Card Geotechnics Limited
Providing Ground Solutions

Urbanest UK Limited

103 Camley Street, London

Updated Remediation Method Statement – Revision 1

July, 2012

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1. INTRODUCTION

Urbanest UK Limited (Urbanest) is proposing to redevelop a site currently occupied by two warehouses, which is situated between Camley Street and the Regent's Canal, in the London Borough of Camden. The anticipated development will comprise multi-storey student accommodation of up to 12 storeys, with 'incubation space' for student business enterprise, cycle parking and a café in a lower ground floor level. Areas of green space will be incorporated adjacent to the canal towpath.

Card Geotechnics Limited (CGL) was appointed by Urbanest to undertake a desk study prior to seeking planning permission for the proposed development. This work was reported as a *Desk study report (DSR)*[1] in November 2010 (Revised August 2011) and concluded that, as a result of various potential sources of contamination on site, there was a generally medium risk to the end development and its users, with one area of higher risk associated with underground storage tanks.

This degree of risk was assigned due to the site's previous land use as part of the *Midland Railway* infrastructure. From circa 1875 to 1980, a large *Goods Depot* extended over the vast majority of the site. More recently, the site has been occupied by warehouses and is also used as for taxi parking. In addition, the site is noted to have at least five Underground Storage Tanks (USTs) on site as well as an electrical substation adjacent to the southern boundary of the site.

As part of the earlier *Desk study report*, a review of two previous reports was completed. The first report detailed the findings of an intrusive ground investigation undertaken by Albury SI[2] in 2000. The second report was completed by Price and Myers[3] and comprised an appraisal of the ground investigation. The intrusive investigation has indicated a thickness of Made Ground of up to 6.30m to be present over the underlying London Clay Formation.

Subsequent to the completion of the *DSR*, a ground investigation was completed by CGL in March 2012, and consisted of 21 window samples, 4 deep cable percussive boreholes and a series of dynamic probe tests. Monitoring wells were also installed on site to allow for

[1] CGL. (2010). *103 Camley Street, London*, *Desk study report*. CG/5521. November, 2010.
[2] Albury SI Limited. (2000). *103 Camley Street, London NW1*. 00/4901/NVM/CM/rpt. December 2000.
[3] Price and Myers Consulting Engineers. (2000). *103 Camley Street, London NW1 – Engineering appraisal of recent site investigations. 10896/PAH/so.*

the completion of soil gas and groundwater monitoring. The findings were reported in a *Geotechnical and Geoenvironmental Interpretative Report (GGIR)*[4] in June 2012.

The investigation was largely confirmatory of the original findings outlined within the Albury SI report with regard to ground conditions. Chemical analysis of the soils indicated that generally contamination is present at acceptable concentrations in relation to assessment criteria for a "*Commercial"* end land use.

The development proposals incorporate the design of a lower ground floor level that would be used for incubation/amenity space. The building footprint will cover the majority of the site and hence most of the Made Ground currently present on site will be removed as part of the construction process. Therefore, the overall risk to future occupiers was anticipated to be minimal.

However, on the basis that bulk excavation of the Made Ground will be required to accommodate the lower ground floor level and given the presence of underground storage tanks on site, CGL has been appointed to prepare a *Remediation method statement* (*RMS*) to set out the measures that will be required to protect the users of the development, the general public and the environment during the construction and operation stages. It also sets out the basis of the verification procedures that will be in place to confirm compliance with the remediation methodology.

[4] CGL. (2012) *103 Camley Street, London Geotechnical and geoenvironmental report*. CG/5521C. June, 2012.

2. SITE CONTEXT

2.1 General

For convenience, a summary of the *Desk study report*[1] and salient information from the CGL present ground investigation is presented below. However, for further details, reference should be made to the original reports.

2.2 Site location and description

The site is located off Camley Street in the London Borough of Camden to the north, northwest of Saint Pancras International Station. The Ordnance Survey Grid Reference for the site location is 529720, 183780. The site location is presented in Figure 1.

The site, which is triangular in shape, is located within a predominantly industrial/commercial area. The site is bounded to the north by residential dwellings and the Jubilee Outdoor Education Centre, to the east by Camley Street and to the west by the Regent's Canal. To the south of the site there is an electrical substation.

