.00 - 4.50	B 11								
4.50 - 5.00	B 12				Medium dense brown slightly gravelly to gravelly SAND. Sand is predominantly medium. Gravel is angular to subrounded fine to coarse chert/flint. (RIVER TERRACE DEPOSIT)		4.50 +0.45		1
5.00 - 5.45	SPTS	N=14 (2,4/5,3,3,3)	5.00	Dry			(0.80)		
5.00	PID	0.0 ppmv (6)							
5.00	ES 13								
5.00 - 5.50	B 14						5.30 -0.35		
5.50 - 5.95	UT 15	30 blows			Stiff becoming very stiff fissured brownish grey CLAY. Fissures are very closely spaced, tight, non discoloured. (LONDON CLAY)				
5.95 - 6.00	D 16								
6.00 - 6.50	B 17								
6.20	PID	0.0 ppmv (7)							
6.20	ES 18								
			04/05/20	1700					
			6.00	Dry					
7.00 - 7.45	SPTS	N=18 (1,3/3,4,5,6)							
7.00 - 7.45	D 19		05/05/20	0800					
			7.00	Dry					
8.00	D 20								
9.00 - 9.45	UT 21	30 blows							
9.45 - 9.50	D 22								
						10.00 At 10m: isolated selenite crystal.			

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)
1	4.50	Remained at 4.50 m after 20 minutes.	

Depth Related Remarks

Depths (m)	Remarks
0.00 - 5.30	50mm standpipe installed.
0.00 - 1.50	50mm standpipe installed.
2.00 - 4.50	Water added to assist drilling.

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH102

Sheet 1 of 5

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.95 mOD
Logged	SN	04/05/2020	D150	0.00	40.45	200	7.00	**Coordinates (m)**	E 523072.73
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.45m					**National Grid**	N 178148.02
Approved	LWB	07/05/2020	No groundwater strikes recorded.						

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00	D 23				Stiff becoming very stiff fissured brownish grey CLAY. Fissures are very closely spaced, tight, non discoloured. (LONDON CLAY)				
10.50 - 10.95	SPTS	N=24 (3,4/4,5,7,8)	7.00	Dry					
10.50	D 24								
11.50	D 25								
12.00 - 12.45	UT 26	40 blows							
12.45 - 12.50	D 27								
13.00	D 28								
13.50 - 13.95	SPTS	N=30 (3,4/6,7,8,9)	7.00	Dry		13.50 Below 13.5m: becoming silty.			
13.50	D 29								
14.50	D 30								
15.00 - 15.40	UT 31	60 blows							
15.40 - 15.45	D 32								
16.00	D 33						(21.70)		
16.50 - 16.95	SPTS	N=35 (3,5/7,8,9,11)	7.00	Dry					
16.50	D 34								
17.50	D 35								
18.00 - 18.45	UT 36	65 blows							
18.45 - 18.50	D 37								
19.00	D 38								
19.50 - 19.95	SPTS	N=38 (4,5/8,9,10,11)	7.00	Dry					
19.50	D 39								

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH102

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.95 mOD
Logged	SN	04/05/2020	D150 Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.45m No groundwater strikes recorded.	0.00	40.45	200	7.00	**Coordinates (m)**	E 523072.73
Checked	LB	**End**						**National Grid**	N 178148.02
Approved	LWB	07/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
					Stiff becoming very stiff fissured brownish grey CLAY. Fissures are very closely spaced, tight, non discoloured. (LONDON CLAY)				
20.50	D 40								
21.00 - 21.45	UT 41	70 blows							
21.40 - 21.45	D 42								
22.00	D 43								
22.50 - 22.95 22.50	SPTS D 44	N=45 (5,8/10,10,11,14)	7.00	Dry					
23.50	D 45								
24.00 - 24.45	UT 46	70 blows							
24.45 - 24.50	D 47								
25.00	D 48								
			05/05/20 7.00	1700 Dry		25.10-25.40 Moderately weak variably dark grey and brown claystone.			
25.50 - 25.94 25.50	SPTS D 49	50 (5,7/8,14,15,13 for 60mm)	06/05/20 7.00	0800 Dry					
26.50	D 50								
27.00 - 27.40	UT 51	70 blows			Very stiff fissured grey to dark grey silty CLAY with fine sand on fissure surfaces or as lenses. (LONDON CLAY)		27.00 -22.05		
27.40	D 52								
28.00	D 53								
28.50 - 28.95 28.50	SPTS D 54	N=42 (5,6/8,9,11,14)	7.00	Dry					
29.50	D 55						(5.00)		

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks
25.10 - 25.40	Chiselling technique used to advance borehole.

Hard Boring

Depths (m)	Duration (mins)	Tools used
25.10 - 25.40	15	

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH102

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.95 mOD
Logged	SN	04/05/2020	D150	0.00	40.45	200	7.00	**Coordinates (m)**	E 523072.73
Checked	LB	**End**	Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.45m					**National Grid**	N 178148.02
Approved	LWB	07/05/2020	No groundwater strikes recorded.						

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
30.00 - 30.40	UT 56	75 blows			Very stiff fissured grey to dark grey silty CLAY with fine sand on fissure surfaces or as lenses. (LONDON CLAY)				
30.40 - 30.45	D 57								
31.00	D 58								
31.50 - 31.91	SPTS	50 (6,10/13,15,16,6 for 30mm)	7.00	Dry					
31.50	D 59								
					Very stiff dark grey CLAY locally grading to extremely weak CLAYSTONE. (LONDON CLAY)		32.00 -27.05		
32.50	D 60								
33.00 - 33.10	UT 61	80 blows							
33.10 - 33.20	D 62								
33.50 - 33.85	UT 63	70 blows							
33.85 - 33.90	D 64								
34.50 - 34.88	SPTS	50 (7,10/13,16,21 for 0mm)	7.00	Dry					
34.50	D 65								
35.50	D 66								
36.00 - 36.30	UT 67	80 blows							
36.30 - 36.35	D 68						(8.45)		
37.00 - 37.35	UT 69	80 blows							
37.35 - 37.40	D 70		7.00	Dry					
37.40 - 37.76	SPTS	50 (7,12/14,20,16 for 60mm)							
37.40	D 71								
38.50	D 72								
39.50 - 39.85	UT 73	100 blows							
39.85 - 39.90	D 74								

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH102

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.95 mOD
Logged	SN	04/05/2020	D150 Hand dug inspection pit to 1.2m followed by cable percussion boring to 40.45m No groundwater strikes recorded.	0.00	40.45	200	7.00	**Coordinates (m)**	E 523072.73
Checked	LB	**End**						**National Grid**	N 178148.02
Approved	LWB	07/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date / Casing	Time / Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
40.00 - 40.31 40.00	SPTS D 75	50 (25 for 60mm/16,13,15,6 for 20mm)	07/05/20 7.00	1700 Dry	Very stiff dark grey CLAY locally grading to extremely weak CLAYSTONE. (LONDON CLAY)				
					END OF EXPLORATORY HOLE		40.45 -35.50		

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

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Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

BH102

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	4.51 mOD
Logged	DB	11/05/2020	D150		8.50			**Coordinates (m)**	E 522921.74
Checked	LB	**End**	Hand excavated inspection pit to 1.2m then cable percussion boring to 8.5m. Borehole drilled as pre-drill for CPT101 - no samples or testing.					**National Grid**	N 177990.36
Approved	LWB	11/05/2020							

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
					Sandy, slightly silty fine and medium subrounded flint GRAVEL. Riverside path. (MADE GROUND)	0.10 1" black ribbed plastic ducting, suspected cable.	0.05 (0.05) +4.46 0.10 (0.05) +4.41		
					Pinkish grey sandy fine angular GRAVEL. (MADE GROUND)				
					Greyish brown sandy gravelly CLAY with low cobble content. Gravel is fine to coarse angular to rounded flint and brick. Occasional fine rounded chalk. Cobbles are red brick fragments. (MADE GROUND)		(2.90)		
						2.00-2.30 Band of brown clayey fine and medium SAND.			
					Soft brown mottled grey sandy SILT. (ALLUVIUM)		3.00 +1.51		
						4.00 Becoming very soft.	(2.00)		
					Brown and grey silty fine to coarse SAND. (RIVER TERRACE DEPOSITS)		5.00 -0.49		
							(1.00)		
					Multicoloured fine to coarse SAND and fine to coarse angular to rounded flint GRAVEL. (RIVER TERRACE DEPOSITS)		6.00 -1.49		
							(2.00)		
						7.80 Becoming clayey.			
					Firm locally soft brown mottled grey slightly sandy CLAY. (LONDON CLAY)		8.00 -3.49		
							(0.50)		
					END OF EXPLORATORY HOLE		8.50 -3.99		

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

17/07/2020 11:16:08

Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

CPT101

Sheet 1 of 1

Borehole Log

SOCOTEC

Drilled	GP	**Start**	**Equipment, Methods and Remarks**	**Depth from (m)**	**to (m)**	**Diameter (mm)**	**Casing Depth (m)**	**Ground Level**	5.11 mOD
Logged	SNN	07/05/2020	D150					**Coordinates (m)**	E 523073.39
Checked	LB	**End**	Hand dug inspection pit followed by cable percussion drilling to 6m					**National Grid**	N 178154.08
Approved	LWB	07/05/2020	Borehole drilled as pre-drill for CPT102 - no samples or testing.						

Samples and Tests

Strata Description

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
					Grass over firm grey slightly gravelly sandy CLAY. Gravel is medium chert. (TOPSOIL)		0.10 (0.10) +5.01		
					Brown gravelly to very gravelly SAND with low to medium cobble content. Sand is fine to coarse. Gravel is predominantly subangular to subrounded medium to coarse brick, concrete and mortar with minor chert. (MADE GROUND)		(0.60) 0.70 +4.41		
					Very loose grey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse brick concrete mortar with minor glass and chert. (MADE GROUND)		(1.20)		
					Recovered as firm brown slightly gravelly locally sandy CLAY. Sand is fine to medium. Gravel is predominantly subrounded medium chert with minor brick and charcoal(?) fragments. (DISTURBED GROUND)		1.90 +3.21 (0.40) 2.30 +2.81		
					Brown slightly gravelly clayey fine to medium SAND. Gravel is angular fine chert. (RIVER TERRACE DEPOSIT)		(0.50) 2.80 +2.31		
					Brown fine to medium SAND. (RIVER TERRACE DEPOSIT)		(0.70) 3.50 +1.61		
					Brown and orange brown sandy GRAVEL. Sand is medium to coarse. Gravel is rounded to subangular fine to medium chert/flint. (RIVER TERRACE DEPOSIT)	4.50 At 4.5m: Horizon of fine to coarse SAND.	(2.10)		
					Stiff greyish brown CLAY. (LONDON CLAY)		5.60 -0.49 (0.40) 6.00 -0.89		
					END OF EXPLORATORY HOLE				

Groundwater Entries

No.	Depth Strike (m)	Remarks	Depth Sealed (m)

Depth Related Remarks

Depths (m)	Remarks

Hard Boring

Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

17/07/2020 11:16:09

Project Hammersmith Bridge

Project No. G0015-20

Carried out for Pell Frischmann

Borehole

CPT102

Sheet 1 of 1

HAMMERSMITH BRIDGE

FACTUAL REPORT ON CONE PENETRATION TESTING

Report No M0012-20

July 2020

Issue No 1

Carried out for:
Pell Frischmann Consulting Engineers Limited
5 Manchester Square
London
W1U 3PD

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Report No M0012-2020

July 2020

ISSUE No DATE	STATUS	PREPARED BY	CHECKED BY	APPROVED BY
1 July 2020	Final report	NAME and QUALIFICATIONS Ian Campbell BSc, BEng, ACSM, FGS SIGNATURE 	NAME and QUALIFICATIONS Peter Hepton BSc PhD SIGNATURE 	NAME and QUALIFICATIONS Ian Campbell BSc, BEng, ACSM, FGS SIGNATURE 

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CONTENTS

1 INTRODUCTION

SOCOTEC UK Limited was commissioned in February 2020 by Pell Frischmann Consulting Engineers Limited (PFCE), to carry out a ground investigation for the construction of a temporary pedestrian footbridge during the refurbishment of Hammersmith Bridge, London, see Site Location Plan in Appendix A. The investigation was required to obtain geotechnical and geoenvironmental information. The scope of the investigation was specified by PFCE and included two cone penetration tests (CPT) one of which was cancelled due to access limitations on site

Records of the main ground investigation works carried out by SOCOTEC are presented in SOCOTEC Report No. G0015-20 (2020). This report presents the factual records of the CPT work, carried out on 20 May 2020, together with an interpretation of the soils penetrated. The information is also presented as digital data as defined in AGS (2017).

2 CONE PENETRATION TESTING

2.1 General

One CPT was carried out from the base of a pre-drilled cable percussion borehole to a maximum depth of 16.84 m, using an electric piezocone operated from a wheeled CPT unit. The test location was selected, set out and surveyed by PFCE to National Grid and Ordnance Datum. The co-ordinates and reduced level for the test location is shown on the CPT log.

Testing was carried out in accordance with Part 9 of BS 1377 (1990) and BS EN ISO 22476-1 (2012). The serial number of the cone used is indicated on the test plot. The calibration certificate is included in Appendix B and provides details of the manufacturer, cone dimensions, capacity and geometry.

Any opinions and interpretations presented are outside the scope of SOCOTEC's UKAS accreditation for cone penetration testing.

2.2 CPT Data Processing

Test control and data acquisition was carried out using CPTask, a proprietary software supplied by Geomil Equipment BV of Holland. The measured cone end resistance, sleeve friction, dynamic porewater pressure, and inclination were recorded at 1 cm intervals of penetration.

Interpretation of the CPT data was carried out using an in-house data reduction spreadsheet. The interpretation follows the recommendations of Lunne et al (1997) to derive, where appropriate: friction ratio, pore pressure ratio, undrained shear strength (minimum and maximum range presented using typical cone factors of 20 and 12 respectively), relative density, angle of friction and soil type. The soil classification uses the soil behaviour type chart of Robertson (1990), see KeyCPT. A nominal groundwater level of 3.30 m has been assumed for the data interpretation, based on the groundwater level recorded during the field works.

Explanation of the terms used and derivations of the cone and soil parameters are given in the Key, see KeyCPT. The data are presented graphically as plots relative to depth below ground level on the CPT logs in Appendix B. The stratum descriptions shown are derived using the interpreted soil classification in conjunction with the site borehole data, together with strength and relative density terms related to the CPT data, as indicated in the Key.

3 REFERENCES

AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4). Association of Geotechnical and Geoenvironmental Specialists.

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

BS EN ISO 22476-1 : 2012 : Geotechnical investigation and testing – Field testing – Part 1 : Cone penetration tests. British Standards Institution

Lunne T, Robertson PK and Powell JJM : 1997 : Cone Penetration Testing in Geotechnical Practice. Blackie Academic & Professional.

Robertson P K : 1990 : Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27(1), 151-8.

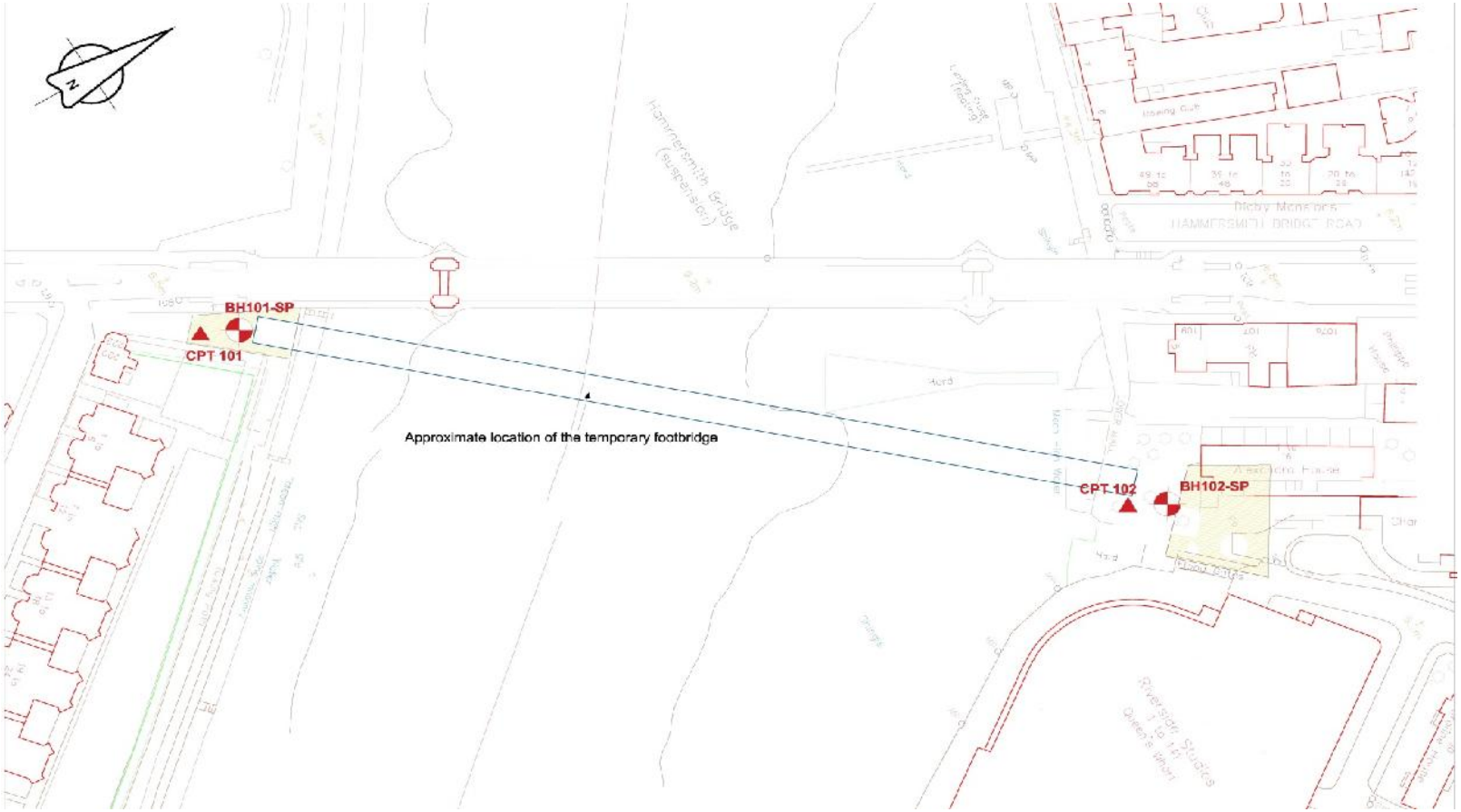
APPENDIX A
DRAWINGS

Site Location Plan	A1
Site Plan	A2

Site Location Plan

Notes: Scale 1:50 000	**Project** HAMMERSMITH BRIDGE **Project No.** M0012-20 **Carried out for** Pell Frischmann Consulting Engineers Limited	**Figure** A1

Borehole Location Plan



Project	HAMERSMITH BRIDGE	Figure
Project No.	M0012-20	A2
Carried out for	Pell Frischmann Consulting Engineers Limited	

APPENDIX B
CONE PENETRATION TEST RECORDS

Key to Cone Penetration Test Records	Key CPT
Cone Calibration Certificate	Cone S15-CFIP.1619
Cone Penetration Test Logs	CPT102

Key to Cone Penetration Test Records

SOCOTEC

Parameter	Unit	Description	Equation
Measured parameters			
q_c	MPa	Cone resistance	Measured parameter
f_s	MPa	Sleeve friction	Measured parameter
I	degrees	Inclination	Measured parameter
u	MPa	Dynamic pore pressure (Piezocone only)	Measured parameter. Denoted as u_1 and u_2 for pore pressure filter locations on cone face and cone shoulder respectively.
-	m, s	Penetration depth and corresponding time	Measured parameters
Derived cone parameters			
R_f	%	Friction ratio	f_s / q_c . 100 %
q_t	MPa	Corrected cone resistance (Piezocone only)	$q_c + (1 - a) . u_2$ where a = area ratio of cone = A_n/A_c; A_n = cross sectional areas of cone tip shaft; A_c = projected area of cone tip
f_t	MPa	Corrected sleeve friction (Piezocone only)	$(f_s – (u_2 . A_{sb} – u_3 . A_{st})) / A_s$ where b = area ratio of friction sleeve; A_{sb} and A_{st} are bottom and top cross sectional areas of friction sleeve
q_e	MPa	Effective cone resistance (Piezocone only)	$q_t – u_2$
q_n	MPa	Net cone resistance (Piezocone or using $q_t = q_c$)	$q_t - \sigma_{vo}$ where σ_{vo} = vertical total stress
R_t'	%	Corrected friction ratio (Piezocone only)	f_t / q_t . 100 %
Δu	MPa	Excess pore pressure (Piezocone only)	$u - u_0$ where u_0 = equilibrium pore water pressure
B_q	-	Pore pressure ratio (Piezocone only)	$(u - u_0) / (q_t - \sigma_{vo}) = \Delta u/q_n$
-	-	Dynamic pore pressure ratio (Piezocone only)	u / q_c
Q_t	-	Normalised cone resistance (Piezocone or using $q_t = q_c$)	$(q_t - \sigma_{vo}) / \sigma'_{vo} = q_n / \sigma'_{vo}$ where σ'_{vo} = vertical effective stress
F_r	%	Normalised local friction (Piezocone or using $q_t = q_c$)	$f_s / (q_t - \sigma_{vo}) = f_s / q_n$. 100 %

Notes:

Project HAMMERSMITH BRIDGE
Project No. M0012-20
Carried out for Pell Frischmann Consulting Engineers Limited

Figure
Key CPT

Key to Cone Penetration Test Records

SOCOTEC

Derived soil parameters		
Parameter	Description	Remarks
s_u Su(min) and Su(max)	Undrained Shear Strength (Clays)	Interpretation for fine soils only – soil types 3 and 4. Based on net cone resistance (corrected where pore pressure data available) and empirical cone factor $= (q_c - \sigma_{vo}) / N_k$ Plots of minimum and maximum strength presented using N_k of 20 and 12.
D_r RD	Relative Density	Interpretation for coarse soils only – soil types 5, 6 and 7. After Baldi et al (1986) for moderately compressible, unaged, uncemented, silica sand $= (1 / C_2) . Ln (q_c / C_0 (\sigma')^{C_1})$ For NC sands : $C_0 = 157$, $C_1 = 0.55$, $C_2 = 2.41$, $\sigma' = \sigma'_{vo}$ For OC sands : $C_0 = 181$, $C_1 = 0.55$, $C_2 = 2.61$, $\sigma' = \sigma'_m$ and mean effective stress = $\sigma'_m = (\sigma'_{vo} + 2\ \sigma'_{ho}) / 3$
ϕ IFA	Internal Friction Angle	Interpretation for coarse soils only – soil types 5, 6 and 7. After Robertson and Campanella (1983) for uncemented, moderately incompressible, predominately silica sands $= \text{Arctan} (0.105 + 0.16 . Ln (q_c / \sigma'_{vo}))$
N_{60}	Equivalent Standard Penetration Test (SPT) N value	$= (q_c / p_a) / 8.5 . (1 - I_c / 4.6))$ p_a – reference stress of 100 kPa

