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MULTIDISCIPLINARY ENGINEERING CONSULTANTS

Report No	Date
XL03964/R2/2	**November 2015**

Project

Antwerp House, Kirby Street
Basement Impact Assessment

Client

Mr. P Tuson

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Issue Number	Status	Description of Amendments
1: 06/11/15	**Final**	
2: 24/11/15	**Final**	Addressing LB Camden comments (McClue / Stacy 23 November 2015

Report prepared by:	
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Approved for issue by:	
Signed 	Jon Palmer BSc MSc CEng MIoM^3 FGS **Director - GeoEnvironmental**

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EXECUTIVE SUMMARY

Client	Peter Tuson
Site	Antwerp House, 26-27 Kirby Street, London EC1N 8TE
Site Location	The site lies approximately 200m to the north west of Farringdon Station Approximate grid reference E531370; N181870.
Current Land Use & Description	The site is currently occupied by a three storey building whose ground level footprint covers the entire area of the site. The building includes a single basement level which only extends below the east half of the ground level footprint.
Development	The proposed development for the site comprises downward extension of the existing basement by 0.5m, and further lateral extension to the west such that the overall basement will extend under the entire footprint of the building. Further above ground extension is proposed to include a 4th and 5th storey to the existing building, which are intended for residential use.
Basement Impact Assessment	The BIA has considered: • Surface water flow and flooding; • Subterranean (groundwater) flow; • Land Stability. The following are key conclusions: • The proposed works will not affect groundwater flow or level; • It is proposed that the existing drainage systems will be retained, with no changes to the volume of runoff or discharge rate; • There will be no change to the flood risk at the site or experienced elsewhere; • There are no issues anticipated with underground services running close to the site; • There are no slope stability issues of concern; • There are no issues associated with trees local to the site; • The proposed development takes account of existing foundations and other structures. The work will be undertaken using conventional underpinning techniques with temporary propping of the works during construction and monitoring of the subject property and neighbouring properties. **It is concluded that the proposed basement development meets the relevant requirements of DP27 and that it can be approved with respect to CPG4**
Geoenvironmental Considerations	**Risks from contamination are assessed as follows:** • No defined risk from soil contamination to human health • PVC and PE water supply pipe materials on site • Radon protection measures are not required for the development. • Ground gas protection measures are not considered necessary as the site is Characteristic Situation 1. **Waste Soils** • As the made ground soils are excavated, natural mixing will aid to dilute the elevated concentrations such that the resultant waste soil may be considered **non-hazardous** to **inert**. • The addition of an acidic agent may be required to neutralise the high pH if it is persists through the made ground.

1.0 INTRODUCTION

1.1 Instruction and Brief

Clarkebond (UK) Limited was instructed by Mr. T Reeves on behalf of Mr. P Tuson to undertake a Ground Investigation to support a Basement Impact Assessment at Antwerp House, Kirby Street, London EC1N 8TE.

The BIA is to form part of the documentation in support of a planning application. The BIA is produced with reference to Camden Planning Guidance CPG4, Basements and Lightwells, and includes hydrogeological and hydrological information.

Additionally, the report includes a basic risk assessment for contamination to inform the design and costing of the basement construction.

The document has been prepared by Jonathan Palmer CEng. He has over 30 years experience gained in engineering consultancy concentrating on heavy civil engineering and the built environment, and has prepared many ground engineering assessments for a multitude of construction projects including flood risk assessments, environmental statements and basement impact assessments.

1.2 Scope of Works

The objectives of the investigation were to determine the sub-surface conditions in respect of the proposed development (Section 2.1), and assess the impact of a new basement extension on the adjacent buildings and buried infrastructure and on the hydrogeological regime.

The assessment is structured in line with the requirements of CPG4, to include:

- Stage 1, Screening – Identification of matters of concern that should be investigated.
- Stage 2, Scoping – Identifying potential impacts of the proposed scheme including geological, hydrogeological and hydrological aspects of the site.
- Stage 3 – Site Investigation including intrusive works to quantify the potential effects of issues arising from the former stages of the BIA.
- Stage 4 – Impact assessment evaluating the direct and indirect implications of the proposed development.

1.3 Limitations

This report is provided for the benefit only of the party to whom it is addressed and we do not accept responsibility to any third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Subsoils are inherently variable and by their very nature are hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent from the data available for review. Similarly, this assessment has been based to some extent on third party data acquired and such data has been taken at face value and has not been subjected to any third party validation.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any regulatory authorities for approval. Redevelopment sites in particular may have planning conditions attached in respect of contaminated land assessment. Where we are made aware of such conditions in advance of scoping the works, we can tailor the report to the regulatory authority requirements. Where we are not made aware of any such requirements there can be no certainty that our investigation will meet any or all of the regulatory authority requirements.

2.0 SCREENING

2.1 Proposed Development

The proposed development for the site comprises downward extension of an existing basement by 0.5m, and further lateral extension to the west such that the overall basement will extend under the entire footprint of the building. Further above ground extension is proposed to include a 4th and 5th storey to the existing building, which are intended for residential use.

Development levels provided are as follows:

- Ground floor level is 0.275m above street level
- Existing basement floor level is 1.875m below street level
- Existing basement floor level is 1.975m below ground floor soffit level.

The development proposal involves lowering the existing basement floor slab by an additional 0.5m. Therefore, for the purposes of the basement impact assessment it is assumed that the basement slab soffit level will be located 3m below the existing ground floor level.

2.2 Site Location and Description

The site lies approximately 200m to the north west of Farringdon Station within predominantly commercial area at approximate grid reference E531370; N181870. The site location is indicated on Figure 2.1.

The site is currently occupied by a three storey building with the ground level footprint occupying the entire area of the site. The building includes a single basement level which extends below the east half of the building footprint only. The above ground floors also only occupy the eastern half of the site, suggesting the west side of the ground floor is a later extension to the original building.

The ground floor and basement levels are used as a jewellery workshop and retailer. The upper storeys comprise office space.

The site forms a mid-terrace development, with the overall terrace occupying the entire west side of Kirkby Street without a break. The terrace comprises individual building developments joined at party walls without a break along the full length of the road. The building immediately to the south of the site also has a single-storey basement.

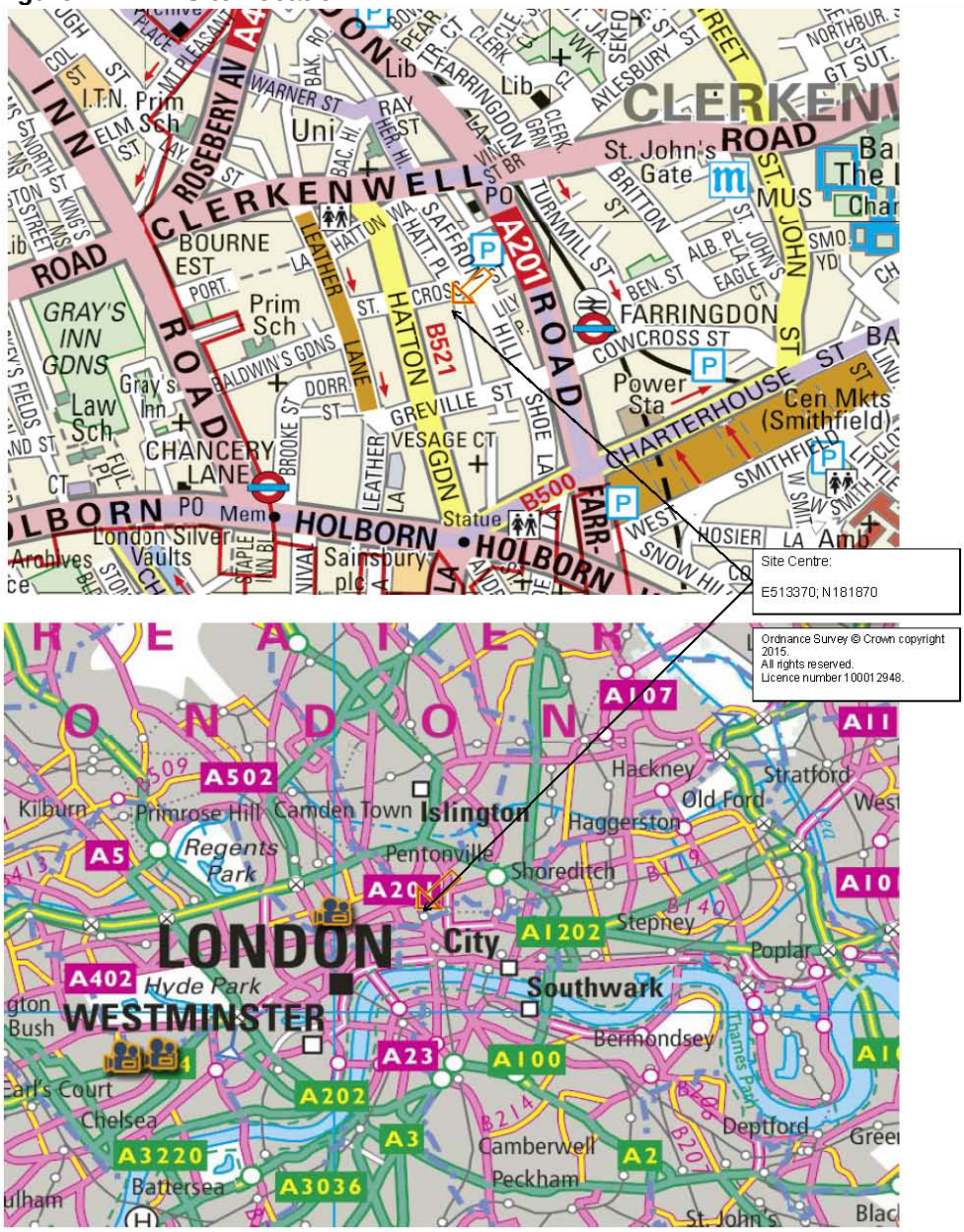
Historic ordnance survey maps of the site indicate the building is a post-war development and London bomb maps from World War 2 (WW2) indicate the buildings south of the site were completely destroyed during the war. No damage is indicated for the site itself.

Access to the building is directly from Kirby Street to the east of the site.

The site lies on the western limb of a shallow valley that falls from north to south forming the course of the former River Fleet. The River Fleet now flows in culvert, discharging into the River Thames in the vicinity of Blackfriars Bridge about 2km south of the site. The base of the valley is obscured by made ground placed to form building platforms for the current developments.

The average slope of the valley side in the vicinity of the site is between 1.5 and 2.0 degrees falling to the east. The built development is superimposed onto the natural valley side including a series of terraces formed along north/south trending streets connected by cross streets passing parallel to the slope in an east/west direction. The essentially north/south axis of the valley approximates to the alignment of Farringdon Road about 100m east of the site.

Figure 2.1 Site Location



2.3 Geology

The geology is indicated on the British Geological Survey (BGS) Digital Geological Map of Great Britain. The ground conditions underlying the site are indicated as follows:

- Drift: Hackney Gravel Member.
- Solid: London Clay Formation.
- Available Borehole data: The BGS website indicates there are 16 historic borehole records within a 200m radius of the site. A summary of historic boreholes surrounding the site is provided in Table 2.1 below.

Table 2.1 Summary of historic borehole records

BGS Reference	Distance from Site	Base of Drift mBGL	mOD	Composition of Drift Geology	Groundwater Depth (mBGL)	Level (mOD)	Remarks
TQ38 SW224	65m E	9.45	14.50	Ballast	'No water'	Unknown	
TQ38 SW1191	120m SE	0.40	12.50	Grey brown silty clay	'No water'	Unknown	Possibly straight into London Clay
TQ38 SW1192/A	130m N	1.83	13.10	Gravel and brown sand	Noted as 'Dry'	Unknown	
TQ38 SW682	140m NW	3.81	11.06	Sandy gravel to sand	1.98	12.89	
TQ38 SW2531	190m SW	4.25	12.90	Sandy gravel	Not noted	Unknown	
TQ38 SW2567	270m SSW	2.50	12.35	Gravel with a trace of sand	2.00	12.88	
TQ38 SW150	300m SW	6.70	13.30	Ballast	Not noted	Unknown	
TQ38 SW4911	320m W	6.20	14.40	Slightly silty sand with frequent gravel	6.00	14.6	

The geology of the site environs indicates Hackney Gravel present beneath and to the west of the site. The British Geological Survey memoir for the area, Geology of London (2004) places the Hackney Gravel as the third terrace of the River Thames with the base of the deposit lying some 6m to 15m above the present day River Thames floodplain. Published information indicates this deposit to thin to the east of the site into the valley of the former River Fleet, being absent at the adjacent street (Saffron Hill). Eastwards beyond Saffron Street the underlying solid geology of the London Clay outcrops at surface (albeit obscured by Made Ground) with recent alluvial deposits present in the base of the valley.

This general geological formation is confirmed from historical borehole information available from the BGS archive (www.mapapps.bgs.ac.uk/geologyofbritain), which indicate a thickening of the drift deposits to the southwest and west. Boreholes undertaken to the east indicate no Hackney Gravel is present underlying the Made Ground.

2.4 Hydrology and Hydrogeology

There are no surface water features on site. The closest surface water feature is The River Thames located approximately 2km south of the site.

The Environment Agency web site indicates:

- The site is not in an area at risk of flooding from rivers, seas or reservoirs,
- The site is not within a groundwater Source Protection Zone,
- The site is underlain by a secondary aquifer within the superficial geology (Hackney Gravel Member).