The site is principally occupied on the eastern perimeter by two brick built structures that are currently used as warehouses. There are numerous temporary container units, some of which are presumed to be used for storage and the others for office space. The remainder of the site is utilised as a base for taxis. The site lies at a higher level than the Regent's Canal, and is supported on the western boundary by a 6m (approx.) high wall retaining the site level.

Information received from London Fire Brigade Planning Authority indicates that a 22,730 litre capacity petrol tank was licensed on site in 1984 for three years. This was then filled with water in 1989. In addition, reference is also made to two tanks containing gas oil, and a further two tanks containing diesel. No records are held on file pertaining to any known leaks or spills on site.

During the recent ground investigation, the presence of five underground storage tanks was confirmed by means of a Ground Penetrating Radar (GPR) survey.

The current site layout (with the locations of the exploratory holes from the recent ground investigation) is presented as Figure 2.

2.3 Site history

The site history was traced using Ordnance Survey maps supplied by Landmark. A full description of the site history may be found within Section 3.2 of the *Desk study report*[1]. To summarise; the site was raised to form a level platform to accommodate part of the *Midland Railway* infrastructure from circa 1875 to 1980 when a large *Goods Depot* extended over the vast majority of the site. From the 1980s, the site became principally occupied by two warehouses.

2.4 Ground conditions and hydrogeology

The ground conditions identified by CGL are summarised in Table 1 below, however, reference should be made to the borehole logs provided within the original report.

Table 1: Summary of ground conditions

Strata	Depth to top of stratum (m bgl)	Thickness (m)
Reinforced concrete and/or brick paviours. [MADE GROUND/HARDSTANDING]	0.0	0.1-0.5
Consisting of varying horizons of sandy gravel, gravelly sand and/or gravelly clay. Gravels are of flint, brick, concrete, glass, clinker, coal, metal, wood and ceramics. [MADE GROUND] *(*Lesser thicknesses of Made Ground are recorded due to refusal being met on brick/concrete obstructions)*	0.10-0.50	* Up to 6.00
Firm orange grey brown mottled silty sandy CLAY (weathered London Clay) becoming stiff to very stiff dark grey sandy CLAY with depth. In BH3 and BH4 siltstone was noted at depths of 22.65m and 19.80m respectively. Sand partings were also noted in these boreholes at depths of 24.1m and 21.35m respectively. [LONDON CLAY FORMATION]	4.20-6.20	Proven to 35mbgl

During window sampling, perched water was noted in the Made Ground at depths between 3.60m and 5.70mbgl. In the boreholes, groundwater was generally not encountered. However, in the deepest boreholes (BH3 and BH4), groundwater was encountered within the sandy partings noted at depth. Therefore, these boreholes were installed with a deep standpipe (as well as a shallower standpipe with a response zone through the Made Ground), in order that the groundwater could be monitored.

Six monitoring rounds were completed subsequent to the intrusive investigation; the groundwater levels are summarised in Table 2 below:

Table 2: Groundwater level summary

Exploratory hole	Groundwater (mbgl)					
	26.04.12	**02.05.12**	**10.05.12**	**17.05.12**	**24.05.12**	**31.05.12**
BH1	5.09	4.98	5.11	5.14	5.16	5.16
BH2	4.24	3.28*	3.28	3.38	3.53	3.52
BH3 (Shallow)	NR	4.82	4.74	4.91	4.92	4.92
BH3 (Deep)	NR	9.82	6.83	6.32	6.42	6.40
BH4 (Shallow)	4.28	4.32	4.52	4.55	4.60	4.68
BH4 (Deep)	5.90	5.43	5.62	5.59	5.67	5.70

Notes:

NR Not recorded due to problem with monitoring well

* Standing water from the surface went into the standpipe when the bung was removed

The groundwater vulnerability map of the area, as indicated on www.environment-agency.gov.uk, shows that the site is underlain by Non Productive strata (London Clay), which comprises relatively impermeable strata, which is of negligible significance for potable water or river base supply. These are generally aquifers formerly classified as non aquifers. The site does not lie within a Source Protection Zone.