Soil Description			
Soil Type	Classification after Robertson (1990) using normalised cone resistance, normalised friction ratio and pore pressure ratio.		
Undrained shear strength description		Descriptive term	Strength, kPa
		Very soft Soft Firm Stiff Very stiff	<20 20 to 40 40 to 75 75 to 150 >150
Relative density description		Descriptive term	Cone resistance (q_c), MPa
		Very loose Loose Medium dense Dense Very dense	<2 2 to 4 4 to 12 12 to 20 >20

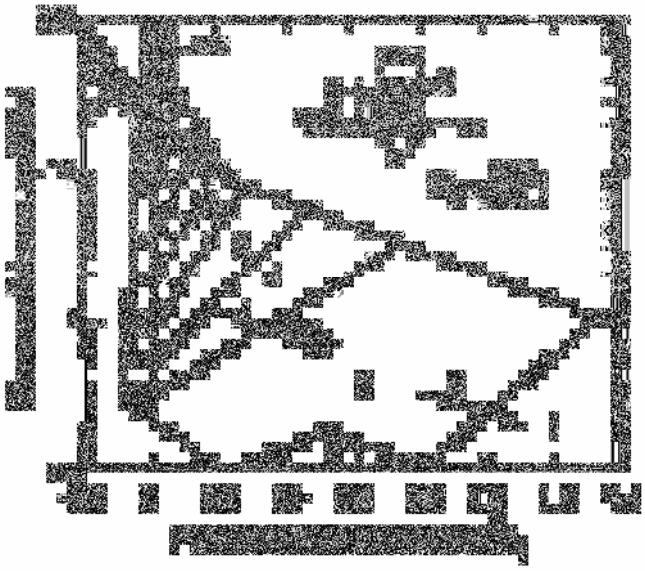
Notes:

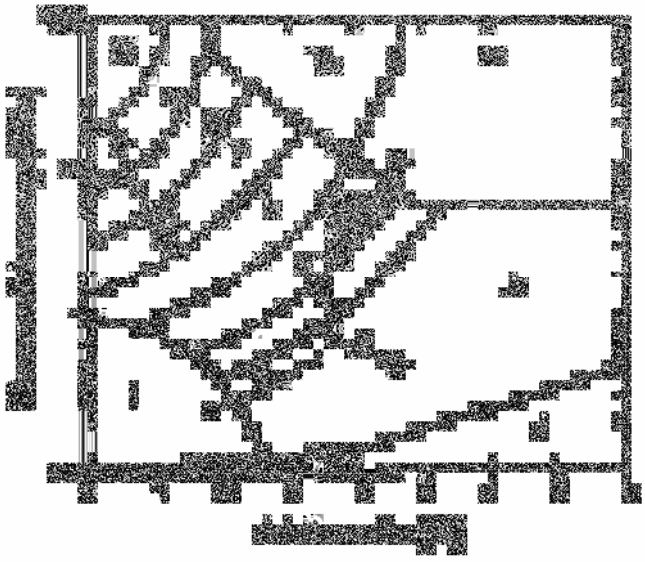
Project HAMMERSMITH BRIDGE
Project No. M0012-20
Carried out for Pell Frischmann Consulting Engineers Limited

Figure
Key CPT

Key to Cone Penetration Test Records

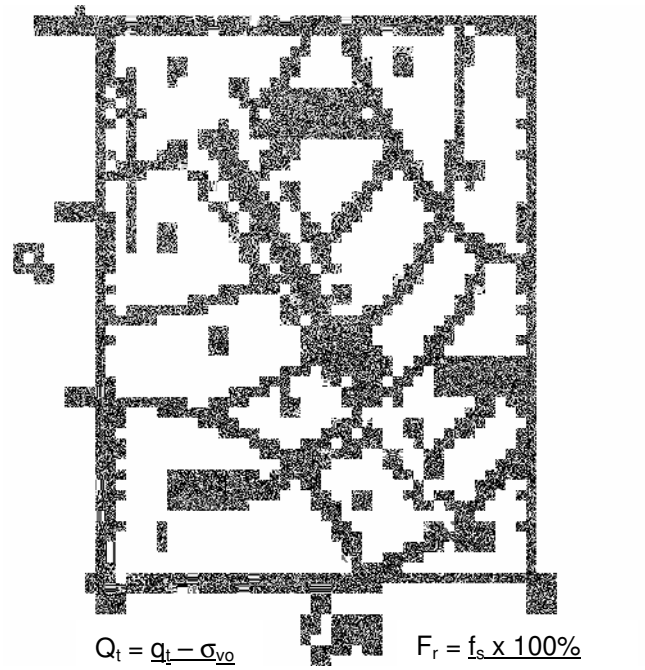
SOCOTEC



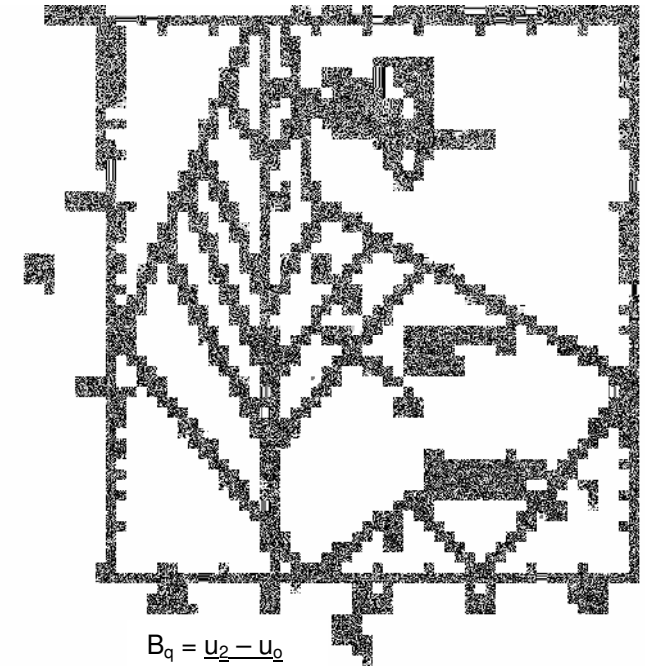


KEY TO SOIL BEHAVIOUR TYPES - after Robertson et al (1986)

ZONE	SOIL BEHAVIOUR TYPE	ZONE	SOIL BEHAVIOUR TYPE	ZONE	SOIL BEHAVIOUR TYPE
1	Sensitive fine grained	5	Clayey silt to silty clay	9	Sand
2	Organic material	6	Sandy silt to clayey silt	10	Gravelly sand to sand
3	Clay	7	Silty sand to sandy silt	11	Very stiff fine grained*
4	Silty clay to clay	8	Sand to silty sand	12	Sand to clayey sand*



$$Q_t = \frac{q_t - \sigma_{vo}}{\sigma'_{vo}} \qquad F_r = \frac{f_s \times 100\%}{q_t - \sigma_{vo}}$$



$$B_q = \frac{u_2 - u_o}{q_t - \sigma_{vo}}$$

KEY TO SOIL BEHAVIOUR TYPES – after Robertson (1990)

ZONE	SOIL BEHAVIOUR TYPE	ZONE	SOIL BEHAVIOUR TYPE	ZONE	SOIL BEHAVIOUR TYPE
1	Sensitive fine grained	4	Silt mixtures: clayey silt to silty clay	7	Gravelly sand to sand
2	Organic soils – peats	5	Sand mixtures: silty sand to sandy silt	8	Very stiff sand to clayey sand
3	Clays: clay to silty clay	6	Sands: clean sand to silty sand	9	Very stiff fine grained

Notes:

Project HAMMERSMITH BRIDGE

Project No. M0012-20

Carried out for Pell Frischmann Consulting Engineers Limited

Figure

Key CPT

Eijkelkamp GeoPoint
SoilSolutions

Rijkstraatweg 22F
2171 AL Sassenheim
The Netherlands

T +31 71 301 9251
E info@eijkelkamp-geopoint.com
I eijkelkamp-geopoint.com

Cone Calibration Certificate

Certificate:	**GS-1619-008**	
Instrument Type:	Electric Subtraction Cone	
Model:	S15-CFIIP	
Serial number:	1619	
Calibration date:	20-04-2020	
Client:	Insitu	
Calibrated by:	W.Volgering	
Calibration instruments		
Manufacturer:	Hottinger Baldwin Messtechnik GmbH	
HBM certificate no. :	49046	
Calibration conditions		
Ambient temperature:	19.0	°C
Atmospheric pressure:	1021	mBar
Cone specifications		
Cone base area:	1500	mm2
Load tip resistance (nom.):	50	kN
Friction sleeve area:	22500	mm2
Load tip + local friction (nom.):	50	kN
Load friction sleeve (nom.):	22.5	kN
Load pore pressure (nom.):	2	MPa
Inclination (nom.):	+/- 20	°
Temperature compensation (all channels):	0...+40	°C
Maximum overload capacity (all channels):	100	%
Cone area ratio (a):	0.79	
Max. Inaccuracy, relative to measurement value:	1.0	%

	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
Zero points:		0243		0214		0221			
	0	0	0	0	0	0	0	2425	2327
	5	0305	5	0313	0.4	1487	-20	0405	0250
	10	0607	10	0624	0.8	2972	20	4412	4357
	15	0912	15	0935	1.2	4456			
	20	1219	20	1251	1.6	5930			
	25	1524	25	1564	2.0	7400			
	30	1828	30	1877					
	35	2130	35	2186					
	40	2432	40	2497					
	45	2735	45	2807					
	50	3038	50	3117					

Max. eror, abs. qc:	35 kPa
Max. error, abs. fs:	2 kPa
Max. error, abs. u2:	10 kPa
Max. error, abs. I:	1 °

This calibration is compliant with GeoPoint Systems internal quality system, internal calibration procedures and meets the requirements of NEN2649, NEN-EN-ISO 22476-1, NORSOK G-001, ISSMFE and ASTM using calibration equipment traceable to (Inter-) National Standards.

Approved by: M.van Es
Date: 20-04-2020

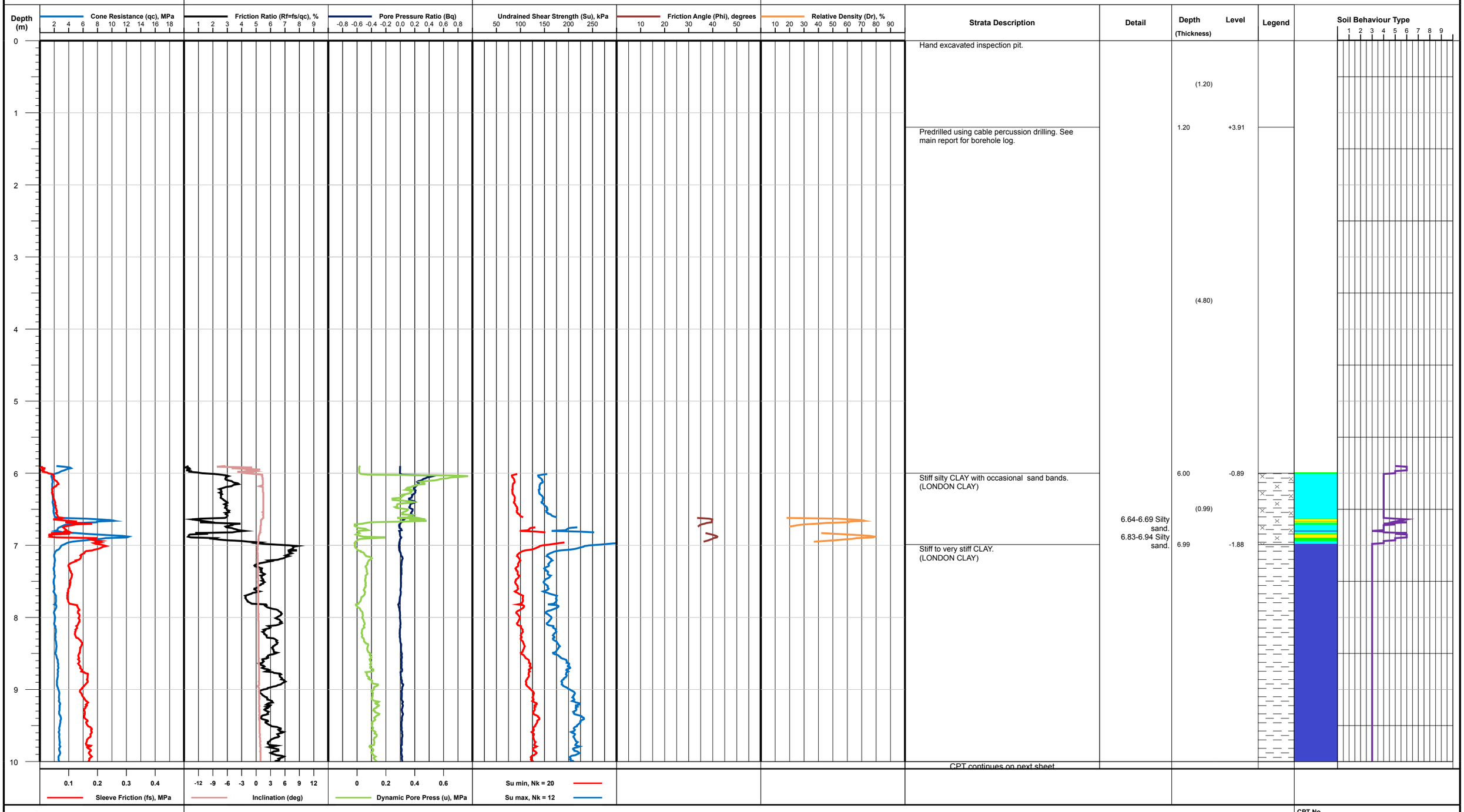
Cone Penetration Test Log

SOCOTEC

Date	20/05/2020	**Equipment and Methods**	Test according to BS 1377 : Part 9 : Method 3.1	**Ground level**	5.11 mOD
Cone ID	S15-CFIP.1619			**Co-ordinates (m)**	E 523073.39
Operator	Walter			**National Grid**	N 178154.08
Checked	IRC				
Approved	IRC				

Remarks CPT test carried out from base of predrilled cable percussion borehole. Terminated due to maximum thrust reached.

Assumed Groundwater Level (m) 3.30



Strata Description	Detail	Depth (Thickness)	Level	Legend
Hand excavated inspection pit.		(1.20)		
Predrilled using cable percussion drilling. See main report for borehole log.		1.20	+3.91	
		(4.80)		
Stiff silty CLAY with occasional sand bands. (LONDON CLAY)		6.00	-0.89	
	6.64-6.69 Silty sand. 6.83-6.94 Silty sand.	(0.99)		
Stiff to very stiff CLAY. (LONDON CLAY)		6.99	-1.88	
CPT continues on next sheet				

Soil Behaviour Type
1 2 3 4 5 6 7 8 9

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

AGS

Project	HAMMERSMITH BRIDGE
Project No.	M0012-20
Carried out for	Pell Frischmann Consulting Engineers Ltd

CPT No.

CPT102

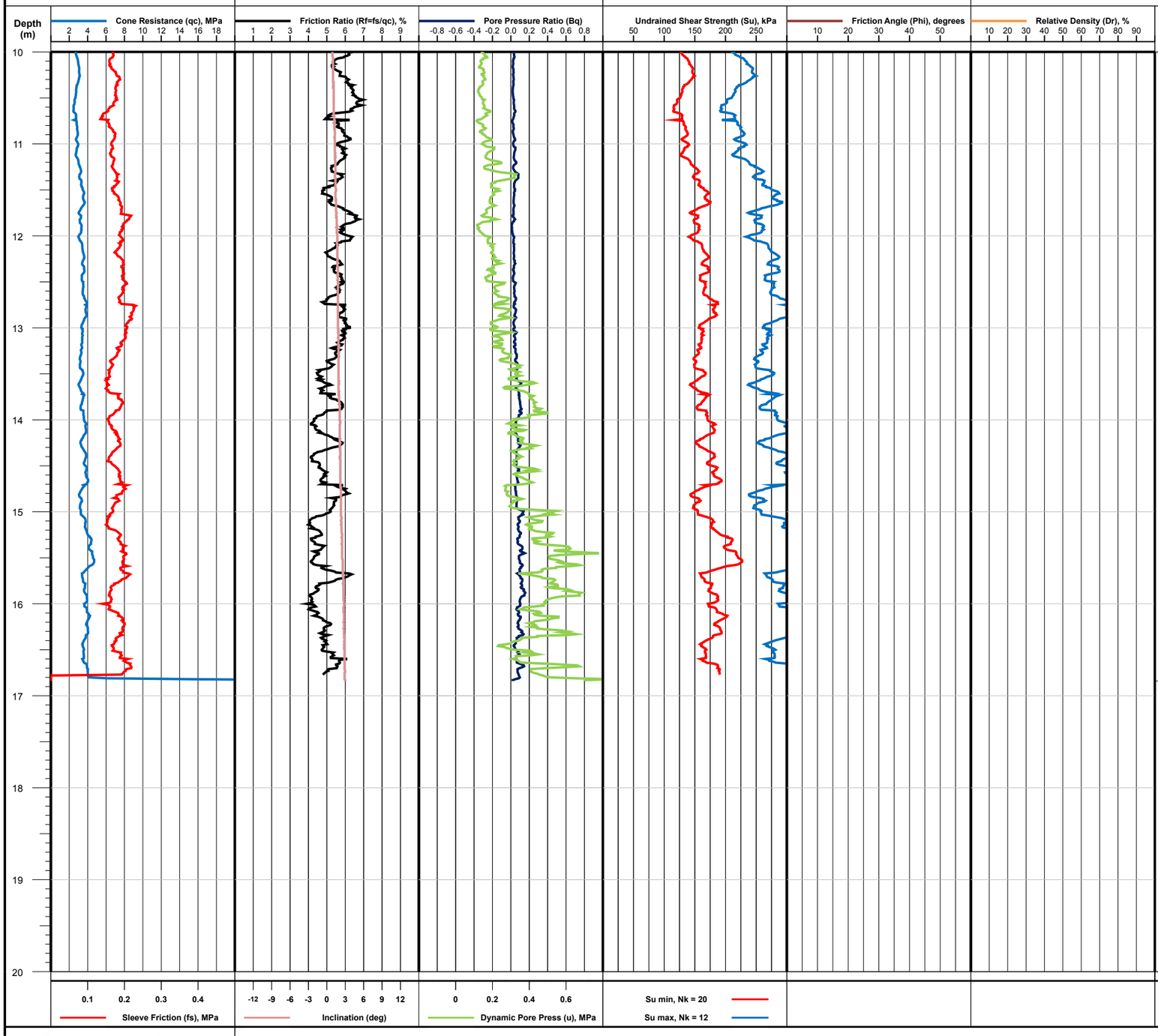
Cone Penetration Test Log

SOCOTEC

Date	20/05/2020	**Equipment and Methods**		**Ground level**	5.11 mOD
Cone ID	S15-CFIP.1619	Test according to BS 1377 : Part 9 : Method 3.1		**Co-ordinates (m)**	E 523073.39
Operator	Walter			**National Grid**	N 178154.08
Checked	IRC				
Approved	IRC				

Remarks CPT test carried out from base of predrilled cable percussion borehole. Terminated due to maximum thrust reached.

Assumed Groundwater Level (m) 3.30



Strata Description	Detail	Depth (Thickness)	Level	Legend
Stiff to very stiff CLAY. (LONDON CLAY)		(9.85)		
End of CPT	16.84 Terminated on obstruction, operator reports possible clay stone.	16.84	-11.73	

Soil Behaviour Type
1 2 3 4 5 6 7 8 9

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

AGS

Project HAMMERSMITH BRIDGE

Project No. M0012-20

Carried out for Pell Frischmann Consulting Engineers Ltd

CPT No.