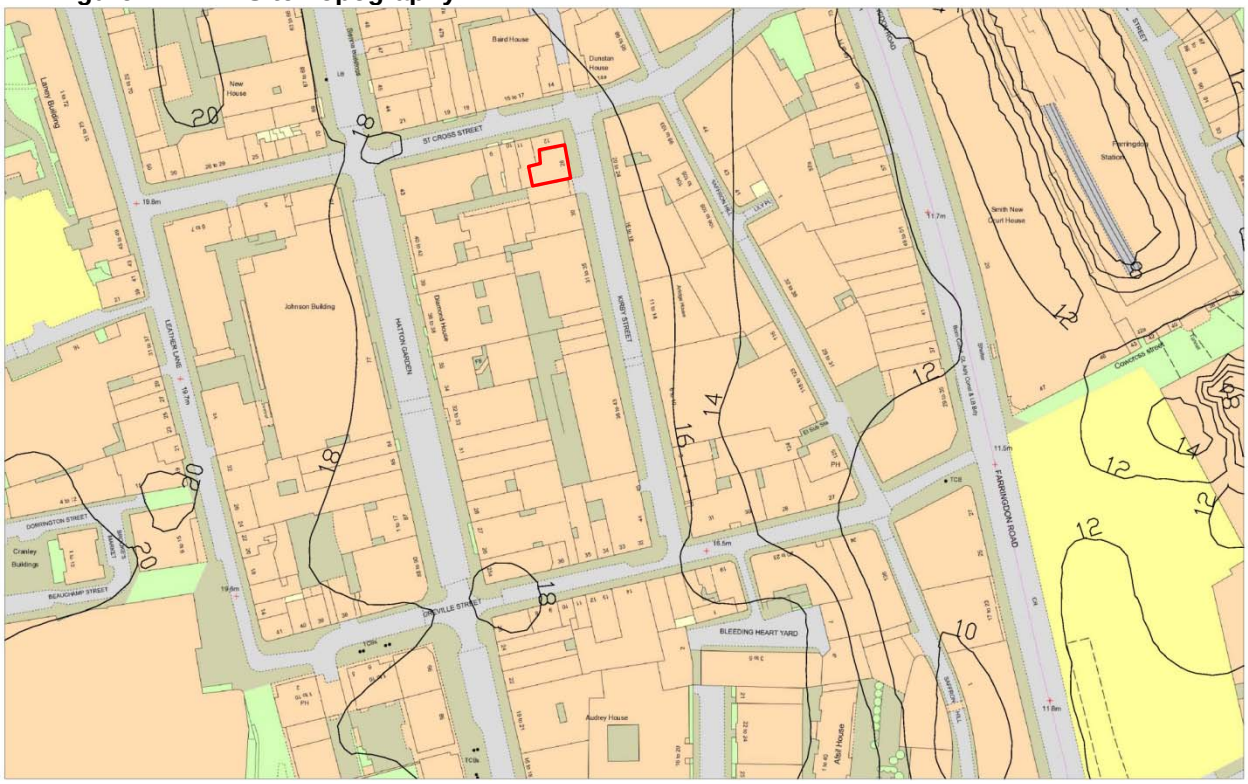
The buried channel of the former River Fleet is located east of the site and runs in an approximate north-south direction to discharge in the River Thames at Blackfriars Bridge. This river is now fully conveyed in culvert.

The site lies at an elevation of about 17mOD. The nearest available borehole records (Table 2.1) indicate the groundwater level east of the site to be at about 12.8 to 14.6mOD. The depth of groundwater in bores east of the site is not recorded.

Based on the topography of the site (Figure 2.2) the likely direction of groundwater flow beneath the site is down-gradient to the east towards the River Fleet channel, and to the south towards the River Thames. Beat estimates of the groundwater level from borehole data summarised in Table 2.1 is between 2.4m and 4.2m below the site level.

From the existing information therefore, it is likely that the groundwater level will be at or below the existing and proposed basement level.

Figure 2.2 Site Topography



Contours in mOD

2.5 Screening Assessment

From the above, the specific requirements of Appendix E, Camden Geological, Hydrogeological and Hydrological Study (Arup 2010) are addressed as follows:

Question No	Description	Response	Notes
Surface Water Flooding			
1	Is the site within the catchment of the pond chains on Hampstead Heath?	No	The site is downstream of Hampstead Heath
2	As part of the proposed drainage, will surface water flows be materially changed from the existing route?	No	The site is entirely covered with the existing building. The impermeable area is thus unchanged by the development, and existing drainage arrangements will be maintained.
3	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No	The site is already entirely covered by impermeable surfaces.
4	Will the proposed basement development result in a change to the profile of surface water being received by adjacent properties or downstream water course?	No	All surface water is collected by dedicated drainage systems (guttering) within the plot area.
5	Will the proposed basement result in changes to the quality of surface water	No	Surface water is collected as roof drainage in the current development, and this will be

Question No	Description	Response	Notes
	being receive by adjacent properties or downstream watercourses?		the case in the proposed development.
6	Is the site area known to be at risk from surface water flooding or is it at risk from flooding, for example because the proposed basement is below the static water level of nearby surface water features?	No	The site is remote from any existing surface water feature. The site is not within an area defined by the Environment Agency as at risk from flooding from rivers, seas or reservoirs. There are no know incidents of flooding at the site.
Subterranean Flooding			
1a	Is the site located directly over an aquifer?	Yes	The site is underlain by a secondary aquifer within the superficial geology (Hackney Gravel Member)
1b	Will the proposed development extend below the water table surface?	To be confirmed	There is no available data specific to the site from which this can be established. Nearest records indicate groundwater level to lie below the proposed basement level.
2	Is the site within 100m of a watercourse, well or potential spring line?	Yes	The abandoned river channel of the River Fleet (now conveyed in culvert) lies approximately 75m east of the site.
3	Is the site within the catchment of the pond chains within Hampstead Heath?	No	The site lies down stream of Hampstead Heath.
4	Will the proposed basement development result in a change in the proportion of hard surfaced/paved areas?	No	The site is already completely covered with impermeable surfacing.
5	As part of the site drainage, will more surface water than at present be discharged to the ground?	No	Storm water falling on the site is currently conveyed to the public sewer. The impermeable area of site will not alter from the proposed development, and off-site drainage will also therefore not alter.
6	Is the lowest point of the proposed excavation (allowing for any drainage and foundation space under the basement floor) close to, or lower than, the mean water level of any local pond or spring line?	No	There are no open local water courses. The proposed basement level is above the (about 13mOD) is above the ground surface level (and therefore the subterranean river channel level) over the abandoned channel of the River Fleet (8mOD at lowest point (Figure 2.2).
Land Stability			
1	Does the existing site include slopes greater than 7° (c.1:8)?	No	The existing site is constructed on a level platform. The average natural slope is less than 2°.
2	Will the proposed re-profiling of landscaping at site change slopes at the property boundary to more than 7° (c.1:8)?	No	There are no proposals to alter the site profile.
3	Does the development neighbour land with a slope greater than 7° (c.1:8)?	No	
4	Is the site within a wider hillside setting in which the general slope is greater than 7° (c.1:8)>	No	
5	Is the London Clay the shallowest strata at the site?	No	The site is directly underlain with natural strata of the Hackney Gravel.
6	Will any trees be felled as part of the development and/or are any works proposed within any tree protection zones where trees are to be retained?	No	There are no trees local to the site.
7	Is there a history of seasonal shrink swell subsidence in the local area or evidence of such effects at the site?	No	A condition survey of the site and surrounding properties indicates no evidence of distress that may be attributed to ground movements. The underlying natural geology is indicated as Hackney Gravel that will not be susceptible to heave/shrinkage in response to seasonal moisture content variation. The nature of Made Ground soils will need to be established from site

Question No	Description	Response	Notes
			investigation.
8	Is the site within 100m of a watercourse, well or potential spring line?	Yes	The abandoned river channel of the River Fleet (now conveyed in culvert) lies approximately 75m east of the site.
9	Is the site within an area of previously worked ground?	No	There is no evidence of worked ground at the site (BGS Geological Sheet 256, North London)
10	Is the site within an aquifer? If so will the proposed development extend beneath the water table such that dewatering may be required during construction?	Yes	The site is underlain by a secondary aquifer within the superficial geology (Hackney Gravel Member). There is no available data specific to the site from which groundwater level can be established. Nearest records indicate groundwater level to lie below the proposed basement level.
11	Is the site within 50m of Hampstead Heath Ponds	No	Ref. Fig 14, Camden Geological, Hydrogeological and Hydrological Study.
12	Is the site within 5m of a highway or pedestrian right of way?	Yes	The site fronts onto a footway with carriageway of Kirkby Street beyond.
13	Will the proposed development significantly increase the differential depth of foundations relative to neighbouring properties?	Yes	THE existing property has a partial basement that is to be extended down by 0.5m and laterally to cover the entire footprint of the property. The adjoining property to the south has a single storey basement, and as such will have foundations at approximately the same elevation to the proposed site depth. The adjoining property to the north has no basement.
14	Is the site over (or within the exclusion zone of) any tunnels?	No	Reference made to London Underground and Crossrail tunnel alignment plans.

3.0 SCOPING

On the basis of Section 2 above, existing information confirms that the proposed development may have adverse effects on the local development and may be impacted by groundwater. Other areas of the Scoping study, particularly relating to surface water flooding, and ground instability other than induced affects on the neighbouring properties, have been confirmed as of little or no concern.

The Scoping Study has therefore indicated the requirement for intrusive investigation, specifically to address the following issues:

1. **Impact of potential groundwater level on the development.**
   There is a paucity of existing information on the groundwater level at the site. Whilst available borehole records indicate that the groundwater level lies below the proposed basement depth, this will need to be determined from site specific investigation, in order to determine the impact of groundwater on the design and construction of the basement.
2. **Impact of the development on the existing groundwater level.**
   As with the above, the local groundwater level is not well defined from existing information, and as such, whilst indications are that the groundwater level will lie below the basement level, site specific data is required to confirm this, and thus address potential concerns over any impedance to groundwater flow arising from the development.
3. **Impact of the development on neighbouring properties.**
   The Scoping Study has identified potential risk of ground movements induced by the proposed development affecting the foundations of adjoining properties.

On the basis of the above, intrusive investigation is required to confirm ground conditions relating to the proposed development. The site investigation activities and findings are discussed in the following sections.

Consultation with adjoining property owners has not been undertaken as part of the current investigation process. It is proposed that this Basement Impact Assessment be utilised within procedures arising from the Party Wall etc. Act (1996), which will necessarily be addressed prior to commencement of the construction.

4.0 SITE INVESTIGATION - FACTUAL INFORMATION

4.1 Scope of Works

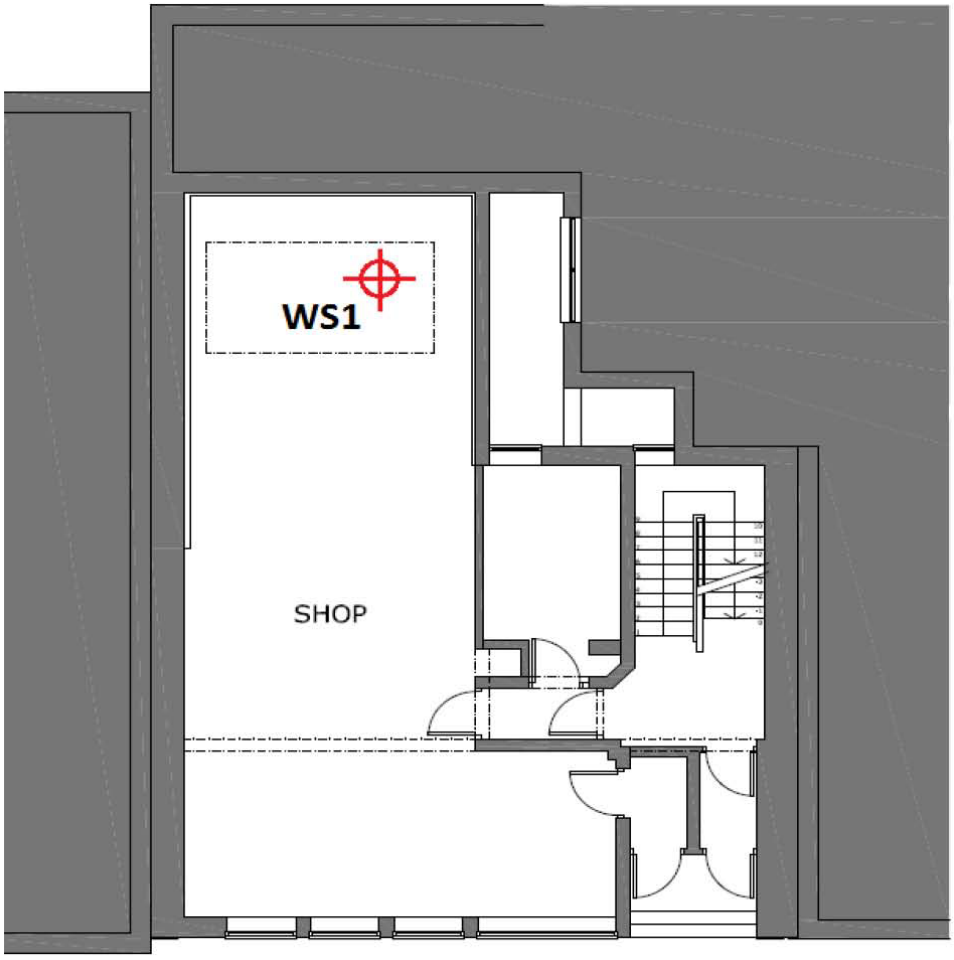
An intrusive site investigation was carried out on the 9th October 2015. One window sample hole, WS1, was bored to a depth of 4.0m below ground level (mBGL) to confirm ground conditions and groundwater level, and to install a groundwater/gas monitoring pipe.

Due to the access restrictions and limitations of the site, hand held window sample boring methods were used, which limited the penetration of the bore to 4.00mBGL. Concrete coring was undertaken prior to window sampling to penetrate the existing concrete floor slab at ground floor level.

The borehole was located in the rear single storey extension to the existing building. This area lies outside of the area of the existing basement in order to sample all soils that will be excavated to form the basement extension.

A plan showing the exploratory hole location is presented as Figure 3.1. All excavations were logged by an on-site engineer, records of which are attached in Appendix A.

Figure 3.1 Exploratory Hole Location



4.2 Monitoring

On completion, the window sample borehole was installed with a 19mm diameter combined gas and groundwater monitoring pipe. Three return visits were made to the site to monitor the gas and groundwater levels.

4.3 Sample Collection and Analysis

Samples obtained during the investigation were subjected to a range of geotechnical and geochemical testing at appropriate UKAS accredited laboratories.

Environmental sample collection was carried out in accordance with Clarkebond Standard Operating Procedures and BS EN ISO 22475-1:2006. All soil samples were collected using either clean stainless steel utensils or clean disposable gloves and placed directly into clean containers provided by the laboratory.

Samples were submitted for geotechnical laboratory testing to characterise the engineering properties of the soil. The following testing was scheduled:

- Moisture Content
- Particle Size Distribution
- pH and sulphate

Geotechnical testing was carried out in accordance with the procedures outlined in BS EN ISO 14688-1:2002, 14688-2:2004 and 14689-1:2003. Geotechnical laboratory test data is presented in Appendix B.

Soil samples were sent for chemical analysis to Scientific Analysis Laboratories Ltd (SAL) to be analysed for:

- Metals including arsenic, cadmium, copper, total chromium, lead, mercury, nickel, selenium and zinc,
- Poly-aromatic Hydrocarbons (PAH),
- Total Petroleum Hydrocarbons (TPH),
- pH, water soluble sulphate, and soil organic matter.
- Waste Acceptance Criteria.

The chemical laboratory test results are presented in Appendix C.

5.0 IMPACT ASSESSMENT

5.1 Ground Conditions

5.1.1 Made Ground

Below the concrete suspended floor slab, Made Ground soils were encountered to a depth of 2.40mBGL. These soils comprised sandy gravelly clay with the gravel component comprising flint, brick, concrete, pottery fragments and slate. Natural moisture content for this unit ranged between 22 and 24.