The nearest abstraction point to the site is 137m south, which permits the removal of surface water from the Grand Union Canal for environmental purposes. The nearest groundwater abstraction point is 296m northeast, however, this is for industrial purposes.

3. SUMMARY OF CONTAMINATION

3.1 Soil contamination

Representative samples from the recent CGL ground investigation were selected for laboratory analysis. The test results were compared against the published Soil Guideline Values (SGVs) and Generic Assessment Criteria (GAC) derived by CGL for the "commercial" land-use category to assess the risk to human health from chemical contamination. Whilst the site is being redeveloped for student residence, the majority of the Made Ground will be removed to allow for a lower ground level to be constructed. At this level, it is proposed that 'incubation spaces' will be provided for student business enterprises. In addition, there will be no areas for private gardens and so the "commercial" land use category was considered appropriate for the site in question.

The results of a statistical analysis completed within the earlier *GGIR* indicated that there were no unacceptable concentrations of contamination across the site in comparison to the assessment criteria for the chosen land use scenario.

Traces of TPH and benzene were noted in some exploratory hole locations that were advanced near to the underground fuel storage tanks. Whilst the concentrations were below the associated assessment criteria, it was noted that this may be indicative of historic leaks/spills from the tanks.

Selected samples were submitted for PCB analysis given the presence of an electrical substation off site. The results that were returned were all below the limits of detection, therefore, the risk from this source is considered to be minimal.

In addition, a sample of fibrous material was taken from one of the window sample locations and was submitted for asbestos identification. The laboratory positively identified chrysotile fibres within the sample. Given the form and type of asbestos encountered and the isolated occurrence, this was considered to be a low risk to human health although it was noted that there may be implications for waste disposal if asbestos was encountered in quantities exceeding 0.1% of a given volume of waste.

3.2 Mobile contamination

The results of the leachate analyses indicated that, where tested, chemical determinands were generally present at acceptable concentrations below the Environmental Quality Standards and Drinking Water Values. However, lead was present at concentrations that exceeded the DWV in two of the samples tested. Lead was detected at a maximum concentration of 21µg/l, which exceeds the DWV of 10µg/l but not the EQS. However, as the hydrogeological and hydrological setting of the site is not greatly sensitive, the risk from this contaminant to controlled waters was considered to be minimal.

3.3 Soil gas

Following on-site gas monitoring, positive and negative flow rates were detected on site, with the maximum flow being recorded in BH2 at 1.8l/hr. Oxygen was recorded in the range of 19.0 to 21.0%. Methane was not detected on site. Carbon dioxide was recorded in the range of 0.0 to 0.5% by volume in air. A Photo Ionisation Detector (PID) was used to detect the presence of Volatile Organic Compounds (VOCs). The readings were negligible and were all 0.0 parts per million.

3.4 Conceptual site model

Generally the risk to human health and to controlled waters was considered to be low. A conceptual site model was provided within the earlier *GGIR*, which should be referenced for detailed information. Otherwise, a diagrammatic version of the CSM is provided as Figure 3.

4. REMEDIATON METHODOLOGY

4.1 General

Made Ground has been confirmed to be in the order of 6.0mbgl and comprises relatively low concentrations of residual inorganic and organic contaminants and isolated asbestos. Traces of hydrocarbons and benzene were noted in soils present in close proximity to the underground storage tanks on site, which may be indicative of historic leaks/spills.

Based on the foregoing, the overall risk deemed appropriate for this site is considered to be generally low, but higher in the area of the underground tanks. In view of the anticipated removal of Made Ground from the majority of the site, including the area around the buried tanks, the presence of London Clay below and the extent of the lower ground floor footprint (see Figure 4), it is considered that little formal remediation will be required at formation level at the site. As a result, remediation will constitute the removal of the underground tanks and the requirement for capping in the limited landscaped areas. Protection against spillage into the adjacent Regent's Canal during the works will also be required.

The remedial measures are set out in following paragraphs. It should be noted that they are not exhaustive as the requirements may be subject to amendment or further inclusions if unforeseen contamination is encountered during earthworks, for example, following removal of the fuel storage tanks.

4.1.1 General principles

The general principles of the remediation methodology are set out below:

1. Source removal, comprising removal of the USTs and any associated pipework followed by an inspection of the surrounding soils.