CPT102

APPENDIX C
INSTRUMENTATION AND MONITORING

Groundwater Monitoring Installations Summary

Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
BH101 (1)	SP	15/05/2020	50	6.00	3.00 to 6.00	Flush cover	Gas tap	
BH101 (2)	SP	15/05/2020	50	1.50	1.00 to 1.50	Flush cover	Gas tap	
BH102 (1)	SP	07/05/2020	50	5.30	2.30 to 5.30	Flush cover	Gas tap	
BH102 (2)	SP	07/05/2020	50	1.50	0.70 to 1.50	Flush cover	Gas tap	

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well

Groundwater Monitoring

Instrument Reference	Instrument Type	Instrument Base, mbgl	Date Time dd/mm/yyyy hh:mm:ss	Groundwater depth, mbgl	Comments
BH101 (1)	SP	6.00	20/05/2020 15:30:00	2.45	
BH101 (1)	SP	6.00	17/06/2020 11:05:00	3.40	
BH101 (2)	SP	1.50	20/05/2020 15:30:00	Dry	
BH101 (2)	SP	1.50	17/06/2020 11:21:00	Dry	
BH102 (1)	SP	5.30	20/05/2020 15:00:00	4.93	
BH102 (1)	SP	5.30	03/06/2020 11:00:00	5.11	
BH102 (1)	SP	5.30	17/06/2020 12:38:00	5.02	
BH102 (2)	SP	1.50	20/05/2020 15:00:00	Dry	
BH102 (2)	SP	1.50	03/06/2020 11:20:00	Dry	
BH102 (2)	SP	1.50	17/06/2020 12:31:00	Dry	

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well

SOCOTEC

Gas Monitoring Record

Project No	G0015-20	Project	Hammersmith Bridge	Sheet No	
Date	03/06/2020	State of Ground	Dry		C3/1
		Wind	Light		
Operator	Daniel Brockman	Wind Direction			
		Cloud Cover	Cloudy		
Equipment Used	LMSXi	Precipitation	Slight		

Borehole ID	Inst ID	Depth of Installation (m BGL)	Time of Reading hh:mm:ss	Barometric Pressure (mbars)	Air temp (°C)	Reading Depth (mBGL)	Dip to Base of Pipe	Depth to Groundwater (m BGL)	Differential Pressure (Pa)	FlowRate (l/hr)	CH4 (% vol)	CH4 (% LEL)	O2 (% vol)	CO2 (% vol)	CO (ppm)	H2S (ppm)	Nitrogen (%vol)	Remarks
Detection Limits																		
BH102	1	5.30	11:00:00	1005			5.37	5.11	0.0	0.10								
BH102	1	5.30	11:02:00								1.6		19.8	0.0	0.0	0.0	78.0	
BH102	1	5.30	11:04:00								3.0		20.0	0.1	0.0	0.0	78.0	
BH102	1	5.30	11:06:00								3.8		20.9	0.2	0.0	0.0	78.0	
BH102	1	5.30	11:10:00								4.0		21.0	0.4	0.0	0.0	78.0	
BH102	1	5.30	11:12:00								4.0		21.0	0.6	0.0	0.0	78.1	
BH102	2	1.50	11:20:00	1005			1.58	Dry	0.0	-0.10								
BH102	2	1.50	11:22:00								0.1		21.6	0.0	0.0	0.0	78.0	
BH102	2	1.50	11:24:00								0.1		21.0	0.0	0.0	0.0	78.1	
BH102	2	1.50	11:26:00								0.1		21.0	0.3	0.0	0.0	78.1	
BH102	2	1.50	11:28:00								0.1		21.0	0.6	0.0	0.0	78.3	
BH102	2	1.50	11:30:00								0.1		20.9	0.7	0.0	0.0	78.4	

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Gas Monitoring Record

Project No	G0015-20	Project	Hammersmith Bridge	Sheet No	
Date	17/06/2020	State of Ground	Damp		C3/2
		Wind	Calm		
Operator	M Wise	Wind Direction	-		
		Cloud Cover	None		
Equipment Used	LMSXi	Precipitation	None		

Borehole ID	Inst ID	Depth of Installation (m BGL)	Time of Reading hh:mm:ss	Barometric Pressure (mbars)	Air temp (^{o}C)	Reading Depth (mBGL)	Dip to Base of Pipe	Depth to Groundwater (m BGL)	Differential Pressure (Pa)	FlowRate (l/hr)	CH4 (% vol)	CH4 (% LEL)	O2 (% vol)	CO2 (% vol)	CO (ppm)	H2S (ppm)	Nitrogen (%vol)	Remarks
Detection Limits																		
BH101	1	6.00	11:05:00	1009	21	0.00	6.15	3.40	26.0	27.81	0.1		20.1	0.4	0.0	0.0	78.5	
BH101	1	6.00	11:05:30						-417.0	-48.81	0.0		20.5	1.1	0.0	0.0	78.3	
BH101	1	6.00	11:06:00						-312.0	-38.61	0.0		20.1	1.3	0.0	0.0	78.5	
BH101	1	6.00	11:06:30						84.0	7.41	0.0		19.8	1.5	0.0	0.0	78.6	
BH101	1	6.00	11:07:00						91.0	22.91	0.0		12.7	1.5	0.0	0.0	78.7	
BH101	1	6.00	11:07:30						45.0	13.11	0.0		19.5	1.6	0.0	0.0	78.8	
BH101	1	6.00	11:08:00						37.0	11.01	0.0		19.3	1.8	0.0	0.0	78.8	
BH101	1	6.00	11:09:00								0.0		19.1	2.0	0.0	0.0	78.8	
BH101	1	6.00	11:10:00								0.0		19.0	2.1	0.0	0.0	78.8	
BH101	2	1.50	11:21:00	1009	21	0.00	1.55	Dry	0.0	0.01	0.0		19.4	1.7	0.0	0.0	78.8	
BH101	2	1.50	11:21:30						0.0	0.01	0.0		19.4	1.6	0.0	0.0	78.9	
BH101	2	1.50	11:22:00								0.0		19.6	1.6	0.0	0.0	78.8	
BH101	2	1.50	11:22:30								0.0		19.8	1.5	0.0	0.0	78.6	
BH101	2	1.50	11:23:00								0.0		19.9	1.4	0.0	0.0	78.5	
BH101	2	1.50	11:23:30								0.0		20.1	1.3	0.0	0.0	78.4	
BH101	2	1.50	11:24:00								0.0		20.1	1.2	0.0	0.0	78.5	
BH101	2	1.50	11:25:00								0.0		19.7	1.4	0.0	0.0	78.8	
BH101	2	1.50	11:26:00								0.0		19.6	1.5	0.0	0.0	78.9	

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Gas Monitoring Record

Project No	G0015-20	Project	Hammersmith Bridge	Sheet No	
Date	17/06/2020	State of Ground	Dry		C3/3
		Wind	Calm		
Operator	M Wise	Wind Direction	-		
		Cloud Cover	Cloudy		
Equipment Used	LMSXi	Precipitation	None		

Borehole ID	Inst ID	Depth of Installation (m BGL)	Time of Reading hh:mm:ss	Barometric Pressure (mbars)	Air temp (^{o}C)	Reading Depth (mBGL)	Dip to Base of Pipe	Depth to Groundwater (m BGL)	Differential Pressure (Pa)	FlowRate (l/hr)	CH4 (% vol)	CH4 (% LEL)	O2 (% vol)	CO2 (% vol)	CO (ppm)	H2S (ppm)	Nitrogen (%vol)	Remarks
Detection Limits																		
BH102	1	5.30	12:38:00	1009	22	0.00	5.42	5.02	0.0	0.01	0.0		21.2	1.0	0.0	0.0	77.9	
BH102	1	5.30	12:38:30						0.0	0.01	0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:39:00						0.0	0.01	0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:39:30								0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:40:00								0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:40:30								0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:41:00								0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:42:00								0.0		20.7	0.8	0.0	0.0	78.4	
BH102	1	5.30	12:43:00															
BH102	2	1.50	12:31:00	1009	22	0.00	1.5	Dry	0.0	-0.11	0.0		20.3	1.4	0.0	0.0	78.2	
BH102	2	1.50	12:31:30						0.0	0.01	0.0		20.2	1.4	0.0	0.0	78.3	
BH102	2	1.50	12:32:00						0.0	0.01	0.0		20.3	1.3	0.0	0.0	78.2	
BH102	2	1.50	12:32:30						0.0	0.01	0.0		20.5	1.2	0.0	0.0	78.2	
BH102	2	1.50	12:33:00						0.0	0.01	0.0		20.5	1.2	0.0	0.0	78.2	
BH102	2	1.50	12:33:30						0.0	0.01	0.0		20.6	1.2	0.0	0.0	78.1	
BH102	2	1.50	12:34:00						0.0	0.01	0.0		20.6	1.1	0.0	0.0	78.2	
BH102	2	1.50	12:35:00								0.0		20.7	1.0	0.0	0.0	78.2	
BH102	2	1.50	12:36:00								0.0		20.7	1.0	0.0	0.0	78.2	

APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX
Particle Size Distribution Analyses	PSD (8No.)
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM
Small Shearbox Test	SSB (1No.)
Hand Vane	HV
Test Report – Chemical Tests	20-09676

INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	p Mg/m3	p_d Mg/m3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	p_s Mg/m3	Remarks
BH101	16	4.00	4.00	D	Brown slightly sandy SILT			39			NP			
BH101	19	5.00	5.50	B	Grey slightly gravelly slightly clayey SAND			20			NP			
BH101	25	8.50	8.50	D	Brown slightly sandy slightly gravelly CLAY			26	84 s	63 a	25	38		
BH101	27	9.50	9.50	D	Brown slightly sandy CLAY			28	100	74 a	26	48		
BH101	32	13.00	13.00	D	Brown slightly sandy CLAY			27	100 n	76 a	27	49		
BH101	37	17.00	17.00	D	Grey slightly sandy CLAY			25	100 n	66 a	28	38		
BH101	43	23.90	23.95	D	Grey slightly sandy CLAY			27	100 n	68 a	30	38		
BH101	51	29.95	30.00	D	Grey slightly sandy CLAY			24	100 n	59 a	23	36		
BH101	67	35.00	35.00	D	Grey slightly sandy CLAY			24	100	64 a	27	37		
BH102	8	2.00	2.45	D	Brown slightly gravelly clayey SAND			15	67 s	28 b	16	12		
BH102	17	6.00	6.50	B	Brown slightly sandy CLAY			35	100	69 a	28	41		
BH102	23	10.00	10.00	D	Brown slightly sandy CLAY			28	100	76 a	31	45		
BH102	30	14.50	14.50	D	Grey slightly sandy CLAY			25	100	69 a	26	43		
BH102	42	21.40	21.45	D	Grey slightly sandy CLAY			23	100 n	65 a	28	37		
BH102	52	27.40	27.40	D	Grey slightly sandy CLAY			22	100 n	63 a	26	37		
BH102	60	32.50	32.50	D	Grey slightly sandy CLAY			23	100 n	64 a	25	39		

General notes: All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : p bulk density, linear; *pd* dry density; *w* moisture content; * test carried out to BS EN ISO 17892

WL Liquid limit; a 4 point cone test; b 1 point cone test

WP Plastic limit; NP non - plastic; IP Plasticity Index

<425um preparation: n from natural soil; s sieved specimen; h removed by hand

ps particle density; -g = gas jar; -p = small pyknometer

QA Ref
SLR 1
Rev 2.94
Mar 17

SOCOTEC

Project No G0015-20

Project Name Hammersmith Bridge

Figure

INDX

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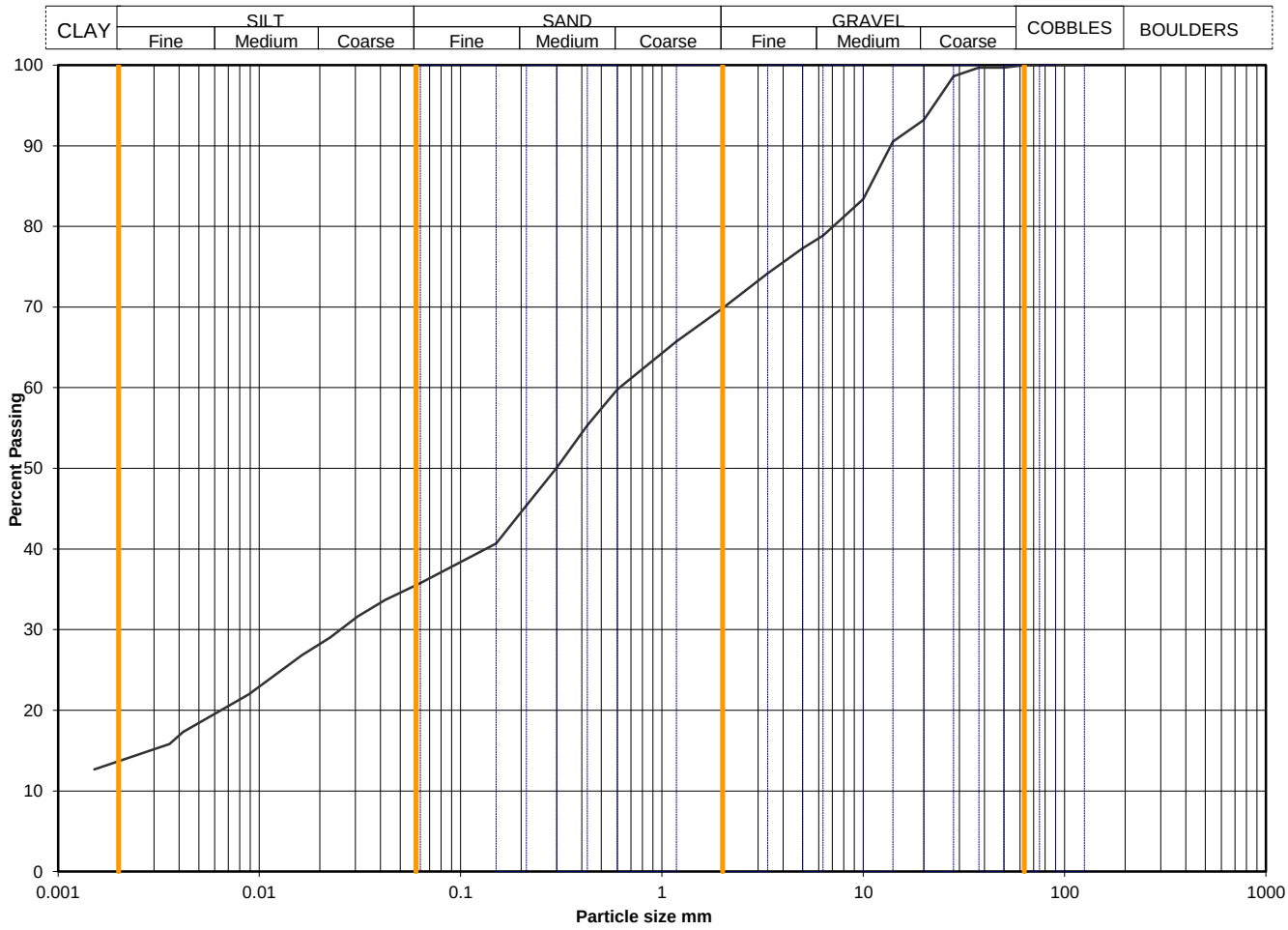
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200513114208

Hole No	BH101
Sample Depth (m BGL)	0.70 - 1.20
Sample Type and No	B4
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	36
90	100	0.0422	34
75	100	0.0307	32
63	100	0.0224	29
50	100	0.0163	27
37.5	100	0.0089	22
28	99	0.0042	17
20	93	0.0036	16
14	91	0.0015	13
10	83		
6.3	79		
5.0	77		
3.35	74		
2.00	70		
1.18	66	Particle density, Mg/m3	
0.600	60		
0.425	55	2.65 assumed	
0.300	50	Dry mass of sample, kg	
0.212	45		
0.150	41	3.7	
0.063	36		

Soil description	Dark brown very gravelly silty SAND		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	30.1	30.1
	Sand	34.1	34.1
*<60mm values to aid description only	Silt	22.1	22.1
	Clay	13.7	13.7

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.21
Jul 17

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Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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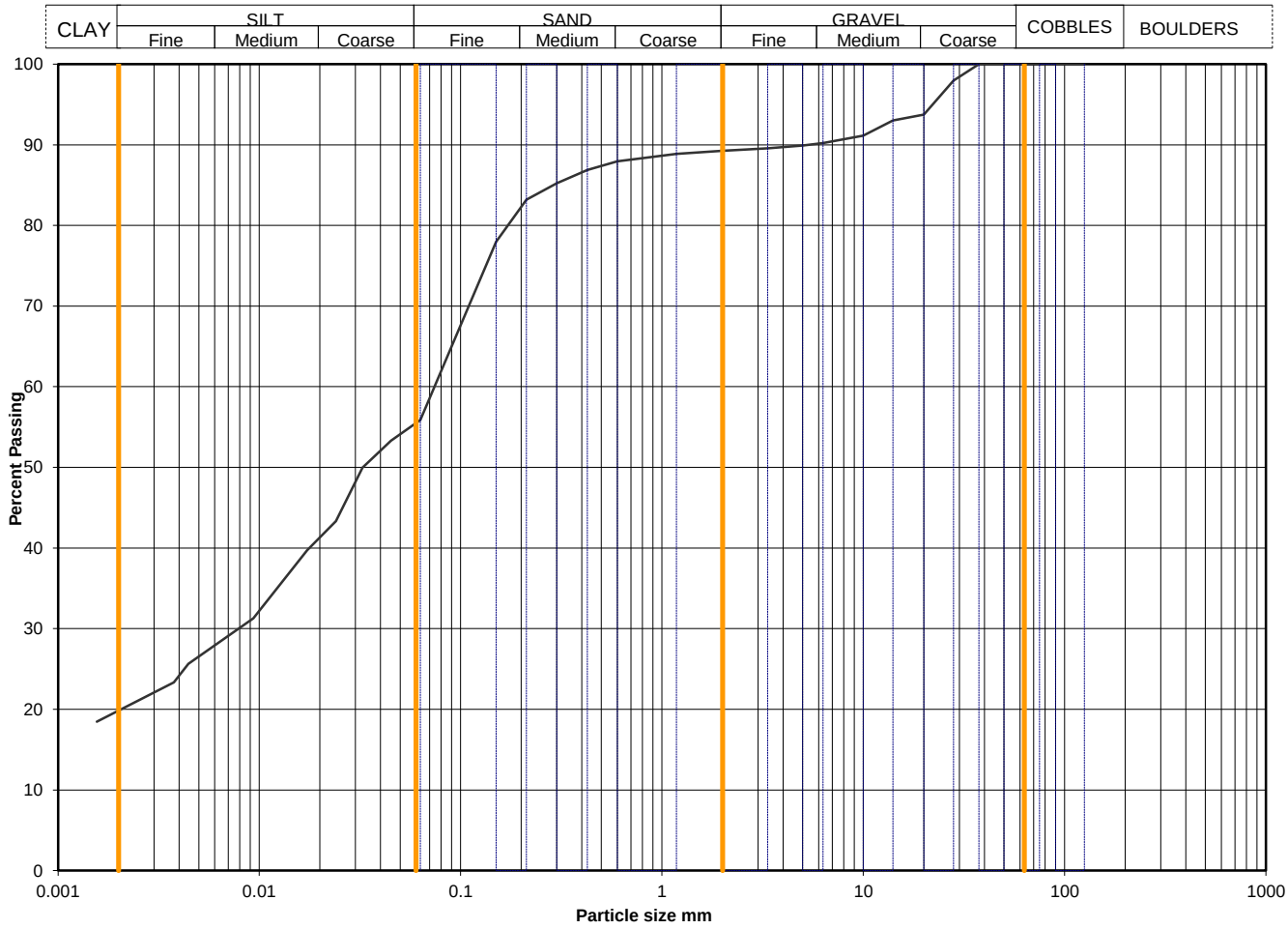
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200513114345

Hole No	BH101
Sample Depth (m BGL)	2.40 - 2.80
Sample Type and No	B10
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	56
90	100	0.0451	53
75	100	0.0326	50
63	100	0.0240	43
50	100	0.0173	40
37.5	100	0.0093	31
28	98	0.0044	26
20	94	0.0038	23
14	93	0.0016	18
10	91		
6.3	90		
5.0	90		
3.35	90		
2.00	89		
1.18	89	Particle density, Mg/m3	
0.600	88		
0.425	87	2.65 assumed	
0.300	85	Dry mass of sample, kg	
0.212	83		
0.150	78	1.9	
0.063	56		

Soil description	Grey oxodising to brown slightly sandy slightly gravelly organic CLAY
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377
Remarks	

Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	10.8	10.8
	Sand	33.4	33.4
*<60mm values to aid description only	Silt	36.0	36.0
	Clay	19.8	19.8

Uniformity Coefficient	D60 / D10	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Project No G0015-20

Project Name Hammersmith Bridge

Figure
PSD

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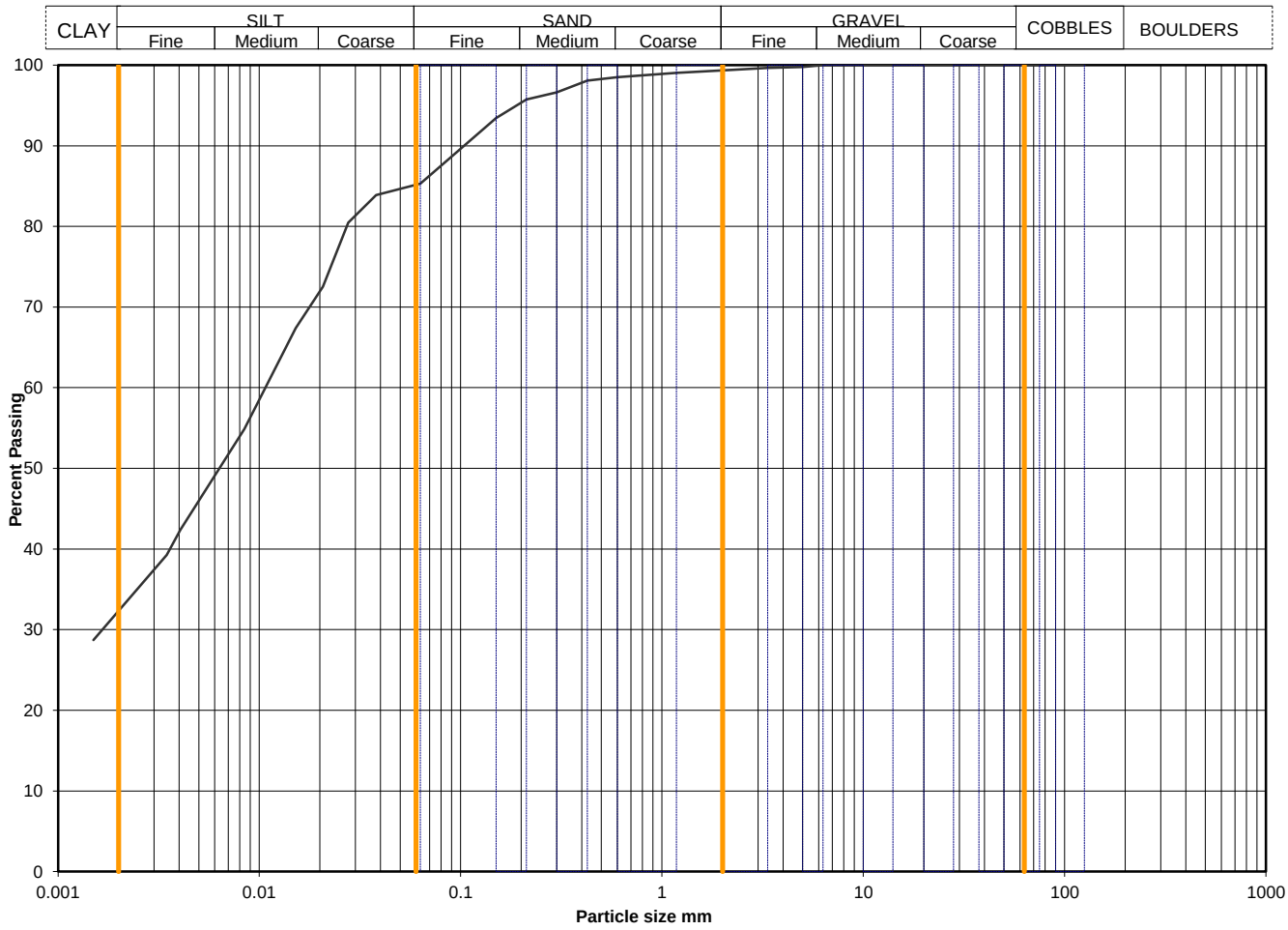
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200513114512

Hole No	BH101
Sample Depth (m BGL)	3.00 - 3.40
Sample Type and No	B15
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	85
90	100	0.0380	84
75	100	0.0276	80
63	100	0.0207	73
50	100	0.0152	67
37.5	100	0.0084	55
28	100	0.0041	42
20	100	0.0035	39
14	100	0.0015	29
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	99		
1.18	99	Particle density, Mg/m3	
0.600	99		
0.425	98	2.65 assumed	
0.300	97	Dry mass of sample, kg	
0.212	96		
0.150	93	0.5	
0.063	85		

Soil description	Grey oxodising to brown slightly sandy slightly gravelly organic CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	0.7	0.7
	Sand	14.0	14.0
*<60mm values to aid description only	Silt	53.0	53.0
	Clay	32.3	32.3