A buried brick wall was encountered running down the east side of the service inspection pit, which was excavated by hand from ground level to 1.20m depth. The base of this wall was not encountered within the service inspection pit. Due to the location of the borehole relative to the building it is unlikely that this wall forms part of the basement wall. The wall may be a relic from the previous building that occupied the site.

The base of the Made Ground unit is roughly level with the basement slab soffit level. It is likely that this Made Ground represents the area of disturbance caused by the construction of the basement.

Made Ground is a variable and unpredictable deposit and should not be relied upon as a founding soil for buildings without treatment.

5.1.2 Hackney Gravel Member

Hackney Gravel Member (HGM) was encountered underlying the Made Ground to the base of the borehole at 4.0m BGL. This stratum comprised sandy gravel becoming gravelly sand below 3.40m depth.

Particle size distribution analysis is provided in Figure 5.1. The principle components of the Hackney Gravel are as follows:

	2.50m depth	3.50m depth
• Gravel	67%	44%
• Coarse sand	7%	4%
• Fine and Medium Sand	19%	46%
• Silt and Clay	7%	6%

Fines content was typically 6% indicating the Hackney Gravel to be non-plastic, confirming site observations.

The permeability of the soil may be estimated using the results of the particle size distribution testing as 4×10^{-4}m/s.

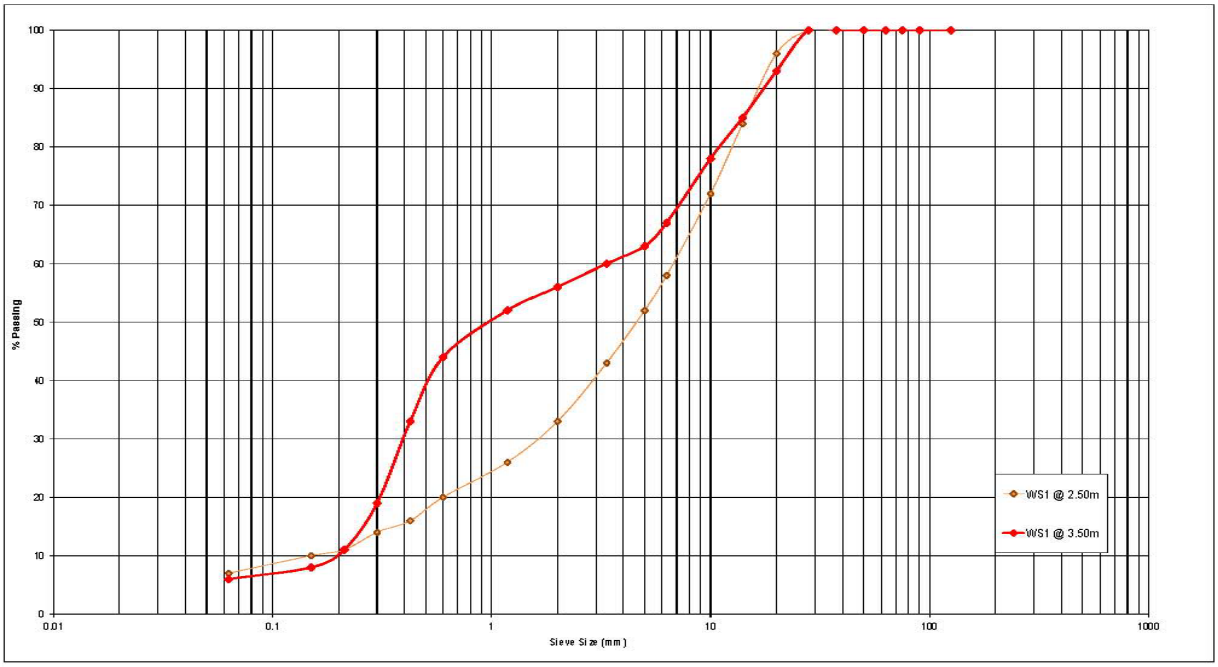
Due to the drilling method used no in-situ strength data for this unit was collected. However, based on prior experience working within this strata and data from adjacent historical borehole, the below parameters are considered suitable, if conservative, values for this unit:

SPT N = 15

ϕ' = 32°

c' = 0 kN/m^2

Figure 5.1 Particle Size Distribution Analysis (Hackney Gravel)



5.1.3 Groundwater

Groundwater observations recorded during the site works and from subsequent monitoring rounds are summarised in Table 5.1.

Table 5.1 Summary of Groundwater Observations

Hole	Depth of Installation (m BGL)	Depth to Groundwater (mBGL)			
		09/10/15 (During boring)	16/10/15	30/10/15	6/11/2015
WS1	3.90	Dry	Dry (Damp at base of pipe)	Dry (Damp at base of pipe)	3.86m

No recordable depth of groundwater was encountered in the borehole during the first two monitoring visits. During the final visit groundwater level was recorded at 3.86m depth.

The groundwater level below the site may have a significant impact on the construction methods used for the proposed basement development. Groundwater monitoring undertaken following the completion of the window sample borehole indicates that the groundwater level rests at or below 3.86m depth, therefore being greater than 0.86m below the proposed basement level.

Groundwater level is subject to seasonal variation and may vary at certain times of the year. However, as the monitoring was undertaken during October and November it is likely that the level recorded represents the higher groundwater level experienced in this area. In addition, the potential for groundwater to rise significantly from the recorded level is likely to be regulated by the presence of the former River Fleet channel into which the natural ground level falls to the east.

On this basis, the risk of the proposed development adversely impacting on the hydrogeological regime at the site is considered to be negligible.

5.2 Engineering considerations

5.2.1 Basement Geology

The results of the site investigation show the basement will be formed entirely within the Made Ground and Hackney Gravel Member. The Hackney Gravel was proven to 4m below ground level however the interface with the underlying London Clay Formation was not encountered. Based on the information available the new basement slab soffit level is assumed to be 3m below ground floor level (i.e. the level from which WS1 was drilled).

5.2.2 Excavations

Excavation will be possible with conventional earthmoving plant. The stability of excavations through Made Ground and Hackney Gravel are unlikely to remain stable even during the short periods required for construction.

The stability of excavations will rapidly deteriorate in the presence of water. The site investigation has not indicated the presence of groundwater within the construction depth, and further the works lying within the internal area of the building will be protected from surface water. Due to the limited extent of the site investigation, it is not possible to completely discount the potential for perched groundwater pockets. It remains likely that if present such bodies will be of limited extent and as such may drain rapidly as the excavation proceeds. However, water bearing granular deposits will not remain stable and even if supported, there is a risk of soil running into the excavation if perched groundwater pockets are encountered.

Any excavation should therefore proceed with caution, and if perched groundwater is encountered, this should be allowed to drain out before further excavation.

5.2.3 Construction Techniques

In the absence of groundwater (other than potentially localised pockets of perched water), the basement construction may be undertaken using conventional underpinning techniques. This method involves excavation directly beneath the existing supporting walls in short, staggered bays, and installing walls (*"pins")* in each bay to provide support to the excavation prior to commencing excavation in the adjacent bay. Pins are tied together and supported by temporary propping at the top and bottom prior to installation of the permanent basement and ground floor slabs following completion of the walls.

In this manner the overall structure remains adequately supported throughout the basement construction.

5.2.4 Ground Movement

The construction will require excavation to 3m below existing ground level. This will result in unloading of the ground with potential for associated dilation and uplift due to relaxation of normal forces within the soil mass.

Potential mechanisms that may result in ground movements during and following construction are discussed below.

Seasonal Moisture Content Variation -

Seasonal moisture variation will not be a consideration for the basement foundations, as it will be founded on granular soils in the Hackney Gravel. Whilst the underlying London Clay is a plastic soil and susceptible to heave and shrinkage in response to seasonal moisture content variation, generally arising from water demand of trees, this will not be a consideration at this site due to the absence of mature vegetation and that the London Clay is likely to lie beneath the penetration depth of root systems.

Unloading -

Unloading during the basement excavation will result in relaxation of load imposed on the ground at basement level which will result in heave of the soils. This will occur in two parts, being:

- Immediate elastic response to the unloading
- Movement as pore water pressures equalise with respect to the new loading conditions. As the basement will be founded on the Hackney Gravel Member, which will exhibit high permeability, this element of the heave will occur rapidly, although due to the influence of the deeper London Clay is likely to extend beyond the period of construction of the basement.

Similar deformation mechanisms may then be expected to manifest as settlement during and after construction of the additional above ground storeys.

The calculation of heave has been completed assuming deformation properties in the Hackney Gravel Member and underlying London Clay. Due to the absence of deep borehole data in the immediate vicinity of the site, the purposes of the analysis it is conservatively assumed for that the London Clay will lie immediately below the penetration of the site investigation, i.e. 4mBGL. Deformation parameters for the soils assumed in the analysis are as follows:

- Hackney Gravel Member - ground level to 4m depth:
  - Youngs modulus (E_u) 60,000kN/m^2
  - Constrained modulus (E_d) = 36,000kN/m^2
- London Clay - below 4m depth:
  - Undrained Shear Strength (c_u) = 100 + 10z kN/m^2. z = depth (m) below foundation level. Maximum value = 200kN/m^2
  - Youngs modulus (E_u) 400c_u = 40,000 to 72,000kN/m^2
  - Constrained modulus (E_d) = 0.6Eu = 24,000 to 43,200kN/m^2

Due to the layout of the proposed development, two different unloading scenarios have been assessed for the site as follows:

1. West half of the site – Basement excavation only
2. East half of the site – Lowering of basement floor and addition of 2 extra above ground storeys.

Scenario 1

The loading conditions assume the construction load to be evenly distributed over the basement slab, which is effectively rigid. Each side of the basement is assumed to act independently, and the effects are assessed based on the following parameters:

- Depth 3mBGL
- Width 5m
- Length 5m
- Total building pressure (Slab only) 12.5kN/m^2
- Unit weight of removed soil 19kN/m^3

The heave calculations based on Bousinesq load decay with depth over 2.5 times the basement width are as follows:

- Immediate elastic heave 4mm (occurring during construction)
- Secondary Heave (Hackney Gravel) 2mm (occurring during construction)
- Secondary Heave (London Clay) 3mm (occurring post construction)
- TOTAL unloading heave 9mm (during and after construction)

Total Heave -

The basement slab will need to accommodate the following heave:

- Heave Arising from seasonal moisture content variation 0mm
- Unloading heave (post construction) 3mm
- **TOTAL HEAVE** **3mm**

Scenario 2
The loading conditions assume the construction load to be evenly distributed over the basement slabs, which is effectively rigid. Each side of the basement is assumed to act independently, and the effects are assessed based on the following parameters:

- Depth 0.5mBGL
- Width 10m
- Length 10m
- Additional building load (3 additional storeys) 37.5kN/m^2
- Unit weight of removed soil 19kN/m^3

The heave calculations based on Bousinesq load decay with depth over 2.5 times the basement width are as follows:

- Immediate elastic heave 1mm (occurring during construction)
- Long term secondary heave 1mm (occurring post construction)
- TOTAL unloading heve 2mm

Total Settlement -
The basement slab will need to accommodate the following settlement:

- Heave Arising from seasonal moisture content variation 0mm
- Unloading heave 1mm
- **TOTAL HEAVE** **1mm**

5.2.5 Affect of Ground Movement on Properties

Lateral deformation of soils into any excavation is inevitable as the horizontal support is removed. Whilst this can be controlled through the use of shoring as the excavation proceeds, there will always be residual lateral movements as the earth pressures equalise against the new retaining wall. Such movement will result in ground loss at surface, and settlement of the site property and adjacent properties, including:

- 12 St Cross Street, a connected property to the north.
- 28 Kirby Street, a connected property to the south.

The elastic heave resulting from unloading as the excavation proceeds is likely to be largely contained within the excavation, and as such will not greatly affect the connecting properties.

Longer term heave arising from re-adjustment of pore-water pressures, whilst largely confined to the base of the new excavation is likely to also affect the neighbouring properties.

Estimates of movements affecting the connecting property assuming excavations extend up to the site boundary are made with reference to guidance included in CIRIA C580 Embedded Retaining Walls – guidance for economic design (2003), as follows:

- Horizontal in response to wall construction 4.5mm
- Vertical (settlement) in response to wall construction 3mm

Predicted classification of visible damage to walls at the connecting properties are as follows (ref. CIRIA C580):

- Horizontal in response to wall construction = **Very Slight** (Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection. Crack width <1mm).
- Vertical in response to wall construction = **Very Slight** (Fine cracks that can easily be treated during normal decoration. Perhaps isolated slight fracture in building. Cracks in external brickwork visible on inspection. Crack width <1mm).

- Resultant in response to wall construction = **Slight** (Cracks easily filled. Redecoration probably required. Several slight fractures showing inside the building. Cracks are visible externally and some re-pointing may be required externally to ensure water tightness. Doors and window may stick slightly).

The combination of settlement due to lateral deformation and unloading heave will to some extent neutralise the overall ground movements as given above, although there will be a net resultant imbalance that may adversely affect the connecting buildings. The predicted damage above represents a worst case assessment and ignores the beneficial counter effect of unloading ground heave in response to the excavation.

Whilst the potential for net ground movements are indicated at a low magnitude, a pre-construction condition survey and close monitoring of displacements of the structure will be an essential as part of any party wall agreement.

5.2.6 Structural Concerns

The discussion above has detailed the quantification of the likely effects the proposed development will have on existing on- and off-site developments, and the natural environment (hydrology and hydrogeology). These aspects should be considered during the detailed design process to ensure the stability of the subterranean structure, both in the temporary case (during construction) and the permanent final case.

Notwithstanding the level of detail that will inevitably be afforded to the structural design and construction methodology, it is recommended to effect observational methods during construction to confirm the validity of design assumptions and account for unforeseen ground conditions and ground responses. This should comprise:

- Condition surveys prior to commencement of the construction – This should include external and internal inspection of all potentially affected properties and recording details of existing defects (such as cracking, uneven brick courses and floors, details of past repair works that may indicate precedents for ground movements);
- Records of excavations – All excavations should be logged and details recorded of:
    - Actual ground conditions encountered;
    - Presence of perched groundwater pockets (if encountered), and associated geological details;
    - Actual location of existing services.
- Monitoring – May include:
    - Definition of threshold displacement values including determination of displacement values including Green (predicted maximum); Amber (tolerable, say up to 150% predicted maximum); Red (action level).
    - Formulation of remedial actions required for Amber and Red displacement levels.
    - Installation and monitoring of survey stations on the existing buildings at lower, mid and upper levels to determine actual structural movements against the predicted levels.
    - Installation of monitoring stations on the new retaining structures as elements are placed to determine performance as the construction proceeds.
    - Post construction monitoring to determine on-going ground response to the construction, again comparing results against predicted levels.
    - During and post construction monitoring of groundwater levels to north and south of development.