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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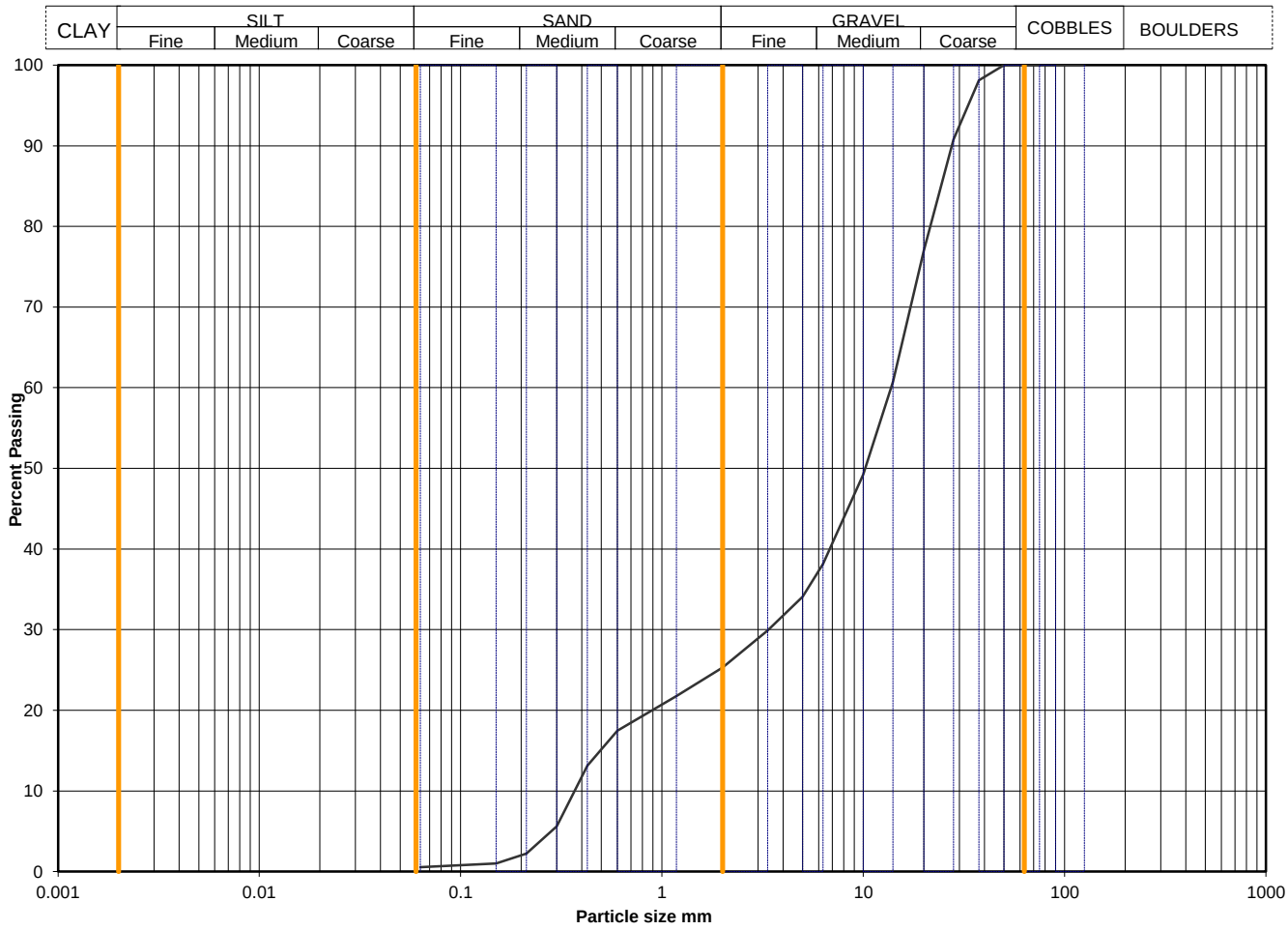
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200514033542

Hole No	BH101
Sample Depth (m BGL)	6.50 - 6.95
Sample Type and No	B21
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	98		
28	91		
20	77		
14	61		
10	49		
6.3	38		
5.0	34		
3.35	30		
2.00	25		
1.18	22		
0.600	17		
0.425	13		
0.300	6	Dry mass of sample, kg	
0.212	2		
0.150	1	6.6	
0.063	1		

Soil description	Brown very sandy slightly silty GRAVEL		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	74.7	74.7
	Sand	24.8	24.8
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	0.5	0.5

Uniformity Coefficient	**D60 / D10**	37

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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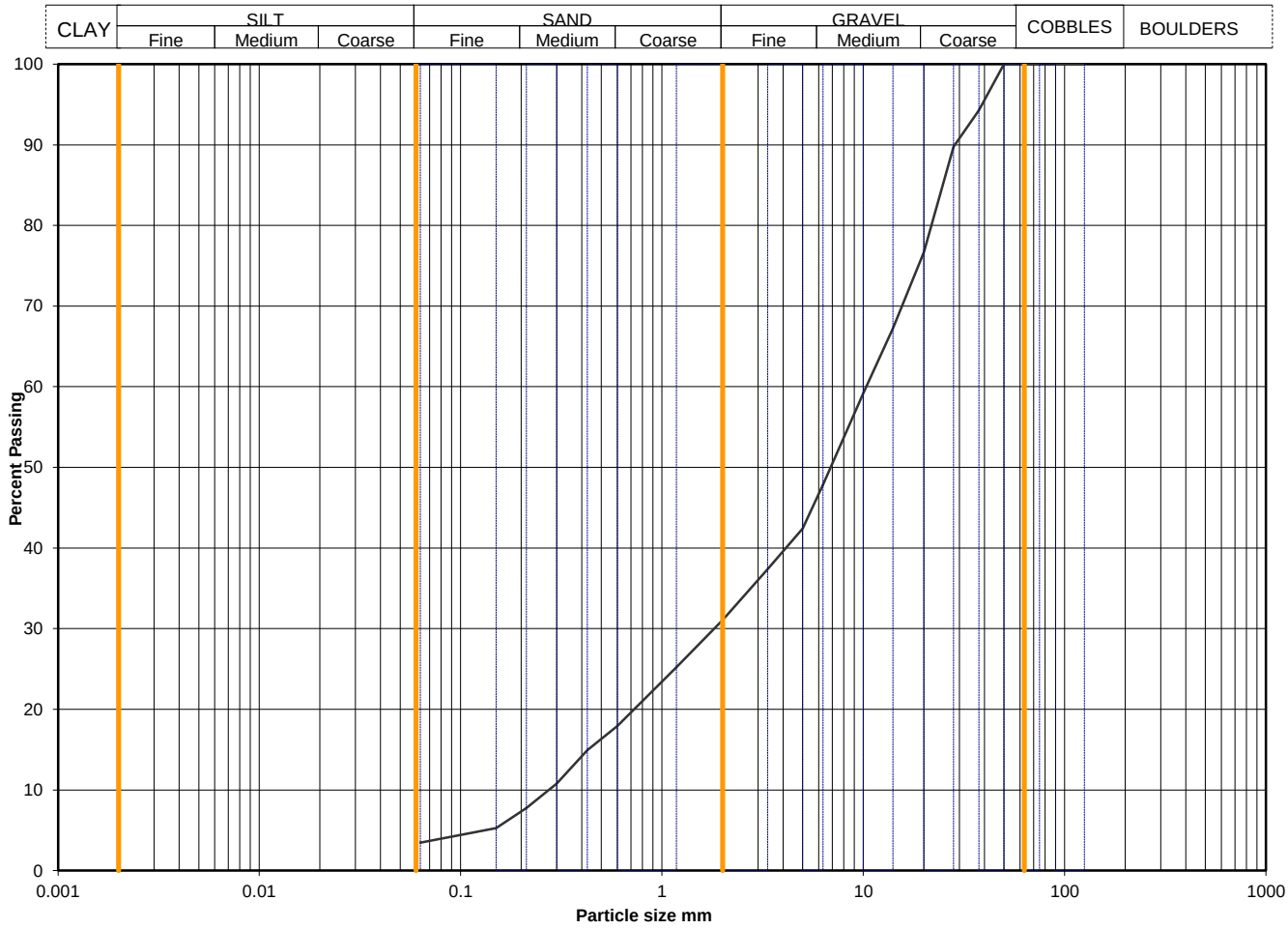
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200514033554

Hole No	BH101
Sample Depth (m BGL)	7.50 - 7.50
Sample Type and No	D22
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	94		
28	90		
20	77		
14	67		
10	59		
6.3	48		
5.0	42		
3.35	37		
2.00	31		
1.18	25		
0.600	18		
0.425	15		
0.300	11	Dry mass of sample, kg	
0.212	8		
0.150	5	1.6	
0.063	3		

Soil description	Brown very sandy slightly silty GRAVEL.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	68.9	68.9
	Sand	27.6	27.6
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	3.5	3.5

Uniformity Coefficient	**D60 / D10**	38

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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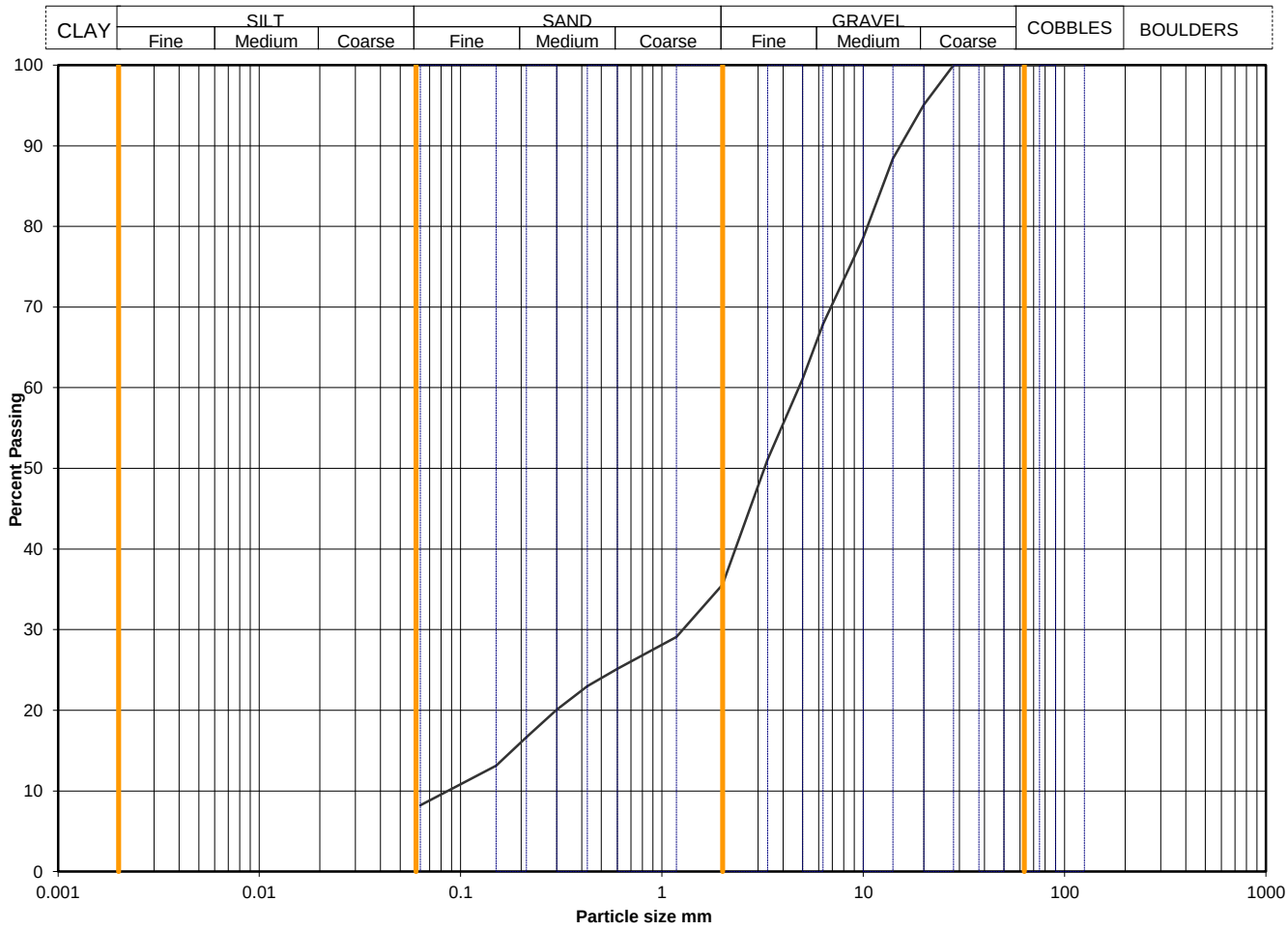
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200505113601

Hole No	BH102
Sample Depth (m BGL)	1.20 - 1.65
Sample Type and No	D6
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	95		
14	88		
10	79		
6.3	68		
5.0	61		
3.35	51		
2.00	36		
1.18	29		
0.600	25		
0.425	23		
0.300	20	Dry mass of sample, kg	
0.212	17	0.3	
0.150	13		
0.063	8		

Soil description	Multicoloured very sandy silty GRAVEL.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	64.4	64.4
	Sand	27.4	27.4
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	8.2	8.2

Uniformity Coefficient	**D60 / D10**	56

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
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Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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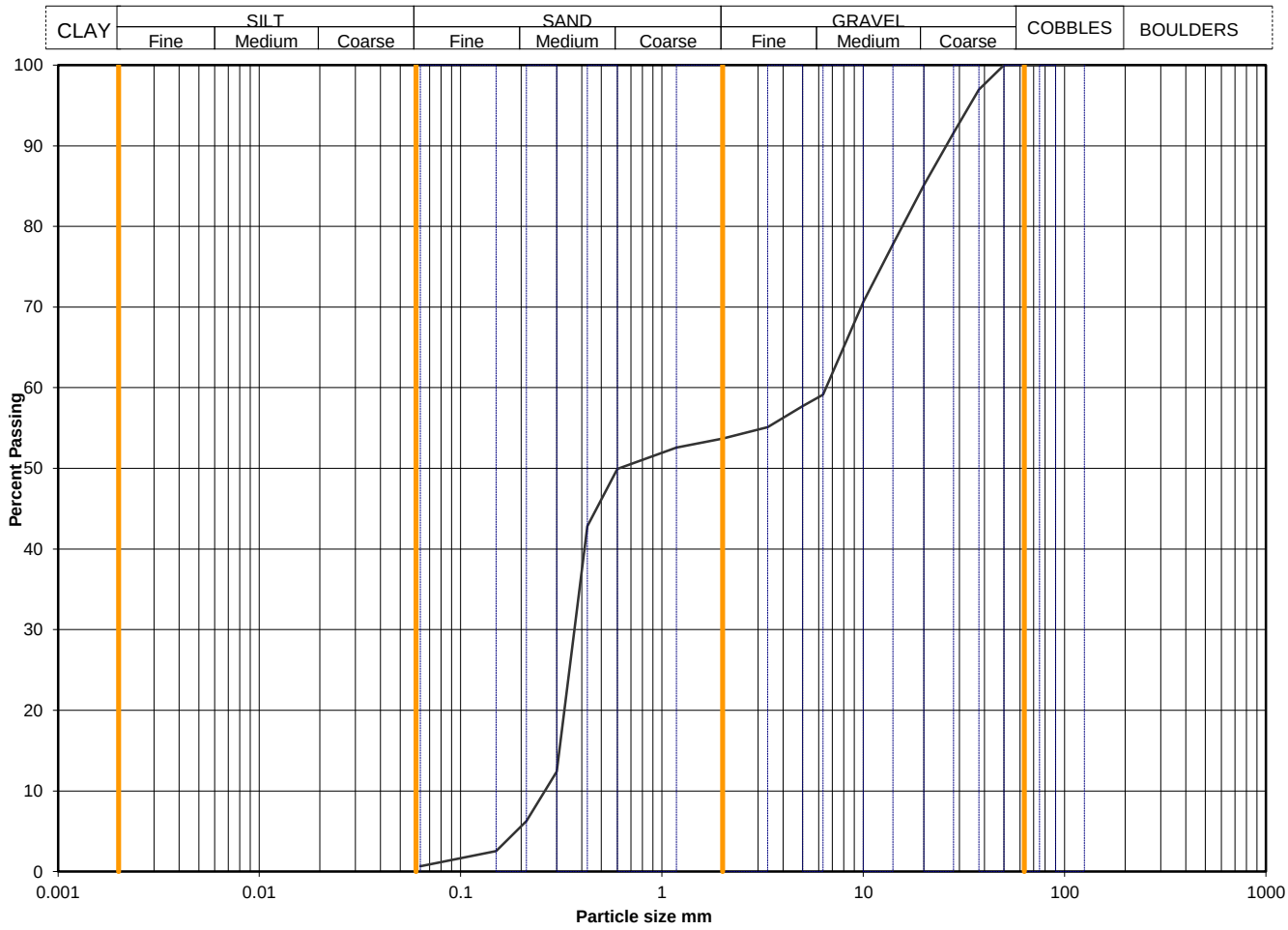
Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200505113703

Hole No	BH102
Sample Depth (m BGL)	4.00 - 4.50
Sample Type and No	B11
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	97		
28	92		
20	85		
14	78		
10	71		
6.3	59		
5.0	58		
3.35	55		
2.00	54		
1.18	53		
0.600	50		
0.425	43		
0.300	12	Dry mass of sample, kg	
0.212	6		
0.150	3	6.2	
0.063	1		

Soil description	Brown very gravelly slightly silty SAND.		
Preparation / Pretreatment	Sieve: pre dried,		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	46.3	46.3
	Sand	53.0	53.0
*<60mm values to aid description only	Silt	silt+clay =	
	Clay	0.7	0.7

Uniformity Coefficient	**D60 / D10**	25

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref
SLR 2,9
Rev 2.21
Jul 17

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0001

SOCOTEC

Project No G0015-20

Project Name Hammersmith Bridge

Figure

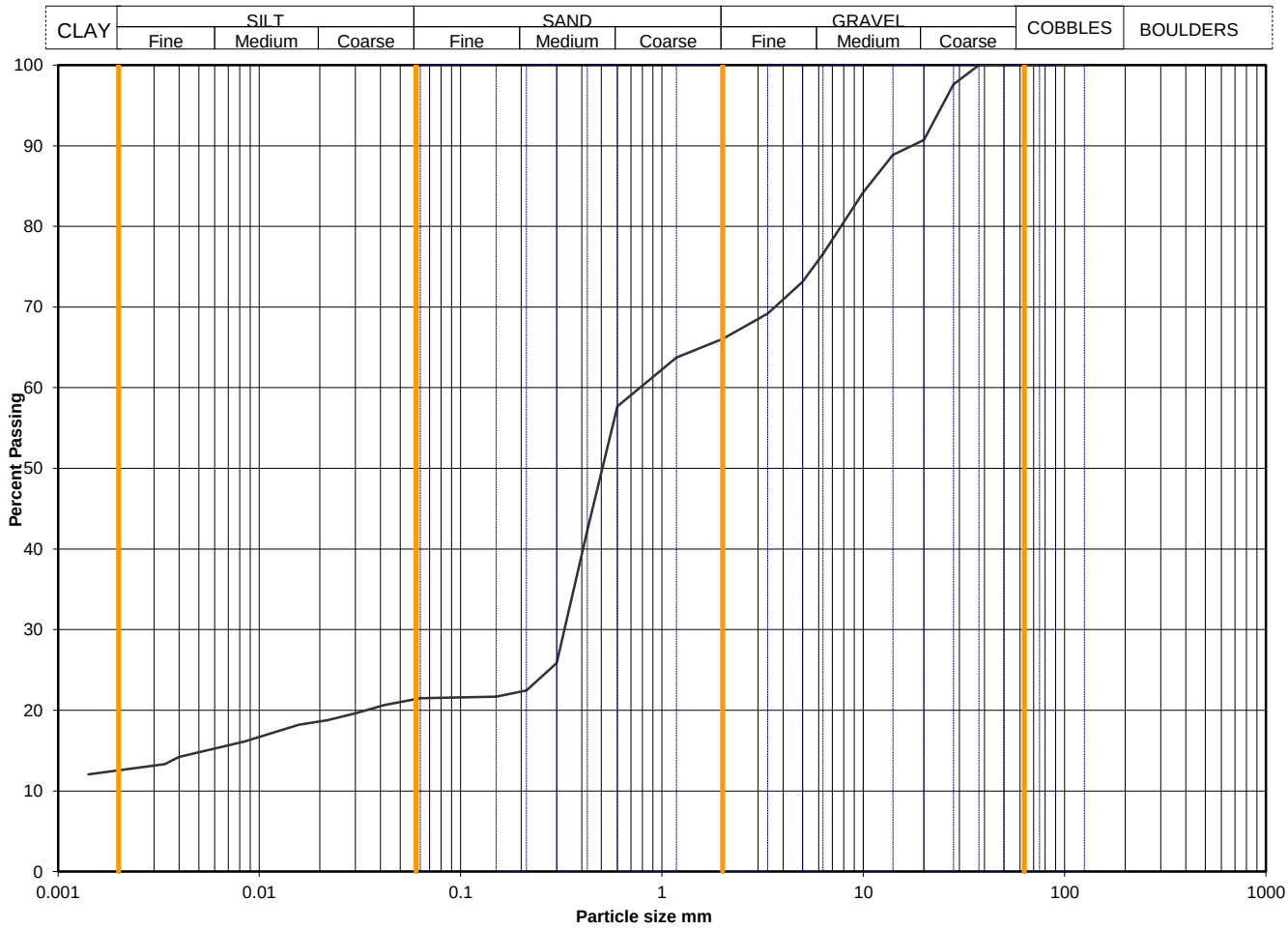
PSD

Printed: 19/06/2020 12:10

Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:
	G0015-2020200505113749

Hole No	BH102
Sample Depth (m BGL)	5.00 - 5.50
Sample Type and No	B14
Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	21
90	100	0.0418	21
75	100	0.0303	20
63	100	0.0218	19
50	100	0.0156	18
37.5	100	0.0084	16
28	98	0.0040	14
20	91	0.0034	13
14	89	0.0014	12
10	84		
6.3	77		
5.0	73		
3.35	69		
2.00	66		
1.18	64	Particle density, Mg/m3	
0.600	58		
0.425	42	2.65 assumed	
0.300	26	Dry mass of sample, kg	
0.212	22		
0.150	22	4.0	
0.063	21		

Soil description	Brownish grey slightly gravelly sandy CLAY.		
Preparation / Pretreatment	Sieve: pre dried, Hydro: as BS1377		
Remarks			
Sample Proportions		Whole	*<60mm
	Cobbles / boulders	0.0	0.0
	Gravel	33.9	33.9
	Sand	44.6	44.6
*<60mm values to aid description only	Silt	8.9	8.9
	Clay	12.6	12.6

Uniformity Coefficient	**D60 / D10**	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.21
Jul 17

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SOCOTEC

Project No G0015-20

Project Name Hammersmith Bridge

Figure

PSD

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UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Density bulk Mg/m3	Density dry Mg/m3	*w* %	Test type	Dia. mm	ó3 kPa	At failure / end of stage: Axial strain %	ó1 - ó3 kPa	*CU* kPa	MODE	Membrane Thickness mm	Remarks
BH101	13	3.00	3.45	UT	Firm greyish brown slightly sandy CLAY	1.54	0.88	74	UU	102	55	6.5	62	31	B	0.3	
BH101	58	8.50	8.95	UT	Stiff - very stiff thinly laminated greyish brown slightly sandy CLAY	2	1.57	27	UU	103.8	160	3.2	288	144	B	0.3	
BH101	59	11.50	11.95	UT	Very stiff thinly laminated greyisg brown slightly sandy CLAY	1.98	1.53	30	UU	103.4	215	3.5	167	84	B	0.3	
BH101	60	14.50	14.95	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.02	1.61	25	UU	103.3	278	5	387	194	B	0.3	
BH101	62	20.50	20.90	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.03	1.6	27	UU	103.3	390	3.1	319	160	B	0.3	
BH101	64	26.70	27.15	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2	1.59	25	UU	104.4	500	3.5	481	240	B	0.3	
BH101	66	32.50	32.85	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.05	1.65	24	UU	103.4	615	3.8	438	219	B	0.3	
BH102	15	5.50	5.95	UT	Stiff greyish brown slightly sandy CLAY	1.99	1.53	30	UU	103.5	100	14.3	183	91	C	0.3	
BH102	21	9.00	9.45	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	1.99	1.54	29	UU	103.3	170	16.4	200	100	B	0.3	
BH102	26	12.00	12.45	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.01	1.58	27	UU	103.1	228	2	168	84	B	0.3	
BH102	36	18.00	18.45	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	1.98	1.55	28	UU	104	342	3.2	284	142	B	0.3	
BH102	46	24.00	24.45	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.02	1.6	26	UU	103.9	455	3.2	308	154	B	0.3	
BH102	63	33.50	33.85	UT	Very stiff thinly laminated greyish brown slightly sandy CLAY	2.04	1.64	24	UU	103.9	630	5.1	398	199	B	0.3	

General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. Latex rubber membrane used and membrane correction applied in accordance with BS1377-7 8.5.1.4 unless stated. Tested from base depth and in a vertical orientation unless stated otherwise.