5.2.7 Affect on Utilities

In addition to disturbance of the existing buildings, ground movements may also affect service connections. Ground movements will reduce with distance from the new retaining walls. For the maximum 3m deep basement, the distance behind the walls at which the ground movement (vertical and horizontal) is negligible will be about 12m. It is therefore likely that service connections within the basement may be affected.

The service with the least tolerance to movement will be clay drainage pipes. This has a tolerance to deflection of 3° at any joint, which for a 2m pipe length (i.e. the shortest probable single length) this would provide a tolerance to movement of 60mm, being considerably greater than the maximum predicted movements.

5.2.8 Proposed Foundations

The basement is proposed under the supporting walls of the existing development only. Shallow strip foundations seated into the Hackney Gravel Member will be appropriate for the proposed development. Such foundations will need to be designed to accommodate the loads from the existing building, and the proposed upward extension.

Ultimately the basement retaining walls will be tied into the ground floor and basement slabs that will provide lateral support against earth pressures to the basement walls. Prior to placing of the basement slab, temporary support will required to provide stability during the construction.

The ultimate limit state allowable bearing capacity for foundations seated in the Hackney Gravel Member, with groundwater below the foundation depth and adopting a factor of safety of 3 on the ultimate calculated value is:

Strip foundation $Q_a = 150kN/m^2$

5.2.9 Floor Slabs

The use of a ground bearing floor slab in the proposed basement construction is considered suitable on the basis that the basement will be seated on the granular Hackney Gravel Member.

The basement floor slab would be subject to a minimal amount of long term heave. Nevertheless, it is likely that floor slabs will require incorporation of void formers beneath the slab to accommodate heave resulting from the basement excavation, and reinforcement to further protect against heave forces.

5.2.10 Retaining Walls

Retaining walls are required for the basement extension. The retaining walls will be constructed against the Made Ground and Hackney Gravel Member, and should be designed on the basis of the parameters in the table below.

Table 5.2 Design Parameters for Retaining Wall Design (unfactored)

Soil Type	Characteristic Values		Active Earth Pressure Coefficient k_a	Passive Earth Pressure Coefficient k_p	Comment
	Friction Angle ϕ'_k (°)	Effective Cohesion c'_k (kN/m^2)			
Made Ground	28	0	0.32	4.0	Ref. BS EN 1997-1:2004 Eurocode 7: Geotechnical Design Fig. C1.1 and C2.1 Assumes horizontal surface above wall, and δ / ϕ' = 0.66
Hackney Gravel Member	32	0	0.26	5.8	Ref. BS EN 1997-1:2004 Eurocode 7: Geotechnical Design Fig. C1.1 and C2.1 Assumes horizontal surface above wall, and δ / ϕ' = 0.66

5.2.11 BRE Sulphate Analyses

Samples were tested for sulphate suites as outlined in *BRE Special Digest 1, Concrete in Aggressive Ground: 2005*, during the site investigation works. The results are summarised in Table 5.3.

Based on test results, it is recommended that the design sulphate class is DS-1 and ACEC class is taken as AC-1.

Table 5.3 Summary of Ground Aggressivity to Buried Concrete

Hole	Depth (mBGL)	Chemical Test Results				Design Sulphate Class[1]	ACEC Class[1]
		pH	Sulphate [Water Sol. SO_4] (mg/l)	Total Sulphur (%)	Max. Total Potential Sulphate (%)		
WS1	0.3	9.3	500	-	-	DS-1	AC-1
WS1	0.7	8.3	300	-	-	DS-1	AC-1
WS1	1.2-1.8	8.0	300	-	-	DS-1	AC-1
WS1	2.0	7.3	280	-	-	DS-1	AC-1
WS1	2.5	7.9	250	-	-	DS-1	AC-1
WS1	3.5	7.86	80	-	-	DS-1	AC-1

1: Design Sulphate and ACEC Class based on sulphate concentrations where available.

5.3 Cumulative Impacts of Basement Development

The Screening and Scoping Assessments discussed in Sections 3 and 4 of this report have concluded that intrusive investigation was required in order to address the following specific concerns relating to the proposed basement extension:

1. Impact of potential groundwater level on the development.
2. Impact of the development on the existing groundwater level.
3. Impact of the development on neighbouring properties.

The intrusive investigation has revealed that the groundwater level lies at sufficient depth below that impacted by the proposed basement that this development will neither impact on the existing groundwater flow, nor be impacted by the presence of groundwater within the basement depth. Both of these potential impacts are therefore adequately negated by based on the data retrieved from the investigation.

The analysis of ground displacement in response to the proposed development has conservatively assumed that the London Clay lies directly below the depth of the borehole sunk during the intrusive investigation. On this basis, ground movements in response to the development are determined to be “Slight”.

Potential damage to neighbouring properties arising from this level of ground displacement will be aesthetic, and lies within the target objective discussed by Burland, The Assessment of the Risk of Damage to Buildings due to Tunnelling and Excavations” (1995). It is recognised that the LB Camden seek an improved risk of damage to less than Category 1.

Whilst the assessment of damage is conservative, the potential for damage to neighbouring properties, albeit of aesthetic consequence only, cannot be discounted where the properties immediately adjoin the subject property. For this reason mitigating measure that can be introduced as part of the Party Wall etc. Act agreements are included in Section 5.2.6.

On this basis, it is concluded that the proposed basement development meets the relevant requirements of DP27 and that it can be approved with respect to CPG4.

6.0 CONTAMINATION ASSESSMENT

6.1 Introduction

Due to the limited nature of the site investigation arising from spatial restrictions at the site, only three soils samples were tested for a general suite of chemical contaminants and Waste Assessment Criteria. It is recognised that this does not provide sufficient reference points for a robust risk assessment, and further testing may be appropriate during construction. The results of this testing are presented in Appendix C.

6.2 Soil Risks to Humans

The proposed redevelopment is a mixture of commercial use on the basement, ground and first floors, and residential from the second floor to the proposed fifth floor. As it will be the commercial space that will be in contact with potentially contaminated soils from the basement level and the ground floor, the analytical data has been compared against the relevant available guidelines for ***commercial*** end-use to identify chemicals of potential concern.

In some cases the measured concentrations of contaminants may have been statistically analysed using the *ESI Statistics Calculator* (software), whilst in other cases the maximum test results have been used. This software follows guidance given in:

- Contaminated Land: Applications in Real Environments, & The Chartered Institute of Environmental Health, 2008. CL:AIRE & CIEH. *Guidance on comparing soil contamination data with a critical concentration*. London.

The Upper Confidence Limits (UCL) of the test results, or maximum results, have then been used for subsequent comparison with:

1. Cl:aire/EIC/AGS *Soil Generic Assessment Criteria for Human Health Risk assessment*, January 2010 and
2. *The LQM/CIEH S4ULs for Human Health Risk Assessment.* Ref: S4UL3269, released January 2015, Land Quality Press, Nottingham and
3. EA Science Report SC050021.

Metals

The CLEA model has separate SGVs for different forms of mercury. However, the SGV report states that for general surface contamination, and to simplify the assessment, the chemical analysis results for total mercury content can just normally be compared with the SGVs for inorganic mercury (e.g. 170mg/kg for private gardens). This is because the equilibrium concentrations of elemental and methyl mercury compounds are likely to be very low. Since all the results are below the SGV for inorganic mercury, then the mercury results are not considered significant.

Table 6.1 below summarises the results. None of the results exceeded the GAC values for *commercial* end-use.

Table 6.1 - Values for Metals in Soils

Compound	Number of samples	Maximum values (mg/kg)	SGV or GAC (Commercial) mg/kg
Arsenic	3	28	640
Cadmium	3	<1	190
Chromium	3	20	8,600
Copper	3	230	68,000
Lead	3	1200	2,300
Mercury	3	12	1,100
Nickel	3	24	980
Selenium	3	<3	12,000
Zinc	3	260	730,000

#: Chromium III Generic Assessment Criteria (GAC).
##: without plant uptake
Bold and/or highlight shows exceedances

Organics – General

SOM tests were undertaken on three samples. The lowest of these values 4.8% and so a conservative figure of 2.5% SOM has been adopted when selecting the Generic Assessment Criteria (GAC) screening values for organics in the following sections.

Organics – TPH

Table 6.2 below summarises the results.

Table 6.2 - Values for Speciated Hydrocarbons in Soils

Compound	Number of samples	Maximum values (mg/kg)	SGV or GAC (2.5% SOM) mg/kg (Commercial)
Aliphatic			
EC 5-6	3	<0.1	5,900
EC> 6-8	3	<0.1	17,000
EC> 8-10	3	<0.1	4,800
EC> 10-12	3	<1	23,000
EC> 12-16	3	<2	82,000
EC> 16-35	3	<5	1,700,000
EC> 35-44	3	<1	1,700,000
Aromatic			
EC 5-7(benzene)	3	<0.10	46,000
EC> 7-8 (toluene)	3	<0.1	110,000
EC>8-10	3	<0.1	8,100
EC>10-12	3	<1	28,000
EC>12-16	3	<1	37,000
EC>16-21	3	<1	28,000
EC>21-35	3	<1	28,000
EC>35-44	3	<1	28,000

Bold and/or highlight shows exceedances

None of the results exceeded the GAC values for *commercial* end-use.

Organics – PAHs

Table 6.3 below summarises the results.

Table 6.3 - Values for Speciated PAH in Soils

Compound	Number of samples	Maximum values (mg/kg)	GAC (2.5% SOM) (Commercial) mg/kg
Naphthalene	3	<0.1	460
Acenaphthylene	3	<0.1	97,000
Acenaphthene	3	<0.1	97,000
Fluorene	3	<0.1	68,000
Phenanthrene	3	<0.1	22,000
Anthracene	3	<0.1	540,000
Fluoranthene	3	<0.1	23,000
Pyrene	3	<0.1	54,000
Benzo(a)anthracene	3	<0.1	170
Chrysene	3	<0.1	350
Benzo(b)fluorathene	3	<0.1	44
Benzo(k)fluorathene	3	<0.1	1,200
Benzo(a)pyrene	3	<0.1	35
Indeno(123-ed)pyrene	3	<0.1	510
Dibenzo(ah)anthracene	3	<0.1	3.6
Benzo(ghi)perylene	3	<0.1	4,000

None of the results exceeded the GAC values for *commercial* end-use.

6.3 Soil Risks to Water Supply Pipes

Plans of the proposed development indicate the new waste service pipes will connect into the existing waste service pipes. These pipes are indicated to currently run along the north side of the site from west to east. The proposed lowering of the basement floor level may require these service pipes to also be lowered.

To assess possible risks to proposed water supply pipes, the laboratory test results have been subject, to initial assessment against the GAC presented in UKWIR. Full testing has not been undertaken to determine the suitability of metallic pipe materials.

It is assumed that water pipes will be placed no deeper than 1mbegl and thus results that relate to strata below 1m are not considered below. Assessment of the results versus the GAC is summarised as follows:

Table 6.4 GAC for Water Supply Pipes

Parameter	GAC (mg/kg)		Results exceeding the GAC (mg/kg)	
	PE pipes	PVC pipes	PE pipes	PVC pipes
BTEX (<C11)	0.1	0.03	None	None
Mineral Oil C11-C20	10	Suitable	None	None
Mineral Oil C21-C40	500	Suitable	None	None

Given the above, then we consider that the local water supply company should accept the use of PVC and PE water supply pipe materials on site.

It is recommended that this assessment be given to the relevant water supply company at an early stage (ideally prior to an application for planning permission being made) to confirm its requirements, which may not necessarily be the same as those recommended by UKWIR.

6.4 Summary of Soil Results Exceedances

The chemical test results for soil samples undertaken for this investigation indicate:

- No defined risk to human health
- PVC and PE water supply pipe materials on site.

6.5 Ground/Landfill Gas Risks to Humans

In order to assess the significance of potential ground gases at the site measured concentrations (by volume in air) and flow rates have been used to generate Gas Screening Values (GSVs). These have then been compared to CIRIA Report 665. BS8485 has also been referenced.

It is recommended that the gas risk should be assessed by the consideration of pathways to human receptors as follows:

- Gas entering the dwelling through the substructure and building up to hazardous levels.

The following ground gas parameters have been recorded over 3nr gas monitoring rounds:

- A maximum 'initial' methane concentration of 0%
- A maximum 'initial' flow rate of 0.1 l/hr;
- A maximum 'steady state' carbon dioxide concentration of 0.3%;
- A maximum 'steady state' flow rate of 0.1 l/hr
- Atmospheric pressures varied between 1012mb and 1024mb during the visits.

Negative flow rates are taken as being zero since they do not indicate gas generation, but usually indicate dropping water levels within monitoring wells, or well/atmospheric pressures equalising.

The worst case Gas Screening Values (GSV) for both methane and carbon dioxide have been calculated, in order to see if any gas protective measures are required in the new development.

The GSV for methane is calculated to be 0.0 l/hr and for carbon dioxide it is 0.03 l/hr.

Hydrogen sulphide can originate from landfill, sewage, dung pits/heaps, peat, bogs and/or organic rich alluvium (CIRIA C665, 2007). Since the site does not contain any of these sources hydrogen sulphide concentrations are not considered significant.

Carbon monoxide is generally the result of incomplete combustion (e.g. forest fires) and rare industrial processes such as iron smelting. Since the site does not contain any of these sources carbon monoxide concentrations are not considered significant.

The site falls into '**Characteristic Situation' 1 (CS1) (very low hazard)** in Table 8.5 of CIRIA 665. This indicates that no protection measures are required in the new buildings.

6.6 Radon Risk to Humans

Guidance provided by UKRadon indicates that Radon protection will not be required at this site.

6.7 Final Conceptual Model and Risk Assessment

The method used for risk evaluation is qualitative based on interpretation of the available geoenvironmental and geotechnical data in order to provide an overall impression of the potential risks present at the site. This is described in terms of two variables as follows:

- **"Probability"** – being the likelihood that a hazard is present on site or in the surroundings.
- **"Consequence"** – being the potential outcome of the hazard.

The combination of these is used to define the risk. Clearly if a hazard is not present there can be no consequence. Similarly hazards that are potentially present will have different degrees of potential consequence. The combination of the presence of a hazard, and the potential severity of outcome of such a hazard within any event, can be used to manage the approach to management of the risk.

The **probability** (likelihood) of an event can be classified on a four point system using the following terms and definitions based on CIRIA C552:

- **Highly likely**: The event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;
- **Likely**: It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;
- **Low likelihood**: Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;
- **Unlikely**: Circumstances are such that it is improbably the event would occur even in the long term.