Legend						
	UU - single stage test (may be in sets of specimens)	ó3	cell pressure	Mode of failure	P	plastic
	UUM - multistage test on a single specimen	ó1 - ó3	deviator stress		B	brittle
	suffix R - remoulded or recompacted	*CU*	undrained shear strength		C	compound

QA Ref
SLR 2
Rev 2.8
Apr 19

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Project No G0015-20

Project Name Hammersmith Bridge

Figure

UUSUM

Printed: 19/06/2020 12:15

Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

Project No	G0015-20	Sample Details:	Hole No.	BH102		
Project Name	Hammersmith Bridge		Depth (m BGL)	4.50-5.00		
			Sample No	12	Type	B
			ID			
			Spec Ref			

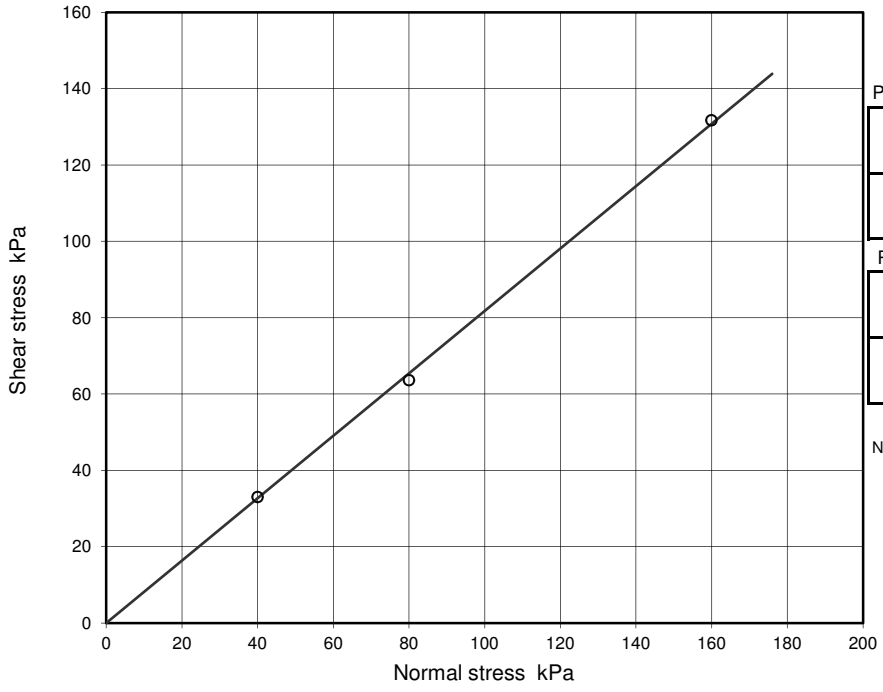
Soil Description	Brown SAND.
Specimen Type /Preparation	-2mm material. Recompacted using 2.5kg equivalent effort at as received moisture content.

Specimen(s) nominally 60mm x 60mm square
Test(s) carried out in submerged condition
Particle density, assumed 2.65 Mg/m^3

Specimen Details		No.	1	2	3	4	5	6
Initial	Height	mm	25.5	25.5	25.5			
	Bulk Density	Mg/m^3	1.91	1.91	1.91			
	Water Content	%	18.7	16.1	17.9			
	Dry density	Mg/m^3	1.61	1.65	1.62			
	Voids ratio		0.644	0.608	0.633			
	Degree of Saturation	%	77	70	75			
Consol^n	Consolidation / Normal Stress applied	kPa	**40**	**80**	**160**			
	Change in height during consolidation	mm	-0.160	-0.130	-0.280			
	Voids ratio after consolidation		0.634	0.600	0.615			
Shear see note 1	Voids ratio at end of test		0.655	0.628	0.646			
	Moisture content at end of test	%	19.6	18.8	17.9			
	Saturation at end of test	%	79	79	73			

Shearing stage

Rate of displacement	Peak	mm/min	0.600	0.600	0.600			
	Residual	mm/min						
Peak values, (o)	Relative displacement	mm	1.30	1.30	1.30			
	Shear stress	kPa	32.9	63.6	131.7			
Residual values, (x)	No. of reversals							
	Relative displacement	mm						
	Shear stress	kPa						



Shear Strength Parameters

Peak strength, (o)		Regression	Manual
c '	kPa	(-1.1)	0.0
Ø '	degrees	(39½)	39½

Residual strength, (x)

c'_R	kPa	-	-
$Ø'_R$	degrees	-	-

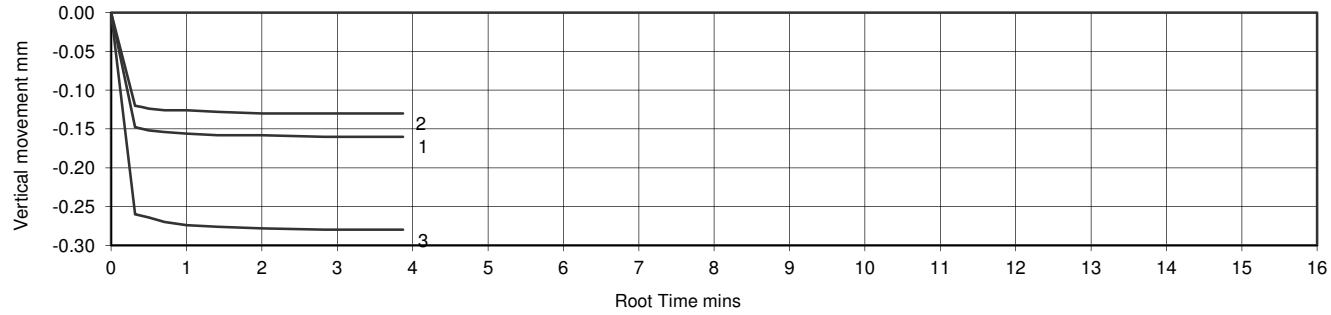
Notes :

1. After shear values based on BS1377. Pt 7 cl. 4.6.1.6 using δH calculated from consolidation and shear stages.
2. The automated regression line results in a negative c' value, therefore a manual line has been used which assumes a c' value of 0.0 kPa. The manual data is presented in the AGS.

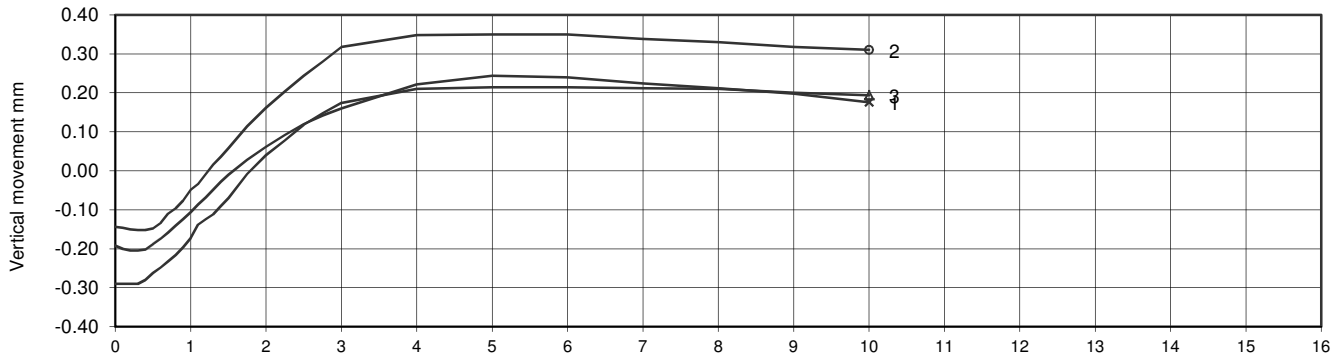
Determination of shear strength by direct shear (Small shearbox apparatus)
(BS1377 : Part 7 : clause 4 : 1990)

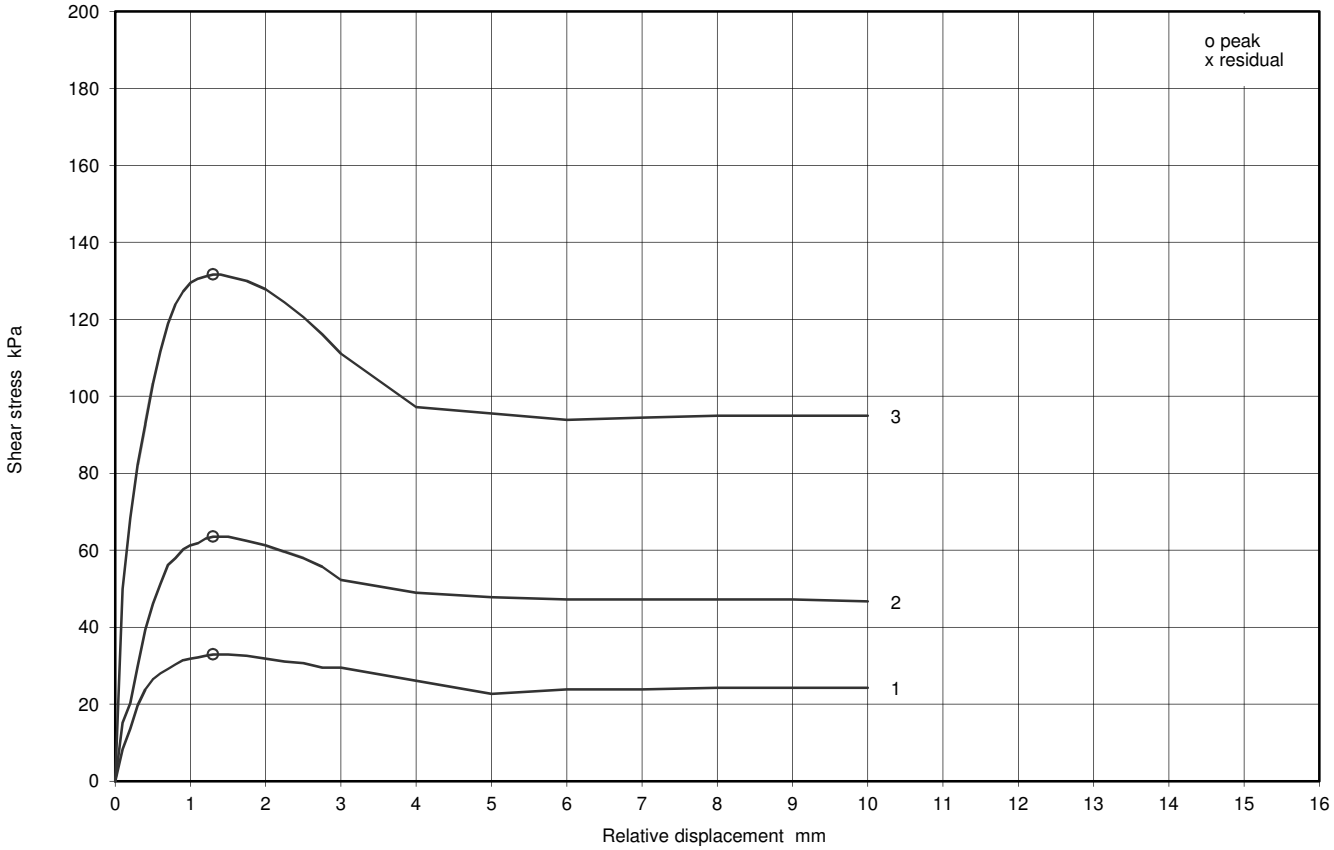
Project No	G0015-20	Sample Details:	Hole No.	BH102		
Project Name	Hammersmith Bridge		Depth (m BGL)	4.50-5.00		
			Sample No	12	Type	B
			ID			
			Spec Ref			

Consolidation stage(s)



Shearing stage(s)





Ref			Figure
SLR7.4 Rev 86.0 Feb18		Printed:19/06/2020 12:21	**SSB** sheet 2 of 2

0001

Shear Strength by Pilcon Hand method - Summary of Results

Hole No.	Sample				Spec ref	Soil Description	Undrained shear strength kPa	Residual shear strength kPa	Remarks
	No.	Depth (m)		type					
		from	to						
BH101	61	17.50	17.95	UT			140		
BH101	63	23.50	23.90	UT			140		
BH101	65	29.50	29.95	UT			140		
BH101	68	35.50	35.95	UT			140		
BH101	73	38.50	38.95	UT			140		
BH102	31	15.00	15.40	UT			140		
BH102	41	21.00	21.45	UT			140		
BH102	51	27.00	27.40	UT			140		
BH102	56	30.00	30.40	UT			140		
BH102	61	33.00	33.10	UT			140		
BH102	67	36.00	36.30	UT			140		
BH102	69	37.00	37.35	UT			140		
BH102	73	39.50	39.85	UT			140		

Notes : 1 Tests carried out in accordance with Manufacturers Instructions

QA Ref
SLR Lvane
Rev 2.1
Sep 17

SOCOTEC

Project No G0015-20

Project Name Hammersmith Bridge

Figure

HV

Printed:19/06/2020 12:08

Certificate of Analysis

Certificate Number	20-09676
	11-Jun-20
Client	Socotec The Oasts Newham Court Bearsted Road Maidstone ME14 5LH
Our Reference	20-09676
Client Reference	G0015
Order No	G/4281
Contract Title	Hammersmith Bridge
Description	8 Soil samples.
Date Received	02-Jun-20
Date Started	02-Jun-20
Date Completed	11-Jun-20
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-09676
Client Ref G0015
Contract Title Hammersmith Bridge

			Lab No	1678546	1678547	1678548	1678549	1678550	1678551	1678552	1678553
			Sample ID	BH101	BH101	BH101	BH101	BH102	BH102	BH102	BH102
			Depth	8.95-9.00	11.95-12.00	14.95-15.00	21.50	5.95-6.00	10.50	15.40-15.45	22.50
			Other ID	20	25	30	41	11	18	26	38
			Sample Type	D	D	D	D	D	D	D	D
			Sampling Date	24/03/2020	n/s	24/03/2020	n/s	24/03/2020	24/03/2020	24/03/2020	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**								
Inorganics											
pH	DETSC 2008#		pH	8.3	8.8	8.7	8.7	8.4	8.7	8.7	8.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	120	150	190	240	260	90	190	< 10
Sulphur as S, Total	DETSC 2320	0.01	%	0.34	0.33	0.50	0.37	0.66	0.20	0.48	0.35
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.12	0.13	0.15	0.12	0.14	0.09	0.14	0.13

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 20-09676
Client Ref G0015
Contract Hammersmith Bridge

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1678546	BH101 8.95-9.00 SOIL	24/03/20	PT 1L	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1678547	BH101 11.95-12.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1678548	BH101 14.95-15.00 SOIL	24/03/20	PT 1L	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1678549	BH101 21.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1678550	BH102 5.95-6.00 SOIL	24/03/20	PT 1L	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1678551	BH102 10.50 SOIL	24/03/20	PT 1L	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1678552	BH102 15.40-15.45 SOIL	24/03/20	PT 1L	Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), pH + Conductivity (7 days)	
1678553	BH102 22.50 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

APPENDIX E

GEOENVIRONMENTAL LABORATORY TEST RESULTS

Test Report - Soil	20050166(v.1)
	20050367(v.1)
Test Report – Water	20060621(v.1)

Environmental Chemistry
SOCOTEC UK
Ashby Rd, Bretby,
Burton-on-Trent, UK
DE15 0YZ

Certificate of Analysis

Project No: 20050166

Client: SOCOTEC Geotechnical

Quote Number: BEC20057992

Project Reference: G0015-20

Site Name: Hammersmith Bridge

Contact: Stewart Nicol

Address: The Oasts, Newnham Court
Bearsted Road
Maidstone
Kent

Post Code: ME14 5LH

E-Mail: Stewart.nicol@socotec.com

Phone No: 07702 641769

Number of Samples Received: 7

Date Received: 07/05/2020

Analysis Date: 22/05/2020

Date Issued: 26/05/2020

Job Status: Complete

Account Manager

Emily Jones

Authorised by the Operations Manager
Becky Batham

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Samples Analysed

Sample Reference	Text ID	Sample Date	Sample Type
BH102-1-ES-0.30	20050166-001	04/05/2020 10:00:00	SOLID
BH102-3-ES-0.50	20050166-002	04/05/2020 10:00:00	SOLID
BH102-5-ES-1.00	20050166-003	04/05/2020 10:00:00	SOLID
BH102-7-ES-2.00	20050166-004	04/05/2020 10:00:00	SOLID
BH102-9-ES-3.00	20050166-005	04/05/2020 10:00:00	SOLID
BH102-13-ES-5.00	20050166-006	04/05/2020 10:00:00	SOLID
BH102-18-ES-6.20	20050166-007	04/05/2020 10:00:00	SOLID

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
>C6-C8 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235	<0.233	<0.246	<0.271	<0.224
>C7-C8 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012	<0.012	<0.012	<0.014	<0.011
>C8-C10 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235*	<0.233*	<0.246*	<0.271*	<0.224*
>C8-C10 Aromatic	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.048	<0.047	<0.049	<0.055	<0.044
C5-C6 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235	<0.233	<0.246	<0.271	<0.224
C5-C7 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012	<0.012	<0.012	<0.014	<0.011
Total GRO	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.235	<0.233	<0.246	<0.271	<0.224
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.8	8.7	8.2	8.0	8.8
Chloride as Cl	KONECL	2	mg/kg^	N	52	20	24	10	25
Chromium (VI) as Cr	KONENS	0.1	mg/kg	N	0.1	<0.1	<0.1	<0.1	<0.1
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6	<0.6	<0.7	<0.6
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6	0.7	2.0	<0.6
Fluoride as F	ISEFSS	0.2	mg/kg^	U	0.5	0.6	0.3	0.4	1.3
Total Organic Carbon	WSLM59	0.02	% m/m^	U	1.81	2.11	5.15	0.89	0.11
LOI	LOI(%MM)	0.2	% m/m^	N	4.7	4.5	5.7	4.4	1.1
Antimony as Sb	ICPMSS	0.1	mg/kg^	U	2.0	2.0	4.1	0.5	0.4

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
>C6-C8 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.243	<0.274
>C7-C8 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012	<0.014
>C8-C10 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.243	<0.274*
>C8-C10 Aromatic	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.048	<0.055
C5-C6 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.243	<0.274
C5-C7 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.012	<0.014
Total GRO	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.243	<0.274
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.9	8.8
Chloride as Cl	KONECL	2	mg/kg^	N	32	109
Chromium (VI) as Cr	KONENS	0.1	mg/kg	N	<0.1	<0.1
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.7
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.6	<0.7
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.7
Fluoride as F	ISEFSS	0.2	mg/kg^	U	1.5	1.1
Total Organic Carbon	WSLM59	0.02	% m/m^	U	0.05	0.44
LOI	LOI(%MM)	0.2	% m/m^	N	0.5	4.9
Antimony as Sb	ICPMSS	0.1	mg/kg^	U	0.4	0.4

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	14.0	13.5	13.9	13.9	12.2
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	0.3	0.3	0.4	0.2	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	36.4	37.2	45.4	36.3	12.6
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	182.1	202.8	382.3	36.3	6.8
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	0.6	0.6	1.0	<0.5	<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM	4.0	5.7	3.9	4.5	12.4
Nickel as Ni	ICPMSS	2	mg/kg^	UM	20.3	20.1	23.2	30.6	23.9
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5	<0.5	<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	62.4	85.0	52.9	72.0	165.3
Vanadium as V	ICPMSS	0.6	mg/kg^	N	36.4	35.1	45.1	50.9	29.9
Zinc as Zn	ICPMSS	16	mg/kg^	UM	123.3	120.4	186.2	51.6	23.1
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM	150	137	275	58.5	29.1
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	N	419	458	2910	2970	262
Benzene	BTEXHSA	10	µg/kg^	UM	<12	<12	<12	<14	<11
Ethylbenzene	BTEXHSA	10	µg/kg^	UM	<12	<12	<12	<14	<11
m/p-Xylene	BTEXHSA	20	µg/kg^	UM	<24	<23	<25	<27	<22
o-Xylene	BTEXHSA	10	µg/kg^	UM	<12	<12	<12	<14	<11

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	**Method Code**	**MDL**	**Units**	**Accred**			
Arsenic as As	ICPMSS	0.3	mg/kg^	UM		13.0	12.8
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM		<0.2	0.3
Copper as Cu	ICPMSS	1.6	mg/kg^	UM		7.7	29.8
Lead as Pb	ICPMSS	0.7	mg/kg^	UM		3.9	15.4
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM		<0.5	<0.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM		7.0	0.9
Nickel as Ni	ICPMSS	2	mg/kg^	UM		15.1	44.7
Selenium as Se	ICPMSS	0.5	mg/kg^	UM		<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM		99.6	48.0
Vanadium as V	ICPMSS	0.6	mg/kg^	N		31.1	68.7
Zinc as Zn	ICPMSS	16	mg/kg^	UM		20.3	86.1
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM		56.9	35.1
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	N		79	249
Benzene	BTEXHSA	10	µg/kg^	UM		<12	<14
Ethylbenzene	BTEXHSA	10	µg/kg^	UM		<12	<14
m/p-Xylene	BTEXHSA	20	µg/kg^	UM		<24	<27
o-Xylene	BTEXHSA	10	µg/kg^	UM		<12	<14

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Toluene	BTEXHSA	10	µg/kg^	UM	<12	<12	<12	<14	<11
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.09	<0.10	<0.11	<0.09
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.09	<0.09	<0.10	<0.11	<0.09
Anthracene	PAHMSUS	0.08	mg/kg^	U	0.23	0.12	0.15	<0.11	<0.09
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.77	0.41	0.40	<0.11	<0.09
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.74	0.36	0.40	<0.11	<0.09
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	1.07	0.61	0.59	<0.11	<0.09
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	0.49	0.26	0.25	<0.11	<0.09
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.41	0.22	0.24	<0.11	<0.09
Chrysene	PAHMSUS	0.08	mg/kg^	UM	0.79	0.48	0.45	<0.11	<0.09
Coronene	PAHMSUS	0.08	mg/kg^	N	0.15	<0.09	<0.10	<0.11	<0.09
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.17	<0.09	<0.10	<0.11	<0.09
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	1.39	0.65	0.76	<0.11	<0.09
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.09	<0.10	<0.11	<0.09
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.74	0.38	0.40	<0.11	<0.09
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.09	<0.10	<0.11	<0.09
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	0.54	0.24	0.42	<0.11	<0.09

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
Toluene	BTEXHSA	10	µg/kg^	UM	<12	<14
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.10	<0.11
Anthracene	PAHMSUS	0.08	mg/kg^	U	<0.10	<0.11
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Chrysene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.10	<0.11
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	<0.10	<0.11

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Pyrene	PAHMSUS	0.08	mg/kg^	UM	1.22	0.58	0.60	<0.11	<0.09
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	<8.93	<4.76	<5.14	<1.73	<1.43
PCB 101	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 118	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 138	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 153	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 180	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 28	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
PCB 52	PCBECD	5	µg/kg^	UM	<5.88	<5.83	<6.14	<6.78	<5.61
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred			
Pyrene	PAHMSUS	0.08	mg/kg^	UM		<0.10	<0.11
Total PAH 16	PAHMSUS	1.28	mg/kg^	U		<1.55	<1.76
PCB 101	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 118	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 138	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 153	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 180	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 28	PCBECD	5	µg/kg^	UM		<6.07	<6.86
PCB 52	PCBECD	5	µg/kg^	UM		<6.07	<6.86
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.2	<0.2	<0.3	<0.2
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.2	<0.2	<0.2	<0.3	<0.2
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6

Client: SOCOTEC Geotechnical

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Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred			
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N		<0.2	<0.3
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.7	<0.7	<0.7	<0.8	<0.7
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	SVOCSW	0.1	mg/kg^	U	<0.1	0.2	<0.1	<0.1	<0.1
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4	<0.4	<0.4	<0.3
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	0.4	0.8	0.3	<0.3	<0.2
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	0.4	0.6	0.3	<0.3	<0.2
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	0.6	1.0	0.4	<0.3	<0.2
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.2	0.3	<0.2	<0.3	<0.2
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.7	<0.6
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred			
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N		<0.7	<0.8
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
Acenaphthene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Anthracene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Azobenzene	SVOCSW	0.3	mg/kg^	N		<0.4	<0.4
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
Benzoic Acid	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7
Biphenyl	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166					
				Sample ID	001	002	003	004	005	
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00	
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020	
Analysis	Method Code	MDL	Units	Accred						
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6	
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.2	<0.2	<0.3	<0.2	
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.2	<0.2	<0.3	<0.2	
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4	<0.4	<0.4	<0.3	
Chrysene	SVOCSW	0.2	mg/kg^	U	0.4	0.8	0.3	<0.3	<0.2	
Coronene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4	<0.4	<0.4	<0.3	
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.7	<0.6	
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	0.3	<0.1	<0.1	<0.1	<0.1	
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.2	<0.2	<0.3	<0.2	
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	SVOCSW	0.2	mg/kg^	U	0.7	1.2	0.6	<0.3	<0.2	
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.2	<0.2	<0.3	<0.2	
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1	

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6	<0.7
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4
Chrysene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Coronene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.7
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

					Project ID	20050166				
					Sample ID	001	002	003	004	005
					Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
					Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred						
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1	<0.1	<0.1	<0.1
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.6	<0.6	<0.7	<0.6
Isophorone	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.6	<0.6	<0.7	<0.6
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N		<1.1	<1.1	<1.1	<1.2	<1.0
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N		<0.6	<0.6	<0.6	<0.7	<0.6
Phenanthrene	SVOCSW	0.1	mg/kg^	U		0.3	0.5	0.3	<0.1	<0.1
Phenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U		0.6	1.2	0.5	<0.3	<0.2
>C10-C12 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.70	<4.66	<4.91	<5.42	<4.48
>C12-C16 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.70	<4.66	<4.91	<5.42	<4.48
>C16-C21 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		5.04	<4.66	<4.91	<5.42	<4.48
>C21-C35 (Aliphatic)	TPHFIDUS (Aliphatic)	10	mg/kg^	U		20.8	12.1	<12.3	<13.6	<11.2
>C35-C44 (Aliphatic)	TPHFIDUS (Aliphatic)	6	mg/kg^	N		7.71	<6.99	<7.37	<8.13	<6.73

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Date Issued: 26/05/2020

Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred			
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Hexachloroethane	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7
Isophorone	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U		<0.6	<0.7
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N		<1.1	<1.2
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N		<0.6	<0.7
Phenanthrene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Phenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U		<0.2	<0.3
>C10-C12 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.85	<5.49
>C12-C16 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.85	<5.49
>C16-C21 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<4.85	<5.49
>C21-C35 (Aliphatic)	TPHFIDUS (Aliphatic)	10	mg/kg^	U		<12.1	<13.7
>C35-C44 (Aliphatic)	TPHFIDUS (Aliphatic)	6	mg/kg^	N		<7.28	<8.23

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Total TPH (Aliphatic)	TPHFIDUS (Aliphatic)	20	mg/kg^	U	31.9	<23.3	<24.6	<27.1	<22.4
>C10-C12 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.70	<4.66	<4.91	<5.42	<4.48
>C12-C16 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	14.7	13.1	5.66	<5.42	<4.48
>C16-C21 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	22.0	16.6	9.70	7.50	5.43
>C21-C35 (Aromatic)	TPHFIDUS (Aromatic)	10	mg/kg^	U	91.9	60.4	37.0	26.8	11.2
>C35-C44 (Aromatic)	TPHFIDUS (Aromatic)	6	mg/kg^	N	36.3	16.0	<7.37	<8.13	<6.73
Total TPH (Aromatic)	TPHFIDUS (Aromatic)	20	mg/kg^	U	152	101	55.1	41.5	<22.4
1,1,1,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	N	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1-Dichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1-Dichloroethene	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
1,1-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	µg/kg^	UM	<3	<4	<4	<4	<3
1,2,3-Trichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	µg/kg^	N	<3	<4	<4	<4	<3

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Date Issued: 26/05/2020

Analysis Results

					Project ID	20050166	
					Sample ID	006	007
					Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
					Sample Type	SOLID	SOLID
					Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred			
Total TPH (Aliphatic)	TPHFIDUS (Aliphatic)	20	mg/kg^	U		<24.3	<27.4
>C10-C12 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U		<4.85	<5.49
>C12-C16 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U		<4.85	<5.49
>C16-C21 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U		5.84	6.61
>C21-C35 (Aromatic)	TPHFIDUS (Aromatic)	10	mg/kg^	U		19.4	18.9
>C35-C44 (Aromatic)	TPHFIDUS (Aromatic)	6	mg/kg^	N		<7.28	<8.23
Total TPH (Aromatic)	TPHFIDUS (Aromatic)	20	mg/kg^	U		31.3	32.3
1,1,1,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	UM		<1	<1
1,1,1-Trichloroethane	VOCHSAS	1	µg/kg^	UM		<1	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	N		<1	<1
1,1,2-Trichloroethane	VOCHSAS	1	µg/kg^	UM		<1	<1
1,1-Dichloroethane	VOCHSAS	1	µg/kg^	UM		<1	<1
1,1-Dichloroethene	VOCHSAS	1	µg/kg^	U		<1	<1
1,1-Dichloropropene	VOCHSAS	1	µg/kg^	UM		<1	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	µg/kg^	UM		<4	<4
1,2,3-Trichloropropane	VOCHSAS	1	µg/kg^	UM		<1	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	µg/kg^	N		<4	<4

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
1,2,4-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
1,2-Dibromoethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
2,2-Dichloropropane	VOCHSAS	2	µg/kg^	UM	<2	<2	<2	<3	<2
2-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
4-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Benzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromodichloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

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Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
1,2,4-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
1,2-Dibromo-3-chloropropane	VOCHSAS	1	µg/kg^	U	<1	<1
1,2-Dibromoethane	VOCHSAS	1	µg/kg^	UM	<1	<1
1,2-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
1,2-Dichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1
1,2-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1
1,3,5-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
1,3-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
1,3-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1
1,4-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
2,2-Dichloropropane	VOCHSAS	2	µg/kg^	UM	<2	<3
2-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1
4-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1
Benzene	VOCHSAS	1	µg/kg^	UM	<1	<1
Bromobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
Bromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1
Bromodichloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Bromoform	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Carbon Tetrachloride	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chloroethane	VOCHSAS	2	µg/kg^	UM	<2	<2	<2	<3	<2
Chloroform	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chloromethane	VOCHSAS	3	µg/kg^	U	<3	<4	<4	<4	<3
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<6	<6	<6	<7	<6
cis 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dibromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dibromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dichlorodifluoromethane	VOCHSAS	1	µg/kg^	N	<1	<1	<1	<1	<1
Ethylbenzene	VOCHSAS	2	µg/kg^	UM	<2	<2	<2	<3	<2
Hexachlorobutadiene	VOCHSAS	2	µg/kg^	N	<2	<2	<2	<3	<2
iso-Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
m and p-Xylene	VOCHSAS	4	µg/kg^	UM	<5	<5	<5	<5	<4
MTBE	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

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Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
Bromoform	VOCHSAS	1	µg/kg^	UM	<1	<1
Bromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1
Carbon Tetrachloride	VOCHSAS	1	µg/kg^	UM	<1	<1
Chlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
Chloroethane	VOCHSAS	2	µg/kg^	UM	<2	<3
Chloroform	VOCHSAS	1	µg/kg^	UM	<1	<1
Chloromethane	VOCHSAS	3	µg/kg^	U	<4	<4
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<6	<7
cis 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1
Dibromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1
Dibromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1
Dichlorodifluoromethane	VOCHSAS	1	µg/kg^	N	<1	<1
Ethylbenzene	VOCHSAS	2	µg/kg^	UM	<2	<3
Hexachlorobutadiene	VOCHSAS	2	µg/kg^	N	<2	<3
iso-Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
m and p-Xylene	VOCHSAS	4	µg/kg^	UM	<5	<6
MTBE	VOCHSAS	1	µg/kg^	UM	<1	<1

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Naphthalene	VOCHSAS	5	µg/kg^	UM	<6	<6	<6	<7	<6
n-Butylbenzene	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
o-Xylene	VOCHSAS	2	µg/kg^	UM	<2	<2	<2	<3	<2
p-Isopropyltoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
sec-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Styrene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
tert-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Tetrachloroethene	VOCHSAS	3	µg/kg^	UM	<3	<4	<4	<4	<3
Toluene	VOCHSAS	5	µg/kg^	UM	<6	<6	<6	<7	<6
trans 1,2-Dichloroethene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
trans 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Trichloroethene	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
Trichlorofluoromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Vinyl Chloride	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Total Moisture at 105°C	TMSS	0.1	%	U	14.9	14.2	18.6	26.2	10.8
Total Moisture at 35°C	CLANDPREP	0.1	%	N	12.1	11.5	16.9	23.2	10.2

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
Naphthalene	VOCHSAS	5	µg/kg^	UM	<6	<7
n-Butylbenzene	VOCHSAS	1	µg/kg^	U	<1	<1
o-Xylene	VOCHSAS	2	µg/kg^	UM	<2	<3
p-Isopropyltoluene	VOCHSAS	1	µg/kg^	UM	<1	<1
Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
sec-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
Styrene	VOCHSAS	1	µg/kg^	UM	<1	<1
tert-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1
Tetrachloroethene	VOCHSAS	3	µg/kg^	UM	<4	<4
Toluene	VOCHSAS	5	µg/kg^	UM	<6	<7
trans 1,2-Dichloroethene	VOCHSAS	1	µg/kg^	UM	<1	<1
trans 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1
Trichloroethene	VOCHSAS	1	µg/kg^	U	<1	<1
Trichlorofluoromethane	VOCHSAS	1	µg/kg^	UM	<1	<1
Vinyl Chloride	VOCHSAS	1	µg/kg^	UM	<1	<1
Total Moisture at 105°C	TMSS	0.1	%	U	17.6	27.1
Total Moisture at 35°C	CLANDPREP	0.1	%	N	17.8	23.5

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166				
				Sample ID	001	002	003	004	005
				Customer ID	BH102-1-ES-0.30	BH102-3-ES-0.50	BH102-5-ES-1.00	BH102-7-ES-2.00	BH102-9-ES-3.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020	04/05/2020	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred					
Colour of Material	CLANDPREP		-	N	Brown	Brown	Brown	Brown	Brown
Major Constituents	CLANDPREP		-	N	SILT	SILT	SILT	CLAY	SAND
Minor Constituents	CLANDPREP		-	N	Gravel/Brick	Gravel/Brick	Gravel/Brick	Gravel	Gravel
Miscellaneous Constituents	CLANDPREP		-	N	Concrete	Concrete	Concrete	na	na
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS	NAIIS	NAIIS	NAIIS

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Analysis Results

				Project ID	20050166	
				Sample ID	006	007
				Customer ID	BH102-13-ES-5.00	BH102-18-ES-6.20
				Sample Type	SOLID	SOLID
				Sampling Date	04/05/2020	04/05/2020
Analysis	Method Code	MDL	Units	Accred		
Colour of Material	CLANDPREP		-	N	Brown	Brown
Major Constituents	CLANDPREP		-	N	SAND	CLAY
Minor Constituents	CLANDPREP		-	N	Gravel	Gravel
Miscellaneous Constituents	CLANDPREP		-	N	na	na
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS

IOM

working for a healthy and sustainable world

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S12460-7

DATE OF ISSUE: 19.05.20

DATE SAMPLES RECEIVED: 12.05.20

DATE ANALYSIS COMPLETED: 19.05.20

DESCRIPTION: Seven soil/loose aggregate samples each weighing approximately 0.8-1.5kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for mass determination of asbestos.

METHODS:

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

Quantitative - The analysis was carried out using our documented in-house method 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 sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

www.iom-world.org

Registered Address: Research Avenue North, Riccarton, Edinburgh, EH14 4AP, United Kingdom
Tel: 0131 449 8000 Fax: 0131 449 8084 Email: iom@iom-world.org

IOM CONSULTING LIMITED, registered in Scotland No. SC205670

UKAS TESTING
0374

CONTRACT NO: S12460-7
DATE OF ISSUE: 19.05.20

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 20050166

IOM sample number	Client sample number	ACM type detected	PLM result
S72745	20050166-001-15	-	No Asbestos Detected
S72746	20050166-002-15	-	No Asbestos Detected
S72747	20050166-003-15	-	No Asbestos Detected
S72748	20050166-004-15	-	No Asbestos Detected
S72749	20050166-005-15	-	No Asbestos Detected
S72750	20050166-006-15	-	No Asbestos Detected
S72751	20050166-007-15	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY: .....
D Third
Scientific Technician

Report Number :

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
GROHSA	001-007	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (C6-C7, C8-C10) . These circumstances should be taken into consideration when utilising the data.

LIMS-F002 - Report Notes

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time	Handling Time
BH102-13-ES-5.00	20050166-006	**GROHSA/BTEXHSA**						✓	
BH102-13-ES-5.00	20050166-006	**BTEXHSA**						✓	

Analysis Method

Analysis	Analysis Type	Analysis Method
BTEXHSA	ORGANIC	As Received
CLANDPREP	PHYS	As Received
GROHSA	ORGANIC	As Received
ICPMSS	METALS	Air Dried & Ground
ICPSOIL	METALS	Air Dried & Ground
ICPWSS	METALS	Air Dried & Ground
ISEFSS	INORGANIC	Air Dried & Ground
KONECL	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Air Dried & Ground
LOI(%MM)	INORGANIC	Air Dried & Ground
PAHMSUS	ORGANIC	As Received
PCBECD	ORGANIC	As Received
SFAPI	INORGANIC	As Received
SVOCSW	ORGANIC	As Received
TMSS	PHYS	As Received
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
VOCHSAS	ORGANIC	As Received
WSLM59	INORGANIC	Air Dried & Ground

Client: SOCOTEC Geotechnical

Project Name: Hammersmith Bridge

Project No: 20050166

Date Issued: 26/05/2020

Additional Information

This report refers to samples as received, and SOCOTEC Uk Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° C

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° C.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation, if applicable further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis

Environmental Chemistry
SOCOTEC UK
Ashby Rd, Bretby,
Burton-on-Trent, UK
DE15 0YZ

Certificate of Analysis

Project No: 20050367

Client: SOCOTEC Geotechnical

Quote Number: BEC20057992

Project Reference: G0015-20

Site Name: G0015-20 Hammersmith Bridge

Contact: Stewart Nicol

Address: The Oasts, Newnham Court
Bearsted Road
Maidstone
Kent

Post Code: ME14 5LH

E-Mail: Stewart.nicol@socotec.com

Phone No: 07702 641769

Number of Samples Received: 7

Date Received: 18/05/2020

Analysis Date: 03/06/2020

Date Issued: 03/06/2020

Job Status: Complete

Account Manager

Emily Jones

Authorised by the Operations Manager
Becky Batham

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Samples Analysed

Sample Reference	Text ID	Sample Date	Sample Type
BH101-1-ES-0.30	20050367-001	12/05/2020 12:06:01	SOLID
BH101-3-ES-0.50	20050367-002	12/05/2020 12:06:01	SOLID
BH101-5-ES-1.00	20050367-003	12/05/2020 12:06:01	SOLID
BH101-7-ES-1.50	20050367-004	12/05/2020 12:06:01	SOLID
BH101-8-ES-2.00	20050367-005	12/05/2020 12:06:01	SOLID
BH101-11-ES-2.50	20050367-006	12/05/2020 12:06:01	SOLID
BH101-18-ES-4.50	20050367-007	12/05/2020 12:06:01	SOLID

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
>C6-C8 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.225	<0.250	<0.248	<0.248	<0.282
>C7-C8 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.011	<0.013	<0.012	<0.012	<0.014
>C8-C10 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.225	<0.250	<0.248	<0.248	<0.282
>C8-C10 Aromatic	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.045	<0.051	<0.049	<0.049	<0.056
C5-C6 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.225	<0.250	<0.248	<0.248	<0.282
C5-C7 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.011	<0.013	<0.012	<0.012	<0.014
Total GRO	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.225	<0.250	<0.248	<0.248	<0.282
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.3	8.2	8.3	8.1	8.2
Chloride as Cl	KONECL	2	mg/kg^	N	2260	110	35	23	30
Chromium (VI) as Cr	KONENS	0.1	mg/kg	N	<0.5	<0.1	<0.1	<0.1	<0.1
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6	<0.6	<0.6	<0.7
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.6	<0.6	<0.6	<0.6	<0.7
Fluoride as F	ISEFSS	0.2	mg/kg^	U	1.9	0.5	0.3	0.2	0.7
Total Organic Carbon	WSLM59	0.02	% m/m^	U	2.34	2.09	5.48	1.91	3.27
LOI	LOI(%MM)	0.2	% m/m^	N	5.7	4.5	6.4	4.4	6.7
Antimony as Sb	ICPMSS	0.1	mg/kg^	U	6.4	1.5	4.4	4.7	1.8

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	**Method Code**	**MDL**	**Units**	**Accred**		
>C6-C8 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.282	<0.293
>C7-C8 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.014	<0.015
>C8-C10 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.282	<0.293
>C8-C10 Aromatic	GROHSA/BTEXHSA	0.04	mg/kg^	UM	<0.056	<0.059
C5-C6 Aliphatic	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.282	<0.293
C5-C7 Aromatic	GROHSA/BTEXHSA	0.01	mg/kg^	UM	<0.014	<0.015
Total GRO	GROHSA/BTEXHSA	0.2	mg/kg^	UM	<0.282	<0.293*
pH (2.5:1 extraction)	PHSOIL	1	pH units	UM	8.2	8.0
Chloride as Cl	KONECL	2	mg/kg^	N	54	71
Chromium (VI) as Cr	KONENS	0.1	mg/kg	N	<0.1	<0.1
Free Cyanide	SFAPI	0.5	mg/kg^	UM	<0.7	<0.7
Phenol Index	SFAPI	0.5	mg/kg^	U	<0.7	<0.7
Total Cyanide	SFAPI	0.5	mg/kg^	UM	<0.7	<0.7
Fluoride as F	ISEFSS	0.2	mg/kg^	U	0.7	0.7
Total Organic Carbon	WSLM59	0.02	% m/m^	U	3.33	3.21
LOI	LOI(%MM)	0.2	% m/m^	N	6.6	5.2
Antimony as Sb	ICPMSS	0.1	mg/kg^	U	1.2	0.5

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	16.3	14.1	19.6	16.1	13.6
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	2.0	0.3	0.3	0.2	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	95.8	67.7	202.0	134.3	61.2
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	180.4	214.6	332.1	320.0	186.5
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	<0.5	0.8	1.2	1.1	1.5
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM	8.7	3.7	4.6	4.0	2.9
Nickel as Ni	ICPMSS	2	mg/kg^	UM	67.4	23.5	26.0	22.9	20.3
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5	<0.5	<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	131.8	60.5	59.7	62.0	56.3
Vanadium as V	ICPMSS	0.6	mg/kg^	N	46.1	41.5	48.1	41.1	38.4
Zinc as Zn	ICPMSS	16	mg/kg^	UM	400.3	110.4	134.2	130.9	70.6
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM	175	93.4	140	88.1	69.1
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	N	2830	269	170	373	215
Benzene	BTEXHSA	10	µg/kg^	UM	<11	<13	<12	<12	<14
Ethylbenzene	BTEXHSA	10	µg/kg^	UM	<11	<13	<12	<12	<14
m/p-Xylene	BTEXHSA	20	µg/kg^	UM	<23	<25	<25	<25	<28
o-Xylene	BTEXHSA	10	µg/kg^	UM	<11	<13	<12	<12	<14

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Arsenic as As	ICPMSS	0.3	mg/kg^	UM	13.5	8.6
Cadmium as Cd	ICPMSS	0.2	mg/kg^	UM	0.2	<0.2
Copper as Cu	ICPMSS	1.6	mg/kg^	UM	61.9	28.4
Lead as Pb	ICPMSS	0.7	mg/kg^	UM	179.5	86.9
Mercury as Hg	ICPMSS	0.5	mg/kg^	UM	1.7	0.6
Molybdenum as Mo	ICPMSS	0.5	mg/kg^	UM	3.0	1.7
Nickel as Ni	ICPMSS	2	mg/kg^	UM	21.3	12.4
Selenium as Se	ICPMSS	0.5	mg/kg^	UM	<0.5	<0.5
Total Chromium as Cr	ICPMSS	1.2	mg/kg^	UM	58.8	35.2
Vanadium as V	ICPMSS	0.6	mg/kg^	N	38.7	24.5
Zinc as Zn	ICPMSS	16	mg/kg^	UM	78.5	45.9
Barium as Ba	ICPSOIL	0.5	mg/kg^	UM	72.3	50.8
Water Soluble Sulphate as SO4 by Mass	ICPWSS	20	mg/kg^	N	167	139
Benzene	BTEXHSA	10	µg/kg^	UM	<14	<15
Ethylbenzene	BTEXHSA	10	µg/kg^	UM	<14	<15
m/p-Xylene	BTEXHSA	20	µg/kg^	UM	<28	<29
o-Xylene	BTEXHSA	10	µg/kg^	UM	<14	<15