The **consequence** (severity) can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to consequence are:

- **Severe**: Short term (acute) risk to human health likely to result in 'significant harm'#. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem#;
- **Medium**: Chronic damage to human health ('significant harm'#), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem#;
- **Mild**: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm'#). Damage to sensitive buildings, structures or the environment; and
- **Minor**: Harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

#: Defined in Defra Circular on "Contaminated Land', EPA 1990 Part 2a", 01/2006, September 2006.

Once the probability of an event occurring and its consequence have been classified, a risk category can be assigned as Table 6.6.

Table 6.6 Risk Classification System (CIRIA 552)

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

Risk Level	Action
Low to Very Low	None
Moderate to Moderate/Low	Undertake appropriate mitigation measures to reduce the risk level by appropriate on-site practice at little additional cost.
High to Very High	Designers should take such risks into account and avoid or reduce risk level to acceptable levels. Additional resources required.

Tables 6.7 to 6.9 provide a summary of the data reference points, together with an indication of the hazard, probability, consequence and thus degree of risk.

Table 6.7 On-Site to On-Site Source - Pathway - Receptor Model

Source 1	Source 2	Migration Pathway	Probability	Exposure Pathway	Consequence	Receptor	Risk
Made Ground soils	Heavy metals and/or hydrocarbons	Migration of liquids & vapours through unsaturated zone; Migration through saturated zone/groundwater; Preferential flow paths (e.g. drains, service runs etc.)	Low Likelihood	Migration to groundwater	Mild	Aquifer	Low
		Ingestion of soil & household dust; Dermal contact with soil and household dust; Inhalation of indoor vapours and household dust; Inhalation of outdoor vapours and fugitive dust.	Low Likelihood	Migration to site users.	Mild	Human beings.	Low
Made Ground and Natural Soils	Ground Gas	Migration of carbon dioxide and/or methane gas through unsaturated zone	Low Likelihood	Migration to site users.	Mild	Human beings	Low

Table 6.8 On-Site to Off-Site Source - Pathway - Receptor Model

Source 1	Source 2	Migration Pathway	Probability	Exposure Pathway	Consequence	Receptor	Risk
Made Ground soils	Heavy metals and/or hydrocarbons	Migration of liquids & vapours through unsaturated zone; Migration through saturated zone/groundwater; Preferential flow paths (e.g. drains, service runs etc.)	Low Likelihood	Migration to groundwater	Mild	Aquifer	Low
		Ingestion of soil & household dust; Dermal contact with soil and household dust; Inhalation of indoor vapours and household dust; Inhalation of outdoor vapours and fugitive dust.	Low Likelihood	Migration to site users.	Mild	Human beings.	Low
Made Ground and Natural Soils	Ground Gas	Migration of carbon dioxide and/or methane gas through unsaturated zone	Low Likelihood	Migration to site users.	Mild	Human beings	Low

Table 6.9 Off-Site to On-Site Source - Pathway - Receptor Model

Source 1	Source 2	Migration Pathway	Probability	Exposure Pathway	Consequence	Receptor	Risk
Made Ground soils	Heavy metals and/or hydrocarbons	Migration of liquids & vapours through unsaturated zone; Migration through saturated zone/groundwater; Preferential flow paths (e.g. drains, service runs etc.)	Low Likelihood	Migration to groundwater	Mild	Aquifer	Low
		Ingestion of soil & household dust; Dermal contact with soil and household dust; Inhalation of indoor vapours and household dust; Inhalation of outdoor vapours and fugitive dust.	Low Likelihood	Migration to site users.	Mild	Human beings.	Low
Made Ground and Natural Soils	Ground Gas	Migration of carbon dioxide and/or methane gas through unsaturated zone	Low Likelihood	Migration to site users.	Mild	Human beings	Low

6.8 Outline Strategy for Risk Reduction & Remediation

Chemical testing of site soils has indicated that all determinands were below the generic acceptance criteria adopted. From the results of the contamination testing, no remediation relating to ground contamination should be required.

The site investigation samples a very small portion of the overall site soils. Given the existence of made ground on the site, vigilance should be maintained during site clearance and construction, in case any further areas of suspected contamination are encountered. If areas are found then a suitably qualified person should undertake appropriate sampling, testing and further risk assessment.

6.9 Waste Assessment

In order to prevent excessive costs and reduce the environmental impact of the development it is recommended that removal of wastes from the site, including waste soils, is kept to a minimum.

To evaluate the various on-site soils for potential off-site disposal, soils are classified in accordance with the Hazardous Waste Directive (HWD) that enables the provision of a European Waste Catalogue (EWC) Code for use during offsite disposal and a Hazardous or Non-Hazardous Classification. Non-Hazardous material is suitable for disposal in a Non-Hazardous landfill; however, disposal to an Inert Landfill requires further Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457–3. Material classed as Hazardous also requires WAC testing to assign a suitable hazardous classification.

The Landfill Regulations require that all Hazardous and Non-Hazardous solid waste must be treated prior to offsite disposal to landfill. You can define 'treatment' by using the following 'three-point test'. All three criteria must be satisfied for all of the waste to qualify as being treated:

1. It must be a physical, thermal, chemical or biological process including sorting.
2. It must change the characteristics of the waste.
3. It must do so in order to:
    a. Reduce its volume; or
    b. Reduce its hazardous nature; or
    c. Facilitate its handling; or
    d. Enhance recovery.

A HazWaste assessment of the soil chemical testing results indicates that two of the samples (0.3m and 1.2m-1.8m depth) may be preliminarily classified as Non Hazardous. The third sample (0.7m depth) contained elevated concentrations of lead that pushed the classification of the sample from Non-Hazardous to Hazardous waste.

The lead concentration of 1200mg/kg only narrowly exceeds the Non-Hazardous/Hazardous classification threshold, as the recorded value for the sample taken at 1.2m-1.8m depth was recorded as 1000mg/kg and did not cause the sample to be classified as Hazardous waste. It is therefore considered likely that the natural mixing of the made ground soils during excavation will result in an overall decrease in the average lead concentrations for the waste soil, such that the waste may be considered Non-Hazardous.

Waste Acceptance Criteria (WAC) testing was undertaken on two soil samples from within the made ground. Table 6.10 below summarises the determinands that exceeded the 'Inert' waste threshold.

Table 6.10 WAC Testing Exceedances

Sample Depth	Determinand	Result	Inert Waste Landfill Threshold	Stable Non-Reactive Waste Threshold
0.3m	pH	10	-	>6
0.3m	Sulphate	1400mg/kg	1,000mg/kg	20,000mg/kg
1.2m – 1.8m	pH	8	-	>6
1.2m – 1.8m	Total Organic Carbon	3.7%	3.0%	5.0%

It is considered that as the made ground soils are excavated, natural mixing will aid to dilute the elevated concentrations such that the resultant waste soil may be considered non-hazardous to inert. The addition of an acidic agent may be required to neutralise the high pH if it is persists through the made ground.

It should be noted that a site investigation is unable to identify all below ground conditions at a site and therefore, if during construction works soils that require offsite disposal are identified as being different to what has been preliminarily tested in this report, additional testing will be required by a suitably qualified environmental consultant prior to disposal or recovery at a licensed offsite facility.

It is also recommended that prior to offsite disposal or recovery of any waste soils; the receiving licensed treatment/landfill facility should be sent copies of all relevant chemical analysis and written confirmation of acceptance of soils provided.

If the site contains potentially hazardous waste and it is envisaged that more than 500kg p.a. will be disposed of off site, then prior to its removal **the site must be registered (by the contractor) with the Environment Agency as a hazardous waste producer**.

All producers of waste have a **duty of care** to ensure that any waste they produce is handled safely and within the law. They must **check** that anyone they pass waste on to is **authorised** to take it. This includes the authorised site earmarked to handle the waste and any haulier (licensed waste carrier) used to transport the waste between the sites.

All waste holders must act to keep waste safe against:

1. Corrosion or wear of waste containers;
2. Accidental spilling or leaking or inadvertent leaching from waste unprotected from rainfall;
3. Accident or weather breaking open contained waste and allowing it to escape;
4. Waste blowing away or falling while stored or transported;
5. Scavenging of waste by vandals, thieves, children, trespassers or animals.

Holders should protect waste against the above risks while it is in their possession and they should also protect it for its future handling requirements. Waste should reach not only its next holder but a licensed facility or other appropriate destination without escape. It is recommended that the container used to transport the waste is suitable not only to prevent solid and liquid residues escaping, but also any potentially dangerous vapours or odours associated with the waste.

Segregation of different categories of waste where they are produced may be necessary to prevent the mixing of incompatible wastes. Segregation may assist the disposal of waste to specialist outlets. Where segregation is practiced on sites, the waste holder should ensure that his employees and anyone else handling waste there are aware of the locations and uses of each segregated waste container.

Waste handed over to another person should be in some sort of container, which might include a skip. The only reasonable exception would be loose material loaded into a vehicle and then

covered sufficiently to prevent escape before being moved. Waste containers should suit the material put in them.

A waste transfer note (WTN) is a document that must accompany any transfer of waste between different holders. The purpose of a WTN is to allow other people who handle your waste to know what they are dealing with so that they can manage it safely and properly.

A WTN must be created for each load of waste that leaves the site.

The WTN must contain enough information about the waste to enable anyone coming into contact with it to handle it safely, and either dispose of it or allow it to be recovered within the law. If insufficient information is given on the WTN the responsible party may liable to be prosecuted.

Records of all waste transferred or received must keep for at least two years.

Appendices

A Exploratory Hole Logs
B Geotechnical Laboratory Results
C Chemical Laboratory Results
D Hazwaste Assessment

A Exploratory Hole Logs

clarkebond

Windowless Sample Borehole Log

Borehole No.: **WS1**

Project Name:	Antwerp House, Kirby Street	Co-Ordinates:	531375.00 E181880.00 N
Project Number:	XL03964	Ground Level:	16.50m OD
Start:	09/10/2015	End:	09/10/2015

Samples and In Situ Testing			Casing/ Water Depth	Depth (m)	Level (m OD)	Legend	Stratum Description	Water Strike	Well
Depth (m)	Type	Results							
					16.50		MADE GROUND CONCRETE.		
				0.23	16.27				
0.30	ES			0.27			MADE GROUND VOID		
					16.23		MADE GROUND Dark brown sandy gravelly clay. Gravel is angular to subangular fine to coarse flint, brick and concrete. *Occasional cobbles of brick and concrete. Rare slate gravel.*	0.5	
0.50	D								
0.70	ES								
0.90	D							1.0	
				1.10	15.40		MADE GROUND Brown slightly sandy gravelly clay. Gravel is angular to subangular fine to coarse brick, flint, concrete and pottery.		
1.20 - 1.80	ES							1.5	
1.80 - 2.00	D								
2.00 - 2.30	D			2.00	14.50		MADE GROUND Firm dark brown slightly sandy slightly gravelly clay. Gravel is angular to subangular fine to medium flint and brick.	2.0	
				2.40	14.10		Dark orangish brown clayey very sandy GRAVEL. Gravel is angular fine to medium flint. HACKNEY GRAVEL MEMBER		
2.50 - 3.00	D							2.5	
								3.0	
				3.10	13.40		Yellowish brown slightly clayey sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. HACKNEY GRAVEL MEMBER		
				3.40	13.10		Greenish grey clayey very gravelly SAND. Gravel is subangular fine to coarse flint. HACKNEY GRAVEL MEMBER		
3.50 - 4.00	D							3.5	
				4.00	12.50		End of Borehole at 4.00m	4.0	
								4.5	
								5.0	

Drilling Run Details

Depth Top (m)	Depth Base (m)	Diameter (mm)	Sample Recovery (%)	Remarks
1.00	2.00	80	60	
2.00	3.00	55	90	Slow progress
3.00	4.00	45	100	Slow progress. Hole collapse back to 3.90m.

Water Strikes

Depth Struck (m)	Casing (m)	Depth Sealed (m)	Remarks

General Remarks:

Groundwater was not encountered during drilling.

Method/Plant Used: Hand Held Window Sampler

Logged By: KB

Approved By: JSP

Scale: 1:25

Sheet 1 of 1

B Geotechnical Laboratory Results

Summary of Natural Moisture Content

Job No.	Project Name	Programme	
19659	Antwerp House, Kirby Street	Samples received	14/10/2015
		Schedule recieved	14/10/2015
Project No.	Client	Project started	14/10/2015
XL03964	Clarkebond	Reported	29/10/2015

Hole No.	Sample				Soil Description	NMC	Remarks
	Ref	Top	Base	Type		%	
WS1	1	0.50		D	Dark brown slightly gravelly sandy slty CLAY with frequent fmc brick and concrete fragments (gravel is fmc sub-rounded to sub-angular)	23	
WS1	2	0.90		D	Dark brown slightly gravelly sandy silty CLAY with frequent fm brick and concrete fragments (gravel is fmc and sub-angular)	24	
WS1	3	1.80		D	Dark brown and yellowish brown slightly sandy slightly gravelly silty CLAY with frequent fmc brick fragments (gravel is fmc sub-angular to rounded)	24	
WS1	4	2.00		D	Yellowish brown and dark brown slightly sandy slightly gravelly silty CLAY with occasional fm brick fragments (gravel is fmc sub-angular to sub-rounded)	22	
WS1	5	2.50		D	Brown clayey very sandy GRAVEL (gravel is fmc sub-angular to rounded)	6.4	
WS1	6	3.50		D	Brownish grey clayey very gravelly SAND (gravel is fmc sub-angular to to rounded)	8.2	

Test Methods: BS1377: Part 2: 1990:
Natural Moisture Content : clause 3.2

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU

Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials **J.P**

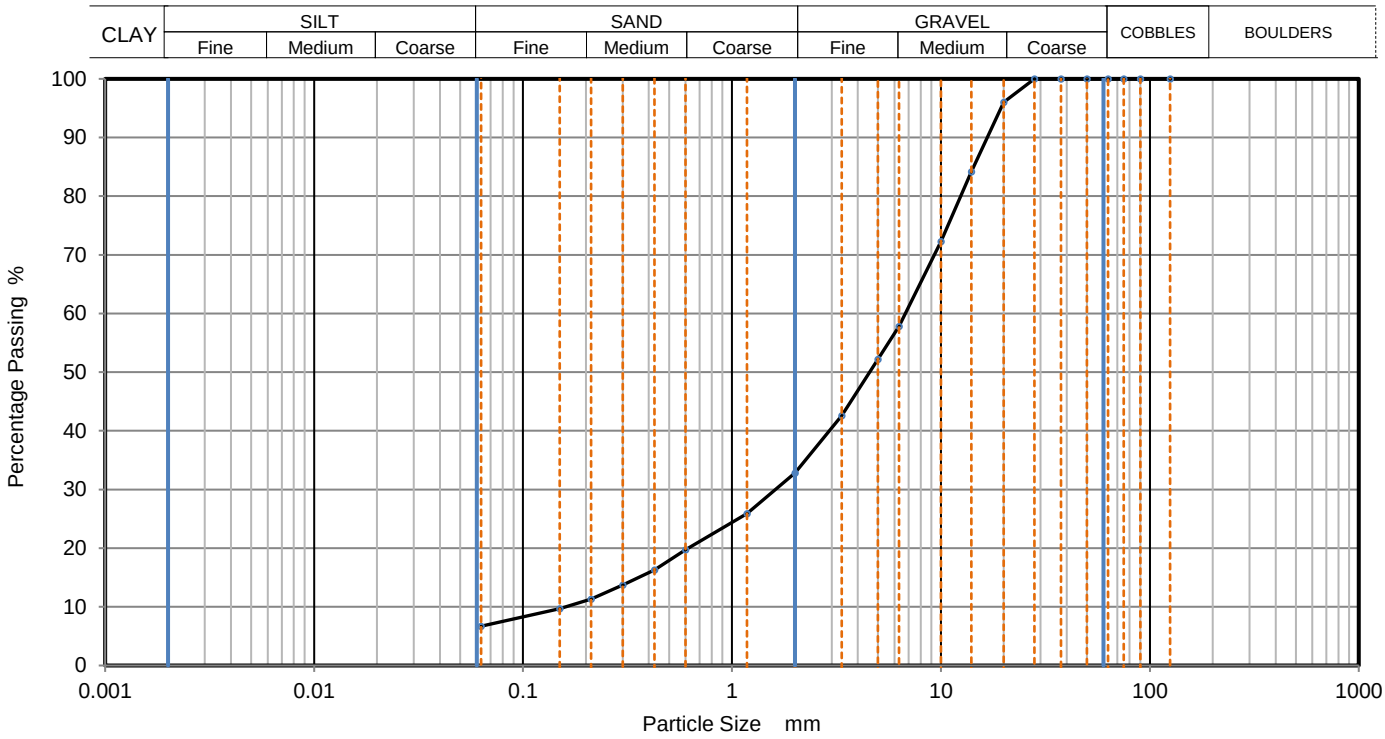
Date: 29/10/2015

UKAS TESTING
2519

Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

PARTICLE SIZE DISTRIBUTION

Site Name	Antwerp House, Kirby Street			Job Ref	19659
				Borehole/Pit No.	WS1
				Sample No.	5
Project No.	XL03964	Client	Clarkebond	Depth	2.50 m
Soil Description	Brown clayey very sandy GRAVEL (gravel is fmc sub-angular to rounded)			Sample Type	D
				Samples received	14/10/2015
				Schedules received	14/10/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	14/10/2015
				Date tested	23/10/2015



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	96		
14	84		
10	72		
6.3	58		
5	52		
3.35	43		
2	33		
1.18	26		
0.6	20		
0.425	16		
0.3	14		
0.212	11		
0.15	10		
0.063	7		

Dry Mass of sample, g	1092

Sample Proportions	% dry mass
Very coarse	0
Gravel	67
Sand	26
Fines <0.063mm	7

Grading Analysis		
D100	mm	
D60	mm	6.76
D30	mm	1.61
D10	mm	0.159
Uniformity Coefficient		42
Curvature Coefficient		2.4

Remarks

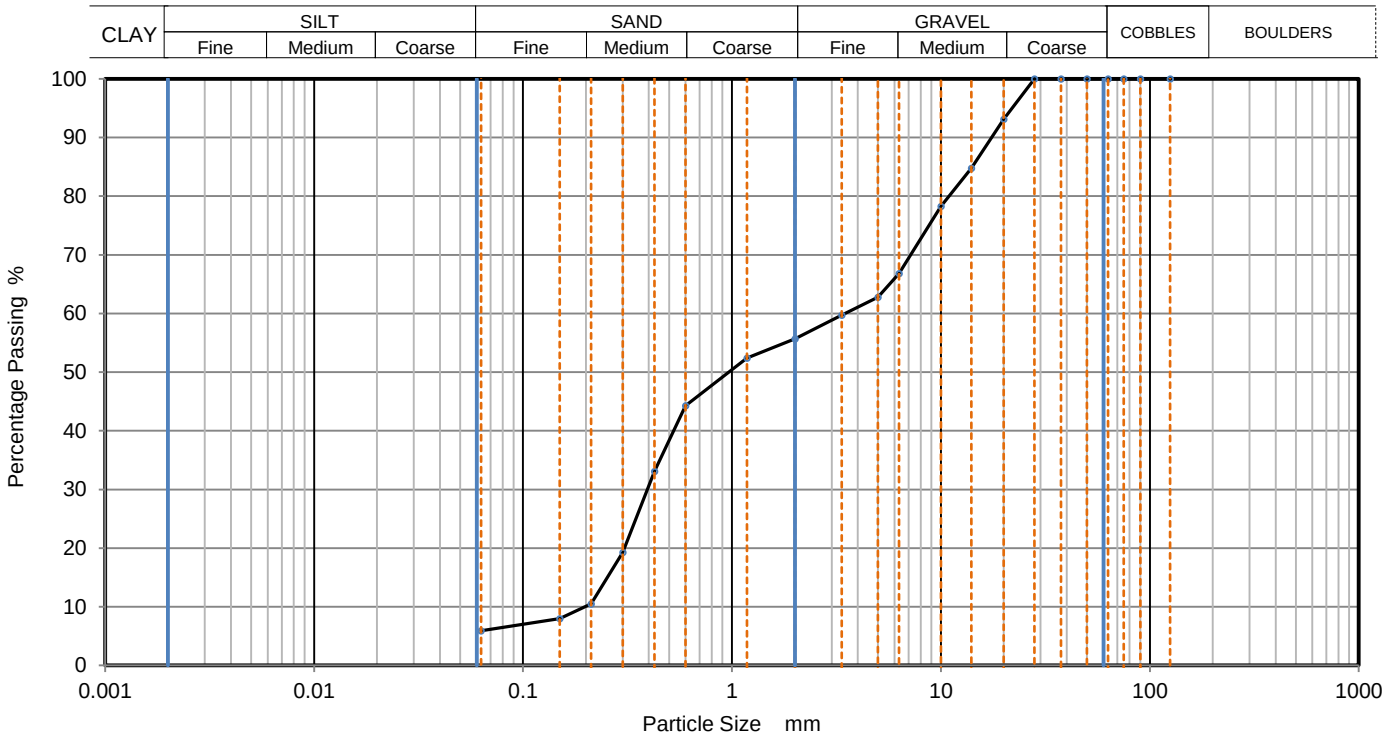
Preparation and testing in accordance with BS1377 unless noted below

K4 Soils Laboratory
Unit 8, Olds Close, Watford, Herts, WD18 9RU
Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials:
Date: 29/10/2015

PARTICLE SIZE DISTRIBUTION

				Job Ref	19659
				Borehole/Pit No.	WS1
Site Name	Antwerp House, Kirby Street			Sample No.	6
Project No.	XL03964	Client	Clarkebond	Depth	3.50 m
Soil Description	Brownish grey clayey very gravelly SAND (gravel is fmc sub-angular to to rounded)			Sample Type	D
				Samples received	14/10/2015
				Schedules received	14/10/2015
Test Method	BS1377:Part 2: 1990, clause 9.0			Project started	14/10/2015
				Date tested	23/10/2015



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	93		
14	85		
10	78		
6.3	67		
5	63		
3.35	60		
2	56		
1.18	52		
0.6	44		
0.425	33		
0.3	19		
0.212	11		
0.15	8		
0.063	6		

Dry Mass of sample, g: 601

Sample Proportions	% dry mass
Very coarse	0
Gravel	44
Sand	50
Fines <0.063mm	6

Grading Analysis		
D100	mm	
D60	mm	3.48
D30	mm	0.393
D10	mm	0.197
Uniformity Coefficient		18
Curvature Coefficient		0.23

Remarks

Preparation and testing in accordance with BS1377 unless noted below

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Email: james@k4soils.com
Tel: 01923 711288

Checked and Approved
Initials:
Date: 29/10/2015

Sulphate Content (Gravimetric Method) for 2:1 Soil: Water Extract and pH Value - Summary of Results

Tested in accordance with BS1377 : Part 3 : 1990, clause 5.3 and clause 9

Job No.	Project Name	Programme	
19659	Antwerp House, Kirby Street	Samples received	14/10/2015
		Schedule received	14/10/2015
Project No.	Client	Project started	14/10/2015
XL03964	Clarkebond	Testing Started	23/10/2015

Hole No.	Sample				Soil description	Dry Mass passing 2mm	SO3 Content	SO4 Content	pH	Remarks
	Ref	Top	Base	Type		%	g/l	g/l		
WS1	4	2.00		D	Yellowish brown and dark brown slightly sandy slightly gravelly silty CLAY with occasional fm brick fragments (gravel is fmc sub-angular to sub-rounded)	87	0.23	0.28	7.30	
WS1	5	2.50		D	Brown clayey very sandy GRAVEL (gravel is fmc sub-angular to rounded)	33	0.20	0.25	7.90	
WS1	6	3.50		D	Brownish grey clayey very gravelly SAND (gravel is fmc sub-angular to to rounded)	56	0.07	0.08	7.86	

Test Report by K4 SOILS LABORATORY
Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU
Tel: 01923 711 288
Email: James@k4soils.com

Checked and Approved

Initials J.P

Date: 29/10/2015

C Chemical Laboratory Results

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 516942-1

Date of Report: 23-Oct-2015

Customer: Clarke Bond (UK) Limited
Unit 17.1
The Leathermarket
11-13 Weston Street
London
SE1 3ER

Customer Contact: Katharine Barker

Customer Job Reference: XL03964
Customer Purchase Order: PO5825
Customer Site Reference: Antwerp House, Kirby Street
Date Job Received at SAL: 14-Oct-2015
Date Analysis Started: 15-Oct-2015
Date Analysis Completed: 22-Oct-2015

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

UKAS TESTING 1549

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Natasha Wild
Project Manager

Issued by :
Natasha Wild
Project Manager

SAL Reference: 516942
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
Clarke Bond Soil Suite (full)

				SAL Reference	**516942 001**	**516942 002**	**516942 003**
				Customer Sample Reference	**WS1**	**WS1**	**WS1**
				Bottom Depth	**0.3**	**0.7**	**1.8**
				Top Depth			**1.2**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Arsenic	T6	M40	2	mg/kg	**18**	**21**	**28**
Cadmium	T6	M40	1	mg/kg	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**20**	**20**	**18**
Copper	T6	M40	1	mg/kg	**180**	**120**	**230**
Lead	T6	M40	1	mg/kg	**660**	**1200**	**1000**
Mercury	T6	M40	1	mg/kg	**4**	**5**	**12**
Nickel	T6	M40	1	mg/kg	**24**	**23**	**21**
pH	T7	AR			**9.3**	**8.3**	**8.0**
Selenium	T6	M40	3	mg/kg	<3	<3	<3
Soil Organic Matter	T287	M40	0.1	%	**4.8**	**6.9**	**6.9**
SO4(2:1)	T6	AR	0.1	g/l	**0.5**	**0.3**	**0.3**
Zinc	T6	M40	1	mg/kg	**180**	**170**	**260**

SAL Reference: 516942
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
Clarke Bond TPH CWG

				SAL Reference	**516942 001**	**516942 002**	**516942 003**
				Customer Sample Reference	**WS1**	**WS1**	**WS1**
				Bottom Depth	**0.3**	**0.7**	**1.8**
				Top Depth			**1.2**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	<2	<2	<2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	<4	<4	<4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	<1	<1	<1
TPH (Aliphatic) total	T85	M105		mg/kg	N.D.	N.D.	N.D.
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	<1	<1	<1
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	<1	<1	<1
TPH (Aromatic) total	T85	M105		mg/kg	N.D.	N.D.	N.D.
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N.D.	N.D.	N.D.
TPH (C16-C35 aliphatic)	T8	M105	1	mg/kg	<1	<1	<1

SAL Reference: 516942
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
PAH US EPA 16 (B and K split)

				SAL Reference	**516942 001**	**516942 002**	**516942 003**
				Customer Sample Reference	**WS1**	**WS1**	**WS1**
				Bottom Depth	**0.3**	**0.7**	**1.8**
				Top Depth			**1.2**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1

SAL Reference: 516942
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**516942 001**	**516942 002**	**516942 003**
				Customer Sample Reference	**WS1**	**WS1**	**WS1**
				Bottom Depth	**0.3**	**0.7**	**1.8**
				Top Depth			**1.2**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1
Moisture @105C	T162	AR	0.1	%	**15**	**15**	**14**

SAL Reference: 516942
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624) (MCERTS)

				SAL Reference	**516942 001**	**516942 002**	**516942 003**
				Customer Sample Reference	**WS1**	**WS1**	**WS1**
				Bottom Depth	**0.3**	**0.7**	**1.8**
				Top Depth			**1.2**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,1-Dichloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,1-Dichloroethylene	T209	M105	50	µg/kg	<50	<50	<50
1,1-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<50	<50	<50
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<50	<50	<50
1,2-dibromoethane	T209	M105	50	µg/kg	<50	<50	<50
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50
1,2-Dichloroethane	T209	M105	50	µg/kg	<50	<50	<50
1,2-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<50	<50	<50
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50
1,3-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50
2,2-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50
2-Chlorotoluene	T209	M105	50	µg/kg	<50	<50	<50
4-Chlorotoluene	T209	M105	50	µg/kg	<50	<50	<50
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10
Bromobenzene	T209	M105	50	µg/kg	<50	<50	<50
Bromochloromethane	T209	M105	50	µg/kg	<50	<50	<50
Bromodichloromethane	T209	M105	50	µg/kg	<50	<50	<50
Bromoform	T209	M105	50	µg/kg	<50	<50	<50
Bromomethane	T209	M105	50	µg/kg	<50	<50	<50
Carbon tetrachloride	T209	M105	50	µg/kg	<50	<50	<50
Chlorobenzene	T209	M105	50	µg/kg	<50	<50	<50
Chlorodibromomethane	T209	M105	50	µg/kg	<50	<50	<50
Chloroethane	T209	M105	50	µg/kg	<50	<50	<50
Chloroform	T209	M105	50	µg/kg	<50	<50	<50
Chloromethane	T209	M105	50	µg/kg	<50	<50	<50
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<50	<50	<50
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50
Dibromomethane	T209	M105	50	µg/kg	<50	<50	<50
Dichlorodifluoromethane	T209	M105	50	µg/kg	<50	<50	<50
Dichloromethane	T209	M105	50	µg/kg	<50	<50	<50
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10
Isopropyl benzene	T209	M105	50	µg/kg	<50	<50	<50
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10
n-Propylbenzene	T209	M105	50	µg/kg	<50	<50	<50
O Xylene	T209	M105	10	µg/kg	<10	<10	<10
p-Isopropyltoluene	T209	M105	50	µg/kg	<50	<50	<50
S-Butylbenzene	T209	M105	50	µg/kg	<50	<50	<50
Styrene	T209	M105	50	µg/kg	<50	<50	<50
T-Butylbenzene	T209	M105	50	µg/kg	<50	<50	<50
Tetrachloroethene	T209	M105	50	µg/kg	<50	<50	<50
Toluene	T209	M105	10	µg/kg	<10	<10	<10
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<50	<50	<50
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50
Trichloroethene	T209	M105	50	µg/kg	<50	<50	<50
Trichlorofluoromethane	T209	M105	50	µg/kg	<50	<50	<50
Vinyl chloride	T209	M105	50	µg/kg	<50	<50	<50