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Toluene	BTEXHSA	10	µg/kg^	UM	<11	<13	<12	<12	<14
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.10	<0.10	<0.10	<0.11
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	0.12	<0.10	<0.10	<0.10	<0.11
Anthracene	PAHMSUS	0.08	mg/kg^	U	0.16	<0.10	<0.10	<0.10	<0.11
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.93	0.30	<0.10	<0.10	<0.11
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	1.21	0.26	<0.10	<0.10	<0.11
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	1.49	0.35	0.11	<0.10	<0.11
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	0.82	0.13	<0.10	<0.10	<0.11
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	0.64	0.19	<0.10	<0.10	<0.11
Chrysene	PAHMSUS	0.08	mg/kg^	UM	0.80	0.28	<0.10	<0.10	<0.11
Coronene	PAHMSUS	0.08	mg/kg^	N	0.31	<0.10	<0.10	<0.10	<0.11
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	0.29	<0.10	<0.10	<0.10	<0.11
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	1.28	0.47	<0.10	<0.10	<0.11
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.10	<0.10	<0.10	<0.11
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	0.98	0.18	<0.10	<0.10	<0.11
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.09	<0.10	<0.10	<0.10	<0.11
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	0.48	0.37	<0.10	<0.10	<0.11

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Toluene	BTEXHSA	10	µg/kg^	UM	<14	<15
Acenaphthene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Acenaphthylene	PAHMSUS	0.08	mg/kg^	U	<0.11	<0.12
Anthracene	PAHMSUS	0.08	mg/kg^	U	<0.11	<0.12
Benzo[a]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Benzo[a]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Benzo[b]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Benzo[g,h,i]perylene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Benzo[k]fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Chrysene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Coronene	PAHMSUS	0.08	mg/kg^	N	<0.11	<0.12
Dibenzo[a,h]anthracene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Fluoranthene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Fluorene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Indeno[1,2,3-cd]pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Naphthalene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Phenanthrene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Pyrene	PAHMSUS	0.08	mg/kg^	UM	1.15	0.34	<0.10	<0.10	<0.11
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	<10.6	<3.46	<1.60	<1.58	<1.81
PCB 101	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 118	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 138	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 153	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 180	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 28	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
PCB 52	PCBECD	5	µg/kg^	UM	<5.62	<6.24	<6.20	<6.19	<7.06
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Pyrene	PAHMSUS	0.08	mg/kg^	UM	<0.11	<0.12
Total PAH 16	PAHMSUS	1.28	mg/kg^	U	<1.81	<1.87
PCB 101	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 118	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 138	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 153	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 180	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 28	PCBECD	5	µg/kg^	UM	<7.05	<7.32
PCB 52	PCBECD	5	µg/kg^	UM	<7.05	<7.32
1,2,4-Trichlorobenzene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1
1,2-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
1,3-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
1,4-Dichlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
1-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4,5-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4,6-Trichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4-Dichlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3	<0.2	<0.2	<0.3
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.2	<0.3	<0.2	<0.2	<0.3
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
2,4-Dimethylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2,4-Dinitrophenol	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
2,4-Dinitrotoluene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.3
2,6-Dinitrotoluene	SVOCSW	0.5	mg/kg^	U	<0.7	<0.7
2-Chloronaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Chlorophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Methylnaphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
2-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
2-Nitrophenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
3- & 4-Methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
3-Nitroaniline	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
4,6-Dinitro-2-methylphenol	SVOCSW	0.2	mg/kg^	N	<0.3	<0.3
4-Bromophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
4-Chloro-3-methylphenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
4-Chloroaniline	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
4-Chlorophenol	SVOCSW	0.5	mg/kg^	U	<0.7	<0.7

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.7	<0.7	<0.7	<0.7	<0.8
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	0.2	<0.1	<0.1	<0.1	<0.1
Anthracene	SVOCSW	0.1	mg/kg^	U	0.2	<0.1	<0.1	<0.1	<0.1
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.3	<0.4	<0.4	<0.4	<0.4
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	1.9	<0.3	0.3	<0.2	<0.3
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	2.0	<0.3	0.3	<0.2	<0.3
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	2.6	<0.3	0.3	<0.2	<0.3
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	1.4	<0.6	<0.6	<0.6	<0.7
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	0.9	<0.3	<0.2	<0.2	<0.3
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
4-Chlorophenyl-phenylether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
4-Nitroaniline	SVOCSW	0.6	mg/kg^	N	<0.8	<0.9
4-Nitrophenol	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
Acenaphthene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Acenaphthylene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Anthracene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
Azobenzene	SVOCSW	0.3	mg/kg^	N	<0.4	<0.4
Benzo[a]anthracene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.3
Benzo[a]pyrene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.3
Benzo[b]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.3
Benzo[g,h,i]perylene	SVOCSW	0.5	mg/kg^	U	<0.7	<0.7
Benzo[k]fluoranthene	SVOCSW	0.2	mg/kg^	U	<0.3	<0.3
Benzoic Acid	SVOCSW	0.5	mg/kg^	N	<0.7	<0.7
Benzyl alcohol	SVOCSW	0.5	mg/kg^	U	<0.7	<0.7
Biphenyl	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
bis(2-Chloroethoxy)methane	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1
bis(2-Chloroethyl)ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

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Analysis Results

				Project ID	20050367					
				Sample ID	001	002	003	004	005	
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00	
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020	
Analysis	Method Code	MDL	Units	Accred						
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7	
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3	<0.2	<0.2	<0.3	
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3	<0.2	<0.2	<0.3	
Carbazole	SVOCSW	0.3	mg/kg^	N	<0.3	<0.4	<0.4	<0.4	<0.4	
Chrysene	SVOCSW	0.2	mg/kg^	U	1.9	<0.3	0.3	<0.2	<0.3	
Coronene	SVOCSW	0.3	mg/kg^	N	0.5	<0.4	<0.4	<0.4	<0.4	
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7	
Dibenzofuran	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Diethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3	<0.2	<0.2	<0.3	
Diphenyl ether	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	SVOCSW	0.2	mg/kg^	U	2.6	<0.3	0.2	<0.2	<0.3	
Fluorene	SVOCSW	0.2	mg/kg^	U	<0.2	<0.3	<0.2	<0.2	<0.3	
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1	
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1	

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Project Name: G0015-20 Hammersmith Bridge

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Analysis Results

					Project ID	20050367	
					Sample ID	006	007
					Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
					Sample Type	SOLID	SOLID
					Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred			
bis(2-Chloroisopropyl)ether	SVOCSW	0.5	mg/kg^	U		<0.7	<0.7
bis(2-Ethylhexyl)phthalate	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Butylbenzylphthalate	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Carbazole	SVOCSW	0.3	mg/kg^	N		<0.4	<0.4
Chrysene	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Coronene	SVOCSW	0.3	mg/kg^	N		<0.4	<0.4
Dibenzo[a,h]anthracene	SVOCSW	0.5	mg/kg^	U		<0.7	<0.7
Dibenzofuran	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Diethylphthalate	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Dimethylphthalate	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Di-n-butylphthalate	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Di-n-octylphthalate	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Diphenyl ether	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Fluoranthene	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Fluorene	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
Hexachlorobenzene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Hexachlorobutadiene	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachloroethane	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U	1.5	<0.6	<0.6	<0.6	<0.7
Isophorone	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U	<0.6	<0.6	<0.6	<0.6	<0.7
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N	<1.0	<1.1	<1.1	<1.1	<1.3
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N	<0.1	<0.1	<0.1	<0.1	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N	<0.6	<0.6	<0.6	<0.6	<0.7
Phenanthrene	SVOCSW	0.1	mg/kg^	U	0.8	<0.1	0.2	<0.1	<0.1
Phenol	SVOCSW	0.1	mg/kg^	U	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U	2.3	<0.3	0.3	<0.2	<0.3
>C10-C12 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.50	<4.99	<4.96	<4.95	<5.65
>C12-C16 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.50	<4.99	5.01	<4.95	<5.65
>C16-C21 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U	<4.50	<4.99	<4.96	<4.95	<5.65
>C21-C35 (Aliphatic)	TPHFIDUS (Aliphatic)	10	mg/kg^	U	<11.2	<12.5	<12.4	<12.4	<14.1
>C35-C44 (Aliphatic)	TPHFIDUS (Aliphatic)	6	mg/kg^	N	<6.75	<7.49	<7.43	<7.43	<8.47

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

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Date Issued: 03/06/2020

Analysis Results

					Project ID	20050367	
					Sample ID	006	007
					Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
					Sample Type	SOLID	SOLID
					Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred			
Hexachlorocyclopentadiene	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Hexachloroethane	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Indeno[1,2,3-cd]pyrene	SVOCSW	0.5	mg/kg^	U		<0.7	<0.7
Isophorone	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Naphthalene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Nitrobenzene	SVOCSW	0.5	mg/kg^	U		<0.7	<0.7
N-Nitroso-di-n-propylamine	SVOCSW	0.9	mg/kg^	N		<1.3	<1.3
N-Nitrosodiphenylamine	SVOCSW	0.1	mg/kg^	N		<0.1	<0.1
Pentachlorophenol	SVOCSW	0.5	mg/kg^	N		<0.7	<0.7
Phenanthrene	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Phenol	SVOCSW	0.1	mg/kg^	U		<0.1	<0.1
Pyrene	SVOCSW	0.2	mg/kg^	U		<0.3	<0.3
>C10-C12 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.64	<5.86
>C12-C16 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		5.94	<5.86
>C16-C21 (Aliphatic)	TPHFIDUS (Aliphatic)	4	mg/kg^	U		<5.64	<5.86
>C21-C35 (Aliphatic)	TPHFIDUS (Aliphatic)	10	mg/kg^	U		<14.1	14.7
>C35-C44 (Aliphatic)	TPHFIDUS (Aliphatic)	6	mg/kg^	N		<8.46	<8.78

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Total TPH (Aliphatic)	TPHFIDUS (Aliphatic)	20	mg/kg^	U	<22.5	<25.0	<24.8	<24.8	<28.2
>C10-C12 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.50*	5.08*	<4.96*	<4.95*	<5.65*
>C12-C16 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	<4.50	<4.99	<4.96	<4.95	<5.65
>C16-C21 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	8.20	<4.99	<4.96	<4.95	<5.65
>C21-C35 (Aromatic)	TPHFIDUS (Aromatic)	10	mg/kg^	U	48.5	27.0	16.0	13.4	24.5
>C35-C44 (Aromatic)	TPHFIDUS (Aromatic)	6	mg/kg^	N	10.8	<7.49	<7.43	<7.43	<8.47
Total TPH (Aromatic)	TPHFIDUS (Aromatic)	20	mg/kg^	U	67.4	36.2	<24.8	<24.8	34.4
1,1,1,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	N	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	VOCHSAS	1	µg/kg^	UM	7	6	10	6	7
1,1-Dichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,1-Dichloroethene	VOCHSAS	1	µg/kg^	U	<1*	<1*	<1*	<1*	<1*
1,1-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	VOCHSAS	3	µg/kg^	UM	<4	<4	<4	<4	<4
1,2,3-Trichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	VOCHSAS	3	µg/kg^	N	<4	<4	<4	<4	<4

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Total TPH (Aliphatic)	TPHFIDUS (Aliphatic)	20	mg/kg^	U	<28.2	<29.3
>C10-C12 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	<5.64*	<5.86*
>C12-C16 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	<5.64	<5.86
>C16-C21 (Aromatic)	TPHFIDUS (Aromatic)	4	mg/kg^	U	7.31	<5.86
>C21-C35 (Aromatic)	TPHFIDUS (Aromatic)	10	mg/kg^	U	19.3	18.5
>C35-C44 (Aromatic)	TPHFIDUS (Aromatic)	6	mg/kg^	N	<8.46	<8.78
Total TPH (Aromatic)	TPHFIDUS (Aromatic)	20	mg/kg^	U	30.2	<29.3
1,1,1,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,1,1-Trichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,1,2,2-Tetrachloroethane	VOCHSAS	1	µg/kg^	N	<1	<2
1,1,2-Trichloroethane	VOCHSAS	1	µg/kg^	UM	9	4
1,1-Dichloroethane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,1-Dichloroethene	VOCHSAS	1	µg/kg^	U	<1*	<2*
1,1-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<2
1,2,3-Trichlorobenzene	VOCHSAS	3	µg/kg^	UM	<4	<5
1,2,3-Trichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,2,4-Trichlorobenzene	VOCHSAS	3	µg/kg^	N	<4	<5

Client: SOCOTEC Geotechnical

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
1,2,4-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
1,2-Dibromoethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,2-Dichloroethane	VOCHSAS	1	µg/kg^	UM	21	12	22	9	10
1,2-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,3-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
2,2-Dichloropropane	VOCHSAS	2	µg/kg^	UM	<2	<2	<3	<3	<3
2-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
4-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Benzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromobenzene	VOCHSAS	1	µg/kg^	UM	<1*	<1*	<1*	<1*	<1*
Bromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromodichloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1

Client: SOCOTEC Geotechnical

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
1,2,4-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
1,2-Dibromo-3-chloropropane	VOCHSAS	1	µg/kg^	U	<1	<2
1,2-Dibromoethane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,2-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
1,2-Dichloroethane	VOCHSAS	1	µg/kg^	UM	18	6
1,2-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,3,5-Trimethylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
1,3-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
1,3-Dichloropropane	VOCHSAS	1	µg/kg^	UM	<1	<2
1,4-Dichlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
2,2-Dichloropropane	VOCHSAS	2	µg/kg^	UM	<3	<3
2-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<2
4-Chlorotoluene	VOCHSAS	1	µg/kg^	UM	<1	<2
Benzene	VOCHSAS	1	µg/kg^	UM	<1	<2
Bromobenzene	VOCHSAS	1	µg/kg^	UM	<1*	<2*
Bromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<2
Bromodichloromethane	VOCHSAS	1	µg/kg^	UM	<1	<2

Client: SOCOTEC Geotechnical

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Bromoform	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Bromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Carbon Tetrachloride	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chloroethane	VOCHSAS	2	µg/kg^	UM	<2	<2	<3	<3	<3
Chloroform	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Chloromethane	VOCHSAS	3	µg/kg^	U	<4	<4	<4	<4	<4
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<6	<6	<7	<7	<7
cis 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dibromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dibromomethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Dichlorodifluoromethane	VOCHSAS	1	µg/kg^	N	<1	<1	<1	<1	<1
Ethylbenzene	VOCHSAS	2	µg/kg^	UM	<2	<2	<3	<3	<3
Hexachlorobutadiene	VOCHSAS	2	µg/kg^	N	<2	<2	<3	<3	<3
iso-Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
m and p-Xylene	VOCHSAS	4	µg/kg^	UM	<5	<5	<5	<5	<5
MTBE	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1

Client: SOCOTEC Geotechnical

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Bromoform	VOCHSAS	1	µg/kg^	UM	<1	<2
Bromomethane	VOCHSAS	1	µg/kg^	UM	<1	<2
Carbon Tetrachloride	VOCHSAS	1	µg/kg^	UM	<1	<2
Chlorobenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
Chloroethane	VOCHSAS	2	µg/kg^	UM	<3	<3
Chloroform	VOCHSAS	1	µg/kg^	UM	<1	<2
Chloromethane	VOCHSAS	3	µg/kg^	U	<4	<5
cis 1,2-Dichloroethene	VOCHSAS	5	µg/kg^	UM	<7	<8
cis 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<2
Dibromochloromethane	VOCHSAS	1	µg/kg^	UM	<1	<2
Dibromomethane	VOCHSAS	1	µg/kg^	UM	<1	<2
Dichlorodifluoromethane	VOCHSAS	1	µg/kg^	N	<1	<2
Ethylbenzene	VOCHSAS	2	µg/kg^	UM	<3	<3
Hexachlorobutadiene	VOCHSAS	2	µg/kg^	N	<3	<3
iso-Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
m and p-Xylene	VOCHSAS	4	µg/kg^	UM	<5	<6
MTBE	VOCHSAS	1	µg/kg^	UM	<1	<2

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

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Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred					
Naphthalene	VOCHSAS	5	µg/kg^	UM	<6	<6	<7	<7	<7
n-Butylbenzene	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
o-Xylene	VOCHSAS	2	µg/kg^	UM	<2	<2	<3	<3	<3
p-Isopropyltoluene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1*	<1*	<1*	<1*	<1*
sec-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Styrene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
tert-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Tetrachloroethene	VOCHSAS	3	µg/kg^	UM	5	4	4	<4	<4
Toluene	VOCHSAS	5	µg/kg^	UM	<6	<6	<7	<7	<7
trans 1,2-Dichloroethene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
trans 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Trichloroethene	VOCHSAS	1	µg/kg^	U	<1	<1	<1	<1	<1
Trichlorofluoromethane	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Vinyl Chloride	VOCHSAS	1	µg/kg^	UM	<1	<1	<1	<1	<1
Total Moisture at 105°C	TMSS	0.1	%	U	11.1	19.9	19.3	19.2	29.2
Total Moisture at 35°C	CLANDPREP	0.1	%	N	8.2	16.8	18.6	16.3	24.6

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Project Name: G0015-20 Hammersmith Bridge

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Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Naphthalene	VOCHSAS	5	µg/kg^	UM	<7	<8
n-Butylbenzene	VOCHSAS	1	µg/kg^	U	<1	<2
o-Xylene	VOCHSAS	2	µg/kg^	UM	<3	<3
p-Isopropyltoluene	VOCHSAS	1	µg/kg^	UM	<1	<2
Propylbenzene	VOCHSAS	1	µg/kg^	UM	<1*	<2*
sec-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
Styrene	VOCHSAS	1	µg/kg^	UM	<1	<2
tert-Butylbenzene	VOCHSAS	1	µg/kg^	UM	<1	<2
Tetrachloroethene	VOCHSAS	3	µg/kg^	UM	5	<5
Toluene	VOCHSAS	5	µg/kg^	UM	<7	<8
trans 1,2-Dichloroethene	VOCHSAS	1	µg/kg^	UM	<1	<2
trans 1,3-Dichloropropene	VOCHSAS	1	µg/kg^	UM	<1	<2
Trichloroethene	VOCHSAS	1	µg/kg^	U	<1	<2
Trichlorofluoromethane	VOCHSAS	1	µg/kg^	UM	<1	<2
Vinyl Chloride	VOCHSAS	1	µg/kg^	UM	<1	<2
Total Moisture at 105°C	TMSS	0.1	%	U	29.1	31.7
Total Moisture at 35°C	CLANDPREP	0.1	%	N	27.7	27.8

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367				
				Sample ID	001	002	003	004	005
				Customer ID	BH101-1-ES-0.30	BH101-3-ES-0.50	BH101-5-ES-1.00	BH101-7-ES-1.50	BH101-8-ES-2.00
				Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020	12/05/2020	12/05/2020	12/05/2020
Analysis	**Method Code**	**MDL**	**Units**	**Accred**					
Colour of Material	CLANDPREP		-	N	Brown	Brown	Brown	Brown	Brown
Major Constituents	CLANDPREP		-	N	SILT	SILT	SILT	MADE GROUND	MADE GROUND
Minor Constituents	CLANDPREP		-	N	Clay	Gravel	Gravel	None	None
Miscellaneous Constituents	CLANDPREP		-	N	Gravel	Brick	Brick	na	na
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS	NAIIS	NAIIS	NAIIS

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Results

				Project ID	20050367	
				Sample ID	006	007
				Customer ID	BH101-11-ES-2.50	BH101-18-ES-4.50
				Sample Type	SOLID	SOLID
				Sampling Date	12/05/2020	12/05/2020
Analysis	Method Code	MDL	Units	Accred		
Colour of Material	CLANDPREP		-	N	Brown	Brown
Major Constituents	CLANDPREP		-	N	MADE GROUND	CLAY
Minor Constituents	CLANDPREP		-	N	None	Sand
Miscellaneous Constituents	CLANDPREP		-	N	na	na
Asbestos Identification	SUB020		-	N	NAIIS	NAIIS

working for a healthy and sustainable world

CERTIFICATE OF ANALYSIS

ANALYSIS REQUESTED BY: SOCOTEC UK Ltd
Environmental Chemistry
PO Box 100
Burton upon Trent
Staffordshire
DE15 0XD

CONTRACT NO: S12532-3

DATE OF ISSUE: 27.05.20

DATE SAMPLES RECEIVED: 20.05.20

DATE ANALYSIS COMPLETED: 26.05.20

DESCRIPTION: Seven soil/loose aggregate samples each weighing approximately 0.9-1.5kg.

ANALYSIS REQUESTED: Qualitative and quantitative analysis of soil/loose aggregate samples for mass determination of asbestos.

METHODS:

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

Quantitative - The analysis was carried out using our documented in-house method 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 sample, detailed analysis of a representative sub-sample and quantification by hand picking/weighing and/or fibre counting/sizing as appropriate.

RESULTS:

Initial Screening

No asbestos was detected in any of the soil samples by stereo-binocular and polarised light microscopy.

A summary of the results is given in Table 1.

www.iom-world.org

Registered Address: Research Avenue North, Riccarton, Edinburgh, EH14 4AP, United Kingdom
Tel: 0131 449 8000 Fax: 0131 449 8084 Email: iom@iom-world.org

CONTRACT NO: S12532-3
DATE OF ISSUE: 27.05.20

RESULTS: (cont.)

Table 1: Qualitative Results

SOCOTEC Job I.D: 20050367

IOM sample number	Client sample number	ACM type detected	PLM result
S72865	20050367-001-15	-	No Asbestos Detected
S72866	20050367-002-15	-	No Asbestos Detected
S72867	20050367-003-15	-	No Asbestos Detected
S72868	20050367-004-15	-	No Asbestos Detected
S72869	20050367-005-15	-	No Asbestos Detected
S72870	20050367-006-15	-	No Asbestos Detected
S72871	20050367-007-15	-	No Asbestos Detected

Our detection limit for this method is 0.001%.

COMMENTS:

IOM Consulting cannot accept responsibility for samples that have been incorrectly collected or despatched by external clients.

Any opinions and interpretations expressed herein are out with the scope of our UKAS accreditation.

AUTHORISED BY: .....
D Third
Scientific Technician

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
TPHFIDUS (AROMATIC)	001 to 007	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (C10-C12) . These circumstances should be taken into consideration when utilising the data.
GROHSA	7	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (C5-C10, C6-C7, TOTAL GRO) . These circumstances should be taken into consideration when utilising the data.
VOCHSAS	001 to 007	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (Bromobenzene, Propylbenzene) . These circumstances should be taken into consideration when utilising the data.
VOCHSAS	001 to 007	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (1,1-Dichloroethene) . These circumstances should be taken into consideration when utilising the data.