Index to symbols used in 516942-1

Value	Description
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
13	Results have been blank corrected.
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T287	Calc TOC/0.58
T162	Grav (1 Dec) (105 C)
T2	Grav
T6	ICP/OES
T8	GC/FID
T7	Probe
T209	GC/MS(Head Space)(MCERTS)
T207	GC/MS (MCERTS)
T85	Calc
T206	GC/FID (MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Arsenic	T6	M40	2	mg/kg	M	001-003
Cadmium	T6	M40	1	mg/kg	M	001-003
Chromium	T6	M40	1	mg/kg	M	001-003
Copper	T6	M40	1	mg/kg	M	001-003
Lead	T6	M40	1	mg/kg	M	001-003
Mercury	T6	M40	1	mg/kg	M	001-003
Nickel	T6	M40	1	mg/kg	M	001-003
pH	T7	AR			M	001-003
Selenium	T6	M40	3	mg/kg	M	001-003
Soil Organic Matter	T287	M40	0.1	%	N	001-003
SO4(2:1)	T6	AR	0.1	g/l	N	001-003
Zinc	T6	M40	1	mg/kg	M	001-003
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-003
M/P Xylene	T209	M105	10	µg/kg	M	001-003
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-003
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-003
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-003
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	001-003
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	001-003
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	001-003
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	001-003
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	001-003
TPH (Aliphatic) total	T85	M105		mg/kg	N	001-003
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001-003
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-003
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-003
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	001-003
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	001-003
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	001-003
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	001-003
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	001-003
TPH (Aromatic) total	T85	M105		mg/kg	N	001-003
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001-003
TPH (C16-C35 aliphatic)	T8	M105	1	mg/kg	N	001-003
Naphthalene	T207	M105	0.1	mg/kg	M	001-003
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-003

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Acenaphthene	T207	M105	0.1	mg/kg	M	001-003
Fluorene	T207	M105	0.1	mg/kg	M	001-003
Phenanthrene	T207	M105	0.1	mg/kg	M	001-003
Anthracene	T207	M105	0.1	mg/kg	U	001-003
Fluoranthene	T207	M105	0.1	mg/kg	M	001-003
Pyrene	T207	M105	0.1	mg/kg	M	001-003
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-003
Chrysene	T207	M105	0.1	mg/kg	M	001-003
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-003
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-003
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-003
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-003
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-003
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-003
PAH(total)	T207	M105	0.1	mg/kg	U	001-003
Retained on 10mm sieve	T2	M40	0.1	%	N	001-003
Moisture @105C	T162	AR	0.1	%	N	001-003
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	001-003
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	001-003
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	001-003
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	001-003
1,1-Dichloroethane	T209	M105	50	µg/kg	M	001-003
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	001-003
1,1-Dichloropropene	T209	M105	50	µg/kg	M	001-003
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	001-003
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	001-003
1,2-dibromoethane	T209	M105	50	µg/kg	M	001-003
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	001-003
1,2-Dichloroethane	T209	M105	50	µg/kg	M	001-003
1,2-Dichloropropane	T209	M105	50	µg/kg	M	001-003
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	001-003
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	001-003
1,3-Dichloropropane	T209	M105	50	µg/kg	M	001-003
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	001-003
2,2-Dichloropropane	T209	M105	50	µg/kg	U	001-003
2-Chlorotoluene	T209	M105	50	µg/kg	U	001-003
4-Chlorotoluene	T209	M105	50	µg/kg	U	001-003
Benzene	T209	M105	10	µg/kg	M	001-003
Bromobenzene	T209	M105	50	µg/kg	M	001-003
Bromochloromethane	T209	M105	50	µg/kg	M	001-003
Bromodichloromethane	T209	M105	50	µg/kg	M	001-003
Bromoform	T209	M105	50	µg/kg	M	001-003
Bromomethane	T209	M105	50	µg/kg	U	001-003
Carbon tetrachloride	T209	M105	50	µg/kg	M	001-003
Chlorobenzene	T209	M105	50	µg/kg	M	001-003
Chlorodibromomethane	T209	M105	50	µg/kg	M	001-003
Chloroethane	T209	M105	50	µg/kg	M	001-003
Chloroform	T209	M105	50	µg/kg	M	001-003
Chloromethane	T209	M105	50	µg/kg	U	001-003
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	001-003
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001-003
Dibromomethane	T209	M105	50	µg/kg	M	001-003
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	001-003
Dichloromethane	T209	M105	50	µg/kg	U	001-003
EthylBenzene	T209	M105	10	µg/kg	M	001-003
Isopropyl benzene	T209	M105	50	µg/kg	M	001-003
n-Propylbenzene	T209	M105	50	µg/kg	M	001-003
O Xylene	T209	M105	10	µg/kg	M	001-003
p-Isopropyltoluene	T209	M105	50	µg/kg	M	001-003
S-Butylbenzene	T209	M105	50	µg/kg	M	001-003
Styrene	T209	M105	50	µg/kg	U	001-003
T-Butylbenzene	T209	M105	50	µg/kg	M	001-003
Tetrachloroethene	T209	M105	50	µg/kg	M	001-003
Toluene	T209	M105	10	µg/kg	M	001-003
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	001-003
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	001-003
Trichloroethene	T209	M105	50	µg/kg	M	001-003
Trichlorofluoromethane	T209	M105	50	µg/kg	M	001-003
Vinyl chloride	T209	M105	50	µg/kg	M	001-003

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Hadfield Street
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Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 517041-1

Date of Report: 23-Oct-2015

Customer: Clarke Bond (UK) Limited
Unit 17.1
The Leathermarket
11-13 Weston Street
London
SE1 3ER

Customer Contact: Katharine Barker

Customer Job Reference: XL03964
Customer Purchase Order: PO5852
Customer Site Reference: Antwerp House, Kirby Street
Date Job Received at SAL: 14-Oct-2015
Date Analysis Started: 15-Oct-2015
Date Analysis Completed: 22-Oct-2015

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

UKAS TESTING 1549

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Natasha Wild
Project Manager

Issued by :
Natasha Wild
Project Manager

Waste Acceptance Criteria

Customer Sample Reference : WS1
SAL Sample Reference : 517041 001
Project Site : Antwerp House, Kirby Street
Customer Reference : XL03964
Date Sampled : 09-OCT-2015
Bottom Depth : 0.3
Type : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**4.7**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	**0.073**	1.0		
pH	Probe			M	**10.0**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**2.3**	3.0	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	**9**	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.015**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.047**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.055**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**48**	800.0	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.050**	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.023**	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**64**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	**0.91**	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	<0.0030	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.054**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.035**	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**1400**	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc WAC ICP/MS	1000	mg/kg	N	**3600**	4000.0	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	<0.020	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

Waste Acceptance Criteria

Customer Sample Reference : WS1
SAL Sample Reference : 517041 002
Project Site : Antwerp House, Kirby Street
Customer Reference : XL03964
Date Sampled : 09-OCT-2015
Bottom Depth : 1.8
Top Depth : 1.2
Type : Sandy Soil

Soil					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Acid Neutralising Capacity (pH 4)	Titration	2	Mol/kg	N	<2			
Acid Neutralising Capacity (pH 7)	Titration	2	Mol/kg	N	<2			
BTEX (Sum)	Calc	0.040	mg/kg	U	<0.040	6.0		
Loss on Ignition	Grav	0.1	%	N	**6.5**			10.0
PAH (Sum)	Calc	1.6	mg/kg	N	<1.6	100.0		
PCB EC7 (Sum)	Calc	0.0035	mg/kg	U	(2) <0.0035	1.0		
pH	Probe			M	**8.2**		> 6.0	
Total Organic Carbon	OX/IR	0.1	%	N	**3.7**	**3.0**	5.0	6.0
Total Petroleum Hydrocarbons C10-C40 (Sum)	Calc	1	mg/kg	N	<1	500.0		

Data for BS EN 12457-2 (10:1)					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony	Calc WAC ICP/MS	0.010	mg/kg	N	**0.011**	0.06	0.7	5.0
Arsenic	Calc WAC ICP/MS	0.0020	mg/kg	N	**0.034**	0.5	2.0	25.0
Barium	Calc WAC ICP/MS	0.010	mg/kg	N	**0.079**	20.0	100.0	300.0
Cadmium	Calc WAC ICP/MS	0.00020	mg/kg	N	<0.00020	0.04	1.0	5.0
Chloride	Calc (W)	10	mg/kg	N	**28**	800.0	15000.0	25000.0
Chromium	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.5	10.0	70.0
Copper	Calc WAC ICP/MS	0.0050	mg/kg	N	<0.0050	2.0	50.0	100.0
Dissolved Organic Carbon	Calc	10	mg/kg	N	**47**	500.0	800.0	1000.0
Fluoride	Calc (W)	0.50	mg/kg	N	<0.50	10.0	150.0	500.0
Lead	Calc WAC ICP/MS	0.0030	mg/kg	N	**0.0086**	0.5	10.0	50.0
Mercury	Calc WAC ICP/MS	0.00050	mg/kg	N	<0.00050	0.01	0.2	2.0
Molybdenum	Calc WAC ICP/MS	0.010	mg/kg	N	**0.088**	0.5	10.0	30.0
Nickel	Calc WAC ICP/MS	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols (Total-Mono)	Calc	1.0	mg/kg	N	<1.0	1.0		
Selenium	Calc WAC ICP/MS	0.0050	mg/kg	N	**0.017**	0.1	0.5	7.0
Sulphate	Calc (W)	5	mg/kg	N	**620**	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc WAC ICP/MS	1000	mg/kg	N	**1500**	4000.0	60000.0	100000.0
Zinc	Calc WAC ICP/MS	0.020	mg/kg	N	**0.024**	4.0	50.0	200.0

Following the recommendation from the Environment Agency (England and Wales)*, the leachate preparation in this report has been carried out to BS EN 12457-2 : One Stage batch test at a liquid to solid ratio of 10 l/kg. This is also compliant with Schedule 10 of the Environmental Permitting Regulations 2010.

Note : This is the minimum amount of testing which is required.

Further testing may be required if :

- evidence of immediately leachable parameters becomes available.
- evidence to indicate that the sample could be classified as hazardous under H1-H14 of the Waste(England and Wales) Regulations 2011(as amended) becomes available.

Acceptance of waste at landfill is always at the discretion of the Landfill Operator.

*** Waste Sampling and Testing for Disposal at Landfill, EBPRI 11507B, Environment Agency (England and Wales) March 2013**

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**517041 001**	**517041 002**
				Customer Sample Reference	**WS1**	**WS1**
				Test Sample	**AR**	**AR**
				Top Depth		**1.2**
				Bottom Depth	**0.3**	**1.8**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Moisture @105C	Grav (1 Dec) (105 C)	0.1	%	N	**13**	**7.8**

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
TPH

				SAL Reference	**517041 001**	**517041 002**
				Customer Sample Reference	**WS1**	**WS1**
				Test Sample	**M105**	**M105**
				Top Depth		**1.2**
				Bottom Depth	**0.3**	**1.8**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	M	**7**	<1
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	**2**	<1

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
BTEX

				SAL Reference	**517041 001**	**517041 002**
				Customer Sample Reference	**WS1**	**WS1**
				Test Sample	**M105**	**M105**
				Top Depth		**1.2**
				Bottom Depth	**0.3**	**1.8**
				Date Sampled	**09-OCT-2015**	**09-OCT-2015**
				Type	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Benzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	(13) <10	(13) <10
EthylBenzene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Meta/Para-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Ortho-Xylene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10
Toluene	GC/MS(Head Space)(MCERTS)	10	µg/kg	M	<10	<10

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
PCB EC7

SAL Reference	**517041 001**	**517041 002**
Customer Sample Reference	**WS1**	**WS1**
Test Sample	**M105**	**M105**
Top Depth		**1.2**
Bottom Depth	**0.3**	**1.8**
Date Sampled	**09-OCT-2015**	**09-OCT-2015**
Type	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol		
Polychlorinated biphenyl BZ#28	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**44**	(2) <0.50
Polychlorinated biphenyl BZ#52	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**18**	(2) <0.50
Polychlorinated biphenyl BZ#101	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**4.4**	(2) <0.50
Polychlorinated biphenyl BZ#118	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**3.0**	(2) <0.50
Polychlorinated biphenyl BZ#153	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**1.3**	(2) <0.50
Polychlorinated biphenyl BZ#138	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**1.8**	(2) <0.50
Polychlorinated biphenyl BZ#180	GC/MS (HR) (MCERTS)	0.05	µg/kg	M	**0.55**	(2) <0.50

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

SAL Reference	**517041 001**	**517041 002**
Customer Sample Reference	**WS1**	**WS1**
Test Sample	**M105**	**M105**
Top Depth		**1.2**
Bottom Depth	**0.3**	**1.8**
Date Sampled	**09-OCT-2015**	**09-OCT-2015**
Type	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol		
Naphthalene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Acenaphthylene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1
Acenaphthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Fluorene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Phenanthrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Anthracene	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1
Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Benzo(a)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Chrysene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Benzo(b/k)Fluoranthene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Benzo(a)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Indeno(123-cd)Pyrene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Dibenzo(ah)Anthracene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Benzo(ghi)Perylene	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1
Polyaromatic Hydrocarbons (Total)	GC/MS (MCERTS)	0.1	mg/kg	U	<0.1	<0.1
Coronene	GC/MS	0.1	mg/kg	N	<0.1	<0.1
Phenol	GC/MS (MCERTS)	0.1	mg/kg	M	<0.1	<0.1

SAL Reference: 517041
Project Site: Antwerp House, Kirby Street
Customer Reference: XL03964

Leachate to BS EN 12457-2 (10:1) Analysed as Water

Waste Acceptance Criteria

SAL Reference	**517041 001**	**517041 002**
Customer Sample Reference	**WS1**	**WS1**
Test Sample	**10:1**	**10:1**
Top Depth		**1.2**
Bottom Depth	**0.3**	**1.8**
Date Sampled	**09-OCT-2015**	**09-OCT-2015**
Type	**Sandy Soil**	**Sandy Soil**

Determinand	Method	LOD	Units	Symbol		
Antimony (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**2**	**1**
Arsenic (Dissolved)	ICP/MS (Filtered)	0.2	µg/l	U	**4.7**	**3.4**
Barium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**6**	**8**
Cadmium (Dissolved)	ICP/MS (Filtered)	0.02	µg/l	U	<0.02	<0.02
Chloride	Discrete Analyser	1	mg/l	U	**5**	**3**
Chromium (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	**5**	<1
Copper (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**2.3**	<0.5
Dissolved Organic Carbon	OX/IR	1	mg/l	N	**6**	**5**
Electrical Conductivity	Probe	10	µS/cm	N	**600**	**260**
Fluoride	Discrete Analyser	0.05	mg/l	U	**0.09**	<0.05
Lead (Dissolved)	ICP/MS (Filtered)	0.3	µg/l	U	<0.3	**0.9**
Mercury (Dissolved)	ICP/MS (Filtered)	0.05	µg/l	U	<0.05	<0.05
Molybdenum (Dissolved)	ICP/MS (Filtered)	1	µg/l	N	**5**	**9**
Nickel (Dissolved)	ICP/MS (Filtered)	1	µg/l	U	<1	<1
Phenols (Total-Mono)	Colorimetry	0.1	mg/l	U	<0.1	<0.1
Selenium (Dissolved)	ICP/MS (Filtered)	0.5	µg/l	U	**3.5**	**1.7**
Sulphate	Discrete Analyser	0.5	mg/l	U	**140**	**62**
Total Dissolved Solids	Grav	100	mg/l	N	**360**	**150**
Zinc (Dissolved)	ICP/MS (Filtered)	2	µg/l	U	<2	**2**

Index to symbols used in 517041-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
10:1 S	Data for BS EN 12457-2 (10:1)
AR	As Received
10:1	Leachate to BS EN 12457-2 (10:1)
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
13	Results have been blank corrected.
2	LOD Raised Due to Matrix Interference
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

D Hazwaste Assessment

clarkebond
ENGINEERING AND MANAGEMENT CONSULTANTS

HazWasteOnline™

Waste Classification Report

TD722-MQ6FF-CEDE4

Job name

Antwerp House, Kirby Street

Waste Stream

CB updated 2015

Comments

Project

XL03964

Site

Antwerp House, Kirby Street

Classified by

Name:
Grogan, Brian
Date:
29/10/2015 15:46 UTC
Telephone:
020 7939 0959

Company:
Clarkebond (UK) Ltd
Unit 17.1, The Leathermarket
11-13 Weston Street
London
SE1 3ER

Report

Created by: Grogan, Brian
Created date: 29/10/2015 15:46 UTC

Job summary

Classification of sample: Sample 1[1]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
Sample 1[1]
Sample Depth:
0.3 m
Moisture content: **15%**
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 15%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 18 mg/kg, converted to compound conc.:20.666 mg/kg or 0.00207%)
cadmium sulfide: (Cation conc. entered: 1 mg/kg, converted to compound conc.:1.118 mg/kg or 0.000112%, Note 1 conc.: 0.000087%)
copper (I) oxide: (Cation conc. entered: 180 mg/kg, converted to compound conc.:176.226 mg/kg or 0.0176%)
lead chromate: (Cation conc. entered: 660 mg/kg, converted to compound conc.:895.198 mg/kg or 0.0895%, Note 1 conc.: 0.0574%)
mercury dichloride: (Cation conc. entered: 4 mg/kg, converted to compound conc.:4.708 mg/kg or 0.000471%)
nickel dihydroxide: (Cation conc. entered: 24 mg/kg, converted to compound conc.:32.963 mg/kg or 0.0033%)
pH: (Whole conc. entered as: 9.3 pH, converted to conc.:9.3 pH or 9.3 pH)
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: 3 mg/kg, converted to compound conc.:6.662 mg/kg or 0.000666%)
zinc chromate: (Cation conc. entered: 180 mg/kg, converted to compound conc.:434.214 mg/kg or 0.0434%)
naphthalene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
acenaphthylene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
acenaphthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
fluorene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
phenanthrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[a]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[b]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[k]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
indeno[123-cd]pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
dibenz[a,h]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[ghi]perylene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "cadmium sulfide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "copper (I) oxide"

Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "lead chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "mercury dichloride"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "naphthalene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "acenaphthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "fluorene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "anthracene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[k]fluoranthene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "dibenz[a,h]anthracene"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "benzo[ghi]perylene"

Note 1 , used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"
Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"
Test: "HP 7 on Carc. 1B; H350, Carc. 1A; H350, Carc. 1B; H350i, Carc. 1A; H350i" for determinand: "cadmium sulfide"
Test: "HP 10 on Repr. 1A; H360, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1B; H360Fd, Repr. 1B; H360Df, Repr. 1A; H360Df" for determinand: "lead chromate"
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"
Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"
Test: "HP 14 on R50, R52, R53, R50/53, R51/53, R52/53" for determinand: "cadmium sulfide"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"
determinand: "lead chromate"

Note A , used on:

determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
determinand: "zinc chromate"

Classification of sample: Sample 2[1]

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample Name:
Sample 2[1]
Sample Depth:
0.7 m
Moisture content: **15%**
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

lead chromate: (Note 1 conc.: 0.104%)

Determinands (Moisture content: 15%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 21 mg/kg, converted to compound conc.:24.11 mg/kg or 0.00241%)
cadmium sulfide: (Cation conc. entered: 1 mg/kg, converted to compound conc.:1.118 mg/kg or 0.000112%, Note 1 conc.: 0.000087%)
copper (I) oxide: (Cation conc. entered: 120 mg/kg, converted to compound conc.:117.484 mg/kg or 0.0117%)
lead chromate: (Cation conc. entered: 1200 mg/kg, converted to compound conc.:1627.633 mg/kg or 0.163%, Note 1 conc.: 0.104%)
mercury dichloride: (Cation conc. entered: 5 mg/kg, converted to compound conc.:5.885 mg/kg or 0.000588%)
nickel dihydroxide: (Cation conc. entered: 23 mg/kg, converted to compound conc.:31.59 mg/kg or 0.00316%)
pH: (Whole conc. entered as: 8.3 pH, converted to conc.:8.3 pH or 8.3 pH)
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: 3 mg/kg, converted to compound conc.:6.662 mg/kg or 0.000666%)
zinc chromate: (Cation conc. entered: 170 mg/kg, converted to compound conc.:410.091 mg/kg or 0.041%)
naphthalene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
acenaphthylene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
acenaphthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
fluorene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
phenanthrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[a]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[b]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[k]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
indeno[123-cd]pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
dibenz[a,h]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)
benzo[ghi]perylene: (Whole conc. entered as: 0.1 mg/kg or 0.0000087%)

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "mercury dichloride"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "naphthalene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "acenaphthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluorene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[k]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "dibenz[a,h]anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[ghi]perylene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Note 1 , used on:

Test: "HP 5 on STOT SE 1; H370, STOT RE 1; H372" for determinand: "cadmium sulfide"
Test: "HP 5 on STOT SE 2; H371, STOT RE 2; H373" for determinand: "cadmium sulfide"
Test: "HP 6 on Acute Tox. 4; H302" for determinand: "cadmium sulfide"
Test: "HP 7 on Carc. 1A; H350, Carc. 1A; H350i, Carc. 1B; H350, Carc. 1B; H350i" for determinand: "cadmium sulfide"
Test: "HP 10 on Repr. 1A; H360, Repr. 1A; H360F, Repr. 1A; H360D, Repr. 1A; H360FD, Repr. 1A; H360Fd, Repr. 1A; H360Df, Repr. 1B; H360, Repr. 1B; H360F, Repr. 1B; H360D, Repr. 1B; H360FD, Repr. 1B; H360Fd, Repr. 1B; H360Df" for determinand: "lead chromate"
Test: "HP 10 on Repr. 2; H361, Repr. 2; H361f, Repr. 2; H361d, Repr. 2; H361fd" for determinand: "cadmium sulfide"
Test: "HP 11 on Muta. 2; H341" for determinand: "cadmium sulfide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"
determinand: "lead chromate"

Note A , used on:

determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
determinand: "zinc chromate"

Classification of sample: Sample 3[1]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
Sample 3[1]
Sample Depth:
1.8 m
Moisture content: **14%**
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands (Moisture content: 14%, dry weight correction)

arsenic trioxide: (Cation conc. entered: 28 mg/kg, converted to compound conc.:32.429 mg/kg or 0.00324%)
cadmium sulfide: (Cation conc. entered: 1 mg/kg, converted to compound conc.:1.127 mg/kg or 0.000113%, Note 1 conc.: 0.0000877%)
copper (I) oxide: (Cation conc. entered: 230 mg/kg, converted to compound conc.:227.153 mg/kg or 0.0227%)
lead chromate: (Cation conc. entered: 1000 mg/kg, converted to compound conc.:1368.259 mg/kg or 0.137%, Note 1 conc.: 0.0877%)
mercury dichloride: (Cation conc. entered: 12 mg/kg, converted to compound conc.:14.247 mg/kg or 0.00142%)
nickel dihydroxide: (Cation conc. entered: 21 mg/kg, converted to compound conc.:29.096 mg/kg or 0.00291%)
pH: (Whole conc. entered as: 8 pH, converted to conc.:8 pH or 8 pH)
selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex: (Cation conc. entered: 3 mg/kg, converted to compound conc.:6.72 mg/kg or 0.000672%)
zinc chromate: (Cation conc. entered: 260 mg/kg, converted to compound conc.:632.7 mg/kg or 0.0633%)
naphthalene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
acenaphthylene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
acenaphthene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
fluorene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
phenanthrene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
benzo[a]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
benzo[b]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
benzo[k]fluoranthene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
benzo[a]pyrene; benzo[def]chrysene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
indeno[123-cd]pyrene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
dibenz[a,h]anthracene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)
benzo[ghi]perylene: (Whole conc. entered as: 0.1 mg/kg or 0.00000877%)

Notes utilised in assessment

C14: Step 5
"identify whether any individual ecotoxic substance is present at or above a cut-off value ..." , used on:

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "arsenic trioxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "copper (I) oxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "lead chromate"

Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "mercury dichloride"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "nickel dihydroxide"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "zinc chromate"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "naphthalene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "acenaphthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluorene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "phenanthrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "pyrene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[b]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[k]fluoranthene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[a]pyrene; benzo[def]chrysene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "dibenz[a,h]anthracene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "benzo[ghi]perylene"
Test: "HP 14 on R50, R52, R50/53, R51/53, R53, R52/53" for determinand: "cadmium sulfide"

Determinand notes

Note 1 , used on:

determinand: "cadmium sulfide"
determinand: "lead chromate"

Note A , used on:

determinand: "selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex"
determinand: "zinc chromate"

Appendix A: Classifier defined and non CLP determinands

pH

Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25/05/2015
Risk Phrases: None.
Hazard Statements: None.

acenaphthylene (CAS Number: 208-96-8)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R22, R26, R27, R36, R37, R38
Hazard Statements: Acute Tox. 4; H302, Acute Tox. 1; H330, Acute Tox. 1; H310, Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315

acenaphthene (CAS Number: 83-32-9)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R36, R37, R38, N; R50/53, N; R51/53
Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Aquatic Chronic 2; H411

fluorene (CAS Number: 86-73-7)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: N; R50/53
Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

phenanthrene (CAS Number: 85-01-8)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: R22, R36, R37, R38, R40, R43, N; R50/53
Hazard Statements: Acute Tox. 4; H302, Eye Irrit. 2; H319, STOT SE 3; H335, Carc. 2; H351, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410, Skin Irrit. 2; H315

anthracene (CAS Number: 120-12-7)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17/07/2015
Risk Phrases: R36, R37, R38, R43, N; R50/53
Hazard Statements: Eye Irrit. 2; H319, STOT SE 3; H335, Skin Irrit. 2; H315, Skin Sens. 1; H317, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

fluoranthene (CAS Number: 206-44-0)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Risk Phrases: Xn; R22, N; R50/53
Hazard Statements: Acute Tox. 4; H302, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

pyrene (CAS Number: 129-00-0)

Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21/08/2015
Risk Phrases: Xi; R36/37/38, N; R50/53
Hazard Statements: Skin Irrit. 2; H315, Eye Irrit. 2; H319, STOT SE 3; H335, Aquatic Acute 1; H400, Aquatic Chronic 1; H410

indeno[123-cd]pyrene (CAS Number: 193-39-5)

Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06/08/2015
Risk Phrases: R40
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (CAS Number: 191-24-2)

Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23/07/2015
Risk Phrases: N; R50/53
Hazard Statements: Aquatic Acute 1; H400, Aquatic Chronic 1; H410

Appendix B: Notes

C14: Step 5

from section: WM3: C14 in the document: "WM3 - Waste Classification"

"identify whether any individual ecotoxic substance is present at or above a cut-off value ..."

Note 1

from section: 1.1.3.2, Annex VI in the document: "CLP Regulations"

"The concentration stated or, in the absence of such concentrations, the generic concentrations of this Regulation (Table 3.1) or the generic concentrations of Directive 1999/45/EC (Table 3.2), are the percentages by weight of the metallic element calculated with reference to the total weight of the mixture."

Note A

from section: 1.1.3.1, Annex VI in the document: "CLP Regulations"

"Without prejudice to Article 17(2), the name of the substance must appear on the label in the form of one of the designations given in Part 3. In Part 3, use is sometimes made of a general description such as '... compounds' or '... salts'. In this case, the supplier is required to state on the label the correct name, due account being taken of section 1.1.1.4."

Appendix C: Version

Classification utilises the following:

- CLP Regulations - Regulation 1272/2008/EC of 16 December 2008
- 1st ATP - Regulation 790/2009/EC of 10 August 2009
- 2nd ATP - Regulation 286/2011/EC of 10 March 2011
- 3rd ATP - Regulation 618/2012/EU of 10 July 2012
- 4th ATP - Regulation 487/2013/EU of 8 May 2013
- Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
- 5th ATP - Regulation 944/2013/EU of 2 October 2013
- 6th ATP - Regulation 605/2014/EU of 5 June 2014
- WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
- Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
- WM3 - Waste Classification - May 2015
- 7th ATP - Regulation 2015/1221/EU of 24 July 2015
- POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
- 1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010
- 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

HazWasteOnline Engine: WM3 1st Edition, May 2015
HazWasteOnline Engine Version: 2015.296.2975.5969 (23 Oct 2015)
HazWasteOnline Database: 2015.296.2975.5969 (23 Oct 2015)