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time	Handling Time
BH101-1-ES-0.30	20050367-001	**PHSOIL**						✓	
BH101-1-ES-0.30	20050367-001	**GROHSA/BTEXHSA**						✓	
BH101-1-ES-0.30	20050367-001	**BTEXHSA**						✓	
BH101-1-ES-0.30	20050367-001	**VOCHSAS**						✓	
BH101-3-ES-0.50	20050367-002	**PHSOIL**						✓	
BH101-3-ES-0.50	20050367-002	**GROHSA/BTEXHSA**						✓	
BH101-3-ES-0.50	20050367-002	**BTEXHSA**						✓	
BH101-3-ES-0.50	20050367-002	**VOCHSAS**						✓	
BH101-5-ES-1.00	20050367-003	**PHSOIL**						✓	
BH101-5-ES-1.00	20050367-003	**GROHSA/BTEXHSA**						✓	
BH101-5-ES-1.00	20050367-003	**BTEXHSA**						✓	
BH101-5-ES-1.00	20050367-003	**VOCHSAS**						✓	
BH101-7-ES-1.50	20050367-004	**PHSOIL**						✓	
BH101-7-ES-1.50	20050367-004	**GROHSA/BTEXHSA**						✓	
BH101-7-ES-1.50	20050367-004	**BTEXHSA**						✓	
BH101-7-ES-1.50	20050367-004	**VOCHSAS**						✓	
BH101-8-ES-2.00	20050367-005	**PHSOIL**						✓	
BH101-8-ES-2.00	20050367-005	**GROHSA/BTEXHSA**						✓	
BH101-8-ES-2.00	20050367-005	**BTEXHSA**						✓	
BH101-8-ES-2.00	20050367-005	**VOCHSAS**						✓	
BH101-11-ES-2.50	20050367-006	**PHSOIL**						✓	
BH101-11-ES-2.50	20050367-006	**GROHSA/BTEXHSA**						✓	
BH101-11-ES-2.50	20050367-006	**BTEXHSA**						✓	
BH101-11-ES-2.50	20050367-006	**VOCHSAS**						✓	
BH101-18-ES-4.50	20050367-007	**PHSOIL**						✓	
BH101-18-ES-4.50	20050367-007	**GROHSA/BTEXHSA**						✓	
BH101-18-ES-4.50	20050367-007	**BTEXHSA**						✓	
BH101-18-ES-4.50	20050367-007	**VOCHSAS**						✓	

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20050367

Date Issued: 03/06/2020

Analysis Method

Analysis	Analysis Type	Analysis Method
BTEXHSA	ORGANIC	As Received
CLANDPREP	PHYS	As Received
GROHSA	ORGANIC	As Received
ICPMSS	METALS	Air Dried & Ground
ICPSOIL	METALS	Air Dried & Ground
ICPWSS	METALS	Air Dried & Ground
ISEFSS	INORGANIC	Air Dried & Ground
KONECL	INORGANIC	Air Dried & Ground
KONENS	INORGANIC	Air Dried & Ground
LOI(%MM)	INORGANIC	Air Dried & Ground
PAHMSUS	ORGANIC	As Received
PCBECD	ORGANIC	As Received
SFAPI	INORGANIC	As Received
SVOCSW	ORGANIC	As Received
TMSS	PHYS	As Received
TPHFIDUS (Aliphatic)	ORGANIC	As Received
TPHFIDUS (Aromatic)	ORGANIC	As Received
VOCHSAS	ORGANIC	As Received
WSLM59	INORGANIC	Air Dried & Ground

Additional Information

This report refers to samples as received, and SOCOTEC Uk Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° C

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° C.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation, if applicable further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis

Environmental Chemistry
SOCOTEC UK
Ashby Rd, Bretby,
Burton-on-Trent, UK
DE15 0YZ

Certificate of Analysis

Project No: 20060621

Client: SOCOTEC Geotechnical

Quote Number: BEC20057992

Project Reference: G0015-20

Site Name: G0015-20 Hammersmith Bridge

Contact: Stewart Nicol

Address: The Oasts, Newnham Court
Bearsted Road
Maidstone
Kent

Post Code: ME14 5LH

E-Mail: Stewart.nicol@socotec.com

Phone No: 07702 641769

Number of Samples Received: 1

Date Received: 19/06/2020

Analysis Date: 07/07/2020

Date Issued: 07/07/2020

Job Status: Complete

Report Type: Final Version 01

Account Manager

Laura Moore

Authorised by the Operations Manager
Becky Batham

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Samples Analysed

Sample Reference	Text ID	Sample Date	Sample Type	Sample Description
BH101	20060621-001	17/06/2020 12:05:00	WATER	Ground Water

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
>C6-C8 Aliphatic	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100
>C7-C8 Aromatic	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005
>C8-C10 Aliphatic	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100
>C8-C10 Aromatic	GROHSA/BTEXHSA	0.02	mg/l	U	<0.020
C5-C6 Aliphatic	GROHSA/BTEXHSA	0.1	mg/l	N	<0.100
C5-C7 Aromatic	GROHSA/BTEXHSA	0.005	mg/l	U	<0.005
Total GRO	GROHSA/BTEXHSA	0.1	mg/l	U	<0.100
Conductivity at 20°C	WSLM2 & 3	100	µS/cm	U	1590
pH	WSLM2 & 3	1	pH units	U	7.6
Chloride as Cl	KONENS	1	mg/l	U	137
Chromium (VI) as Cr	KONENS	0.003	mg/l	U	<0.003
Free Cyanide	SFAPI	0.02	mg/l	U	<0.02
Phenol Index	SFAPI	0.05	mg/l	U	<0.05
Total Cyanide	SFAPI	0.02	mg/l	U	<0.02
Fluoride as F	ISEF	0.1	mg/l	U	0.2
Total Alkalinity	WSLM12	2	mg/l	U	511
BOD (5 day)	WSLM20	1	mg O2/l	U	<2.9
Total Organic Carbon	WSLM13	0.2	mg/l	U	4.2
Antimony as Sb	ICPMSW (Dissolved)	0.001	mg/l	U	0.002
Arsenic as As	ICPMSW (Dissolved)	0.001	mg/l	U	0.002
Cadmium as Cd	ICPMSW (Dissolved)	0.00002	mg/l	U	<0.00002
Total Chromium as Cr	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001
Copper as Cu	ICPMSW (Dissolved)	0.001	mg/l	U	0.001
Lead as Pb	ICPMSW (Dissolved)	0.001	mg/l	U	<0.001
Mercury as Hg	ICPMSW (Dissolved)	0.00003	mg/l	U	<0.00003

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
Molybdenum as Mo	ICPMSW (Dissolved)	0.001	mg/l	U	0.003
Nickel as Ni	ICPMSW (Dissolved)	0.001	mg/l	U	0.006
Selenium as Se	ICPMSW (Dissolved)	0.001	mg/l	U	0.001
Vanadium as V	ICPMSW (Dissolved)	0.001	mg/l	U	0.001
Zinc as Zn	ICPMSW (Dissolved)	0.002	mg/l	U	0.008
Barium as Ba	ICPWATVAR (Dissolved)	0.01	mg/l	U	0.05
Total Sulphur as SO4	ICPWATVAR (Dissolved)	3	mg/l	U	207
Benzene	BTEXHSA	5	µg/l	U	<5
Ethylbenzene	BTEXHSA	5	µg/l	U	<5
m/p-Xylene	BTEXHSA	10	µg/l	U	<10
o-Xylene	BTEXHSA	5	µg/l	U	<5
Toluene	BTEXHSA	5	µg/l	U	<5
Acenaphthene	PAHMSW	0.01	µg/l	U	<0.01
Acenaphthylene	PAHMSW	0.01	µg/l	U	<0.01
Anthracene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[a]anthracene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[a]pyrene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[b]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[g,h,i]perylene	PAHMSW	0.01	µg/l	U	<0.01
Benzo[k]fluoranthene	PAHMSW	0.01	µg/l	U	<0.01
Chrysene	PAHMSW	0.01	µg/l	U	<0.01
Coronene	PAHMSW	0.01	µg/l	U	<0.01
Dibenzo[a,h]anthracene	PAHMSW	0.01	µg/l	U	<0.01
Fluoranthene	PAHMSW	0.01	µg/l	U	<0.01
Fluorene	PAHMSW	0.01	µg/l	U	<0.01

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
Indeno[1,2,3-cd]pyrene	PAHMSW	0.01	µg/l	U	<0.01
Naphthalene	PAHMSW	0.01	µg/l	U	<0.01
Phenanthrene	PAHMSW	0.01	µg/l	U	<0.01
Pyrene	PAHMSW	0.01	µg/l	U	<0.01
Total PAH 16	PAHMSW	0.16	µg/l	U	<0.16
PCB 101	PCBECD	0.01	µg/l	N	<0.01
PCB 118	PCBECD	0.01	µg/l	N	<0.01
PCB 138	PCBECD	0.01	µg/l	N	<0.01
PCB 153	PCBECD	0.01	µg/l	N	<0.01
PCB 180	PCBECD	0.01	µg/l	N	<0.01
PCB 28	PCBECD	0.01	µg/l	N	<0.01
PCB 52	PCBECD	0.01	µg/l	N	<0.01
1,2,4-Trichlorobenzene	SVOCSW	0.005	mg/l	N	<0.025
1,2-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.025
1,3-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.025
1,4-Dichlorobenzene	SVOCSW	0.005	mg/l	N	<0.025
1-Methylnaphthalene	SVOCSW	0.002	mg/l	N	<0.010
2,4,5-Trichlorophenol	SVOCSW	0.02	mg/l	N	<0.100
2,4,6-Trichlorophenol	SVOCSW	0.02	mg/l	N	<0.100
2,4-Dichlorophenol	SVOCSW	0.02	mg/l	N	<0.100
2,4-Dimethylphenol	SVOCSW	0.02	mg/l	N	<0.100
2,4-Dinitrophenol	SVOCSW	0.01	mg/l	N	<0.050
2,4-Dinitrotoluene	SVOCSW	0.005	mg/l	N	<0.025
2,6-Dinitrotoluene	SVOCSW	0.005	mg/l	N	<0.025
2-Chloronaphthalene	SVOCSW	0.002	mg/l	N	<0.010

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
2-Chlorophenol	SVOCSW	0.02	mg/l	N	<0.100
2-Methylnaphthalene	SVOCSW	0.002	mg/l	N	<0.010
2-Methylphenol	SVOCSW	0.005	mg/l	N	<0.025
2-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.025
2-Nitrophenol	SVOCSW	0.02	mg/l	N	<0.100
3- & 4-Methylphenol	SVOCSW	0.02	mg/l	N	<0.100
3-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.025
4,6-Dinitro-2-methylphenol	SVOCSW	0.05	mg/l	N	<0.250
4-Bromophenyl-phenylether	SVOCSW	0.005	mg/l	N	<0.025
4-Chloro-3-methylphenol	SVOCSW	0.005	mg/l	N	<0.025
4-Chloroaniline	SVOCSW	0.005	mg/l	N	<0.025
4-Chlorophenol	SVOCSW	0.02	mg/l	N	<0.100
4-Chlorophenyl-phenylether	SVOCSW	0.005	mg/l	N	<0.025
4-Nitroaniline	SVOCSW	0.005	mg/l	N	<0.025
4-Nitrophenol	SVOCSW	0.05	mg/l	N	<0.250
Acenaphthene	SVOCSW	0.002	mg/l	N	<0.010
Acenaphthylene	SVOCSW	0.002	mg/l	N	<0.010
Anthracene	SVOCSW	0.002	mg/l	N	<0.010
Azobenzene	SVOCSW	0.01	mg/l	N	<0.050
Benzo[a]anthracene	SVOCSW	0.002	mg/l	N	<0.010
Benzo[a]pyrene	SVOCSW	0.002	mg/l	N	<0.010
Benzo[b]fluoranthene	SVOCSW	0.002	mg/l	N	<0.010
Benzo[g,h,i]perylene	SVOCSW	0.002	mg/l	N	<0.010
Benzo[k]fluoranthene	SVOCSW	0.002	mg/l	N	<0.010
Benzoic Acid	SVOCSW	0.1	mg/l	N	<0.500

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
Benzyl alcohol	SVOCSW	0.005	mg/l	N	<0.025
Biphenyl	SVOCSW	0.002	mg/l	N	<0.010
bis(2-Chloroethoxy)methane	SVOCSW	0.005	mg/l	N	<0.025
bis(2-Chloroethyl)ether	SVOCSW	0.005	mg/l	N	<0.025
bis(2-Chloroisopropyl)ether	SVOCSW	0.005	mg/l	N	<0.025
bis(2-Ethylhexyl)phthalate	SVOCSW	0.005	mg/l	N	<0.025
Butylbenzylphthalate	SVOCSW	0.005	mg/l	N	<0.025
Carbazole	SVOCSW	0.01	mg/l	N	<0.050
Chrysene	SVOCSW	0.002	mg/l	N	<0.010
Coronene	SVOCSW	0.05	mg/l	N	<0.250
Dibenzo[a,h]anthracene	SVOCSW	0.002	mg/l	N	<0.010
Dibenzofuran	SVOCSW	0.005	mg/l	N	<0.025
Diethylphthalate	SVOCSW	0.005	mg/l	N	<0.025
Dimethylphthalate	SVOCSW	0.005	mg/l	N	<0.025
Di-n-butylphthalate	SVOCSW	0.005	mg/l	N	<0.025
Di-n-octylphthalate	SVOCSW	0.002	mg/l	N	<0.010
Diphenyl ether	SVOCSW	0.002	mg/l	N	<0.010
Fluoranthene	SVOCSW	0.002	mg/l	N	<0.010
Fluorene	SVOCSW	0.002	mg/l	N	<0.010
Hexachlorobenzene	SVOCSW	0.005	mg/l	N	<0.025
Hexachlorobutadiene	SVOCSW	0.005	mg/l	N	<0.025
Hexachlorocyclopentadiene	SVOCSW	0.005	mg/l	N	<0.025
Hexachloroethane	SVOCSW	0.005	mg/l	N	<0.025
Indeno[1,2,3-cd]pyrene	SVOCSW	0.002	mg/l	N	<0.010
Isophorone	SVOCSW	0.005	mg/l	N	<0.025

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
Naphthalene	SVOCSW	0.002	mg/l	N	<0.010
Nitrobenzene	SVOCSW	0.005	mg/l	N	<0.025
N-Nitroso-di-n-propylamine	SVOCSW	0.005	mg/l	N	<0.025
N-Nitrosodiphenylamine	SVOCSW	0.005	mg/l	N	<0.025
Pentachlorophenol	SVOCSW	0.05	mg/l	N	<0.250
Phenanthrene	SVOCSW	0.002	mg/l	N	<0.010
Phenol	SVOCSW	0.02	mg/l	N	<0.100
Pyrene	SVOCSW	0.002	mg/l	N	<0.010
>C10-C12 (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C12-C16 (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C16-C21 (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C21-C35 (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C35-C44 (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	N	<0.01
Total TPH (Aliphatic)	TPHFID (Aliphatic)	0.01	mg/l	U	<0.01
>C10-C12 (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C12-C16 (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C16-C21 (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C21-C35 (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
>C35-C44 (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	N	<0.01
Total TPH (Aromatic)	TPHFID (Aromatic)	0.01	mg/l	U	<0.01
1,1,1,2-Tetrachloroethane	VOCHSAW	1	µg/l	U	<1
1,1,1-Trichloroethane	VOCHSAW	1	µg/l	U	<1
1,1,2,2-Tetrachloroethane	VOCHSAW	1	µg/l	N	<1
1,1,2-Trichloroethane	VOCHSAW	1	µg/l	U	<1
1,1-Dichloroethane	VOCHSAW	1	µg/l	U	<1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

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Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
1,1-Dichloroethene	VOCHSAW	1	µg/l	U	<1*
1,1-Dichloropropene	VOCHSAW	1	µg/l	U	<1
1,2,3-Trichlorobenzene	VOCHSAW	5	µg/l	U	<5
1,2,3-Trichloropropane	VOCHSAW	1	µg/l	U	<1
1,2,4-Trichlorobenzene	VOCHSAW	5	µg/l	U	<5
1,2,4-Trimethylbenzene	VOCHSAW	1	µg/l	U	<1
1,2-Dibromo-3-chloropropane	VOCHSAW	5	µg/l	U	<5
1,2-Dibromoethane	VOCHSAW	1	µg/l	U	<1
1,2-Dichlorobenzene	VOCHSAW	5	µg/l	U	<5
1,2-Dichloroethane	VOCHSAW	1	µg/l	U	<1
1,2-Dichloropropane	VOCHSAW	1	µg/l	U	<1
1,3,5-Trimethylbenzene	VOCHSAW	1	µg/l	U	<1
1,3-Dichlorobenzene	VOCHSAW	1	µg/l	U	<1
1,3-Dichloropropane	VOCHSAW	1	µg/l	N	<1
1,4-Dichlorobenzene	VOCHSAW	1	µg/l	U	<1
2,2-Dichloropropane	VOCHSAW	1	µg/l	N	<1
2-Chlorotoluene	VOCHSAW	1	µg/l	U	<1
4-Chlorotoluene	VOCHSAW	1	µg/l	U	<1
Benzene	VOCHSAW	1	µg/l	U	<1
Bromobenzene	VOCHSAW	1	µg/l	U	<1
Bromochloromethane	VOCHSAW	1	µg/l	U	<1
Bromodichloromethane	VOCHSAW	1	µg/l	U	<1
Bromoform	VOCHSAW	1	µg/l	U	<1
Bromomethane	VOCHSAW	5	µg/l	N	<5
Carbon Tetrachloride	VOCHSAW	1	µg/l	U	<1

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
Chlorobenzene	VOCHSAW	1	µg/l	U	<1
Chloroethane	VOCHSAW	5	µg/l	U	<5
Chloroform	VOCHSAW	5	µg/l	U	<5
Chloromethane	VOCHSAW	1	µg/l	U	<1*
cis 1,2-Dichloroethene	VOCHSAW	5	µg/l	U	<5
cis 1,3-Dichloropropene	VOCHSAW	1	µg/l	N	<1
Dibromochloromethane	VOCHSAW	1	µg/l	U	<1
Dibromomethane	VOCHSAW	1	µg/l	U	<1
Dichlorodifluoromethane	VOCHSAW	1	µg/l	N	<1
Ethylbenzene	VOCHSAW	1	µg/l	U	<1
Hexachlorobutadiene	VOCHSAW	5	µg/l	U	<5
iso-Propylbenzene	VOCHSAW	1	µg/l	U	<1
m and p-Xylene	VOCHSAW	1	µg/l	U	<1
MTBE	VOCHSAW	1	µg/l	N	<1
Naphthalene	VOCHSAW	5	µg/l	U	<5
n-Butylbenzene	VOCHSAW	1	µg/l	U	<1
o-Xylene	VOCHSAW	1	µg/l	U	<1
p-Isopropyltoluene	VOCHSAW	1	µg/l	U	<1
Propylbenzene	VOCHSAW	1	µg/l	U	<1
sec-Butylbenzene	VOCHSAW	1	µg/l	U	<1
Styrene	VOCHSAW	1	µg/l	U	<1
tert-Butylbenzene	VOCHSAW	1	µg/l	U	<1
Tetrachloroethene	VOCHSAW	5	µg/l	U	<5
Toluene	VOCHSAW	1	µg/l	U	<1
trans 1,2-Dichloroethene	VOCHSAW	1	µg/l	U	<1*

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Analysis Results

				Project ID	20060621
				Sample ID	001
				Customer ID	BH101
				Sample Type	WATER
				Sampling Date	17/06/2020
Analysis	Method Code	MDL	Units	Accred	
trans 1,3-Dichloropropene	VOCHSAW	1	µg/l	U	<1
Trichloroethene	VOCHSAW	5	µg/l	U	<5
Trichlorofluoromethane	VOCHSAW	1	µg/l	U	<1
Vinyl Chloride	VOCHSAW	1	µg/l	U	<1*

SOCOTEC - Unknowns Analysis Report

Sample Name: 20060621-001

Component RT	Compound Name	Match Score	CAS#	Estimated Concentration
	None Detected			

Additional Report Notes

Method Code	Sample ID	The following information should be taken into consideration when using the data contained within this report
WSLM20	001	Based on the sample history/appearance/smell, a dilution was applied prior to testing. Unfortunately the result is below our lower range for this sample volume, therefore the detection limit has been raised.
VOCHSAW	1	The Primary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation, where applicable, from the affected analytes (1,1-Dichloroethene, Bromomethane, Chloromethane, trans 1,2-Dichloroethene) . These circumstances should be taken into consideration when utilising the data.
VOCHSAW	1	The Secondary process control data associated with this Test has not wholly met the requirements of the Laboratory Quality Management System QMS with one or more target analytes falling outside acceptable limits. However the remaining data gives the Laboratory confidence that the test has performed satisfactorily (including the Primary Process Control) and that the validity of the data may not have been significantly affected. However in line with our QMS policy we have removed accreditation , where applicable, from the affected analytes (Vinyl Chloride) . These circumstances should be taken into consideration when utilising the data.

LIMS-F002 - Report Notes

Client: SOCOTEC Geotechnical

Project Name: G0015-20 Hammersmith Bridge

Project No: 20060621

Date Issued: 07/07/2020

Deviating Sample Report

Sample Reference	Text ID	Reported Name	Incorrect Container	Incorrect Label	Headspace	Incorrect/No Preservative	No Sampling Date	Holding Time	Handling Time
BH101	20060621-001	**WSLM20** BOD (5 day)						✓	

Analysis Method

Analysis	Analysis Type	Analysis Method
BTEXHSA	ORGANIC	UNFILTERED
GROHSA	ORGANIC	UNFILTERED
GROHSA/BTEXHSA	ORGANIC	
ICPMSW (Dissolved)	METALS	FILTERED
ICPWATVAR (Dissolved)	METALS	FILTERED
ISEF	INORGANIC	UNFILTERED
KONENS	INORGANIC	FILTERED
PAHMSW	ORGANIC	UNFILTERED
PCBECD	ORGANIC	UNFILTERED
SFAPI	INORGANIC	UNFILTERED
SVOCSW	ORGANIC	UNFILTERED
TPHFID (Aliphatic)	ORGANIC	UNFILTERED
TPHFID (Aromatic)	ORGANIC	UNFILTERED
WSLM13	INORGANIC	UNFILTERED
WSLM2 & 3	INORGANIC	UNFILTERED
WSLM20	INORGANIC	UNFILTERED

Additional Information

This report refers to samples as received, and SOCOTEC Uk Ltd takes no responsibility for accuracy or competence of sampling by others.

Results within this report relate only to the samples tested.

In the accreditation column of analysis report the codes are as follows:

U = UKAS accredited analysis
M = MCERT accredited analysis
N = Unaccredited analysis

Any units marked with ^ signify results are reported on a dry weight basis of 105° C

All Air Dried and Ground Samples (ADG) are oven dried at less than 35° C.

This report shall not be reproduced except in full and with approval from the laboratory.

Opinions and interpretations given are outside the scope of our UKAS accreditation.

Any samples marked with * are not covered by our scope of UKAS accreditation, if applicable further report notes have been added.

Any solid samples where the Major Constituents are not one of the following (Sand, Silt, Clay, Made Ground) are not one of our accredited matrix types.

Any samples marked with ‡ have had MCERTS accreditation removed for this result

Any samples marked with a tick in the deviant table is deviant for the specific reason.

Any samples reported as IS, NA, ND mean the following:

IS = Insufficient Sample to complete analysis
NA = Sample is not amenable for the required analysis
ND = Results cannot be determined

Our deviating sample report does not include deviancy information for Subcontracted analysis. Please see the report from the Subcontracted lab for information regarding any deviancies for this analysis.

End of Certificate of Analysis