2a. Secondary source management, comprising excavation of the Made Ground on site for lower ground floor construction and including removal of hydrocarbon impacted soils (if any) in the vicinity of the fuel tanks and;

2b. Supplementary testing of the Made Ground (if required) to enable thorough waste classification and zoning to assist in the possible re-use and recycling of materials on site to reduce the amount of waste arisings being deposited at a landfill facility and;

2c. Dewatering of lower ground floor excavation.

3. Capping layers in soft landscaped areas.

4. Suitable potable water supply pipework.

5. Verification.

It is understood that Lee Demolition have been appointed to complete the demolition of existing structures on site and the excavation of the lower floor to reduced level. This will include removal of the underground storage tanks and associated contamination, and disposal of the arisings from the lower ground floor excavation to landfill/treatment centres.

Lee Demolition will be responsible for the bulk excavation and demolition works; CGL will be present periodically during the works and will be responsible for compliance of the works with this document. CGL will undertake regular monitoring of the work, and testing of excavated materials for waste classification and disposal purposes.

CGL will provide test results, waster transfer documentation, photographs and other lines of evidence within a final validation report for agreement with the regulators.

4.2 Source removal

4.2.1 USTs and related infrastructure

A suitably qualified and experienced contractor should undertake the decommissioning and removal of the tanks in accordance with Health and Safety Executive Guide CS 15: *Cleaning and gas freeing of tanks containing flammable residues*, PPG27: *Installation, decommissioning and removal of underground storage tanks,* HSG 41: *Petroleum Filling Stations Construction and Operation* and any other available guidance. The works should be carried out and verified under the observation of CGL.

Prior to removal, chemical testing of the tank contents should be carried out to confirm the nature of the contents and the requirements for recycling or waste disposal. The tanks

and associated pipe work should be exposed by excavation and the contents observed by means of the access panel. It may be necessary to expose the pipework by hand digging. Excavation should be supervised by a competent foreman at all times and all leaks and spills monitored. The tanks must not be damaged during these works.

All piping into the tanks should be drained and flushed, being careful to avoid spillage as the piping and fittings are likely to contain residues. Suitable fire fighting equipment and emergency spill response materials should be retained on site during this phase.

Any liquid in the tanks should be pumped out, including liquid requiring a hand pump to remove. The contents of the tanks should be transferred to a tanker for off site disposal or recycling at a licensed facility. Any solids or sludge should also be removed. All tanks should be removed from the ground by lifting with suitable plant.

Gas vapours may have built up in the tank and piping and, as a result, concentrations should be checked and monitored using a combustible gas indicator that has been maintained and calibrated according to the instructions of the manufacturer. Once the indicator shows levels of volatile organic compounds below 20% of the Lower Explosive Limit (LEL), the tanks and pipes may be considered inert and safe for removal. If levels above 20% LEL are recorded then the tanks and fittings must be rendered inert prior to removal by ventilating the tanks and piping with a non-reactive gas, such as nitrogen.

Oily water may be encountered during the removal of the tanks. Should this occur it will require sump pumping and should be disposed of, either to sewer, under license and through an oil/water separator, or by tanker.

The tanks, contents and fittings should be transferred to a registered waste carrier for off site disposal at a licensed landfill or recycled as scrap metal. Transport of the tanks should be in accordance with all applicable regulations, including the Environmental Protection (Duty of Care) Regulations. Waste disposal documentation must be retained for verification purposes.

4.2.2 Secondary source soil management

The removal of the secondary source soils, that is the Made Ground, will be completed as part of the construction phase of the development, in order to allow formation of the basement. It is anticipated that the lower ground floor will be constructed using

contiguous pile walls. A drawing indicating the extent of the basement is presented as Figure 4.

CGL will be present at stages during the removal of the Made Ground in order to confirm that material of a similar composition can be stockpiled and sampled to allow for waste characterisation.

In general, the Made Ground may be classified as non-hazardous waste for disposal purposes. Natural arisings which are not contaminated can be disposed at an *inert* landfill based on being classified a natural soil and a listed inert waste with no requirement for WAC testing.

WAC test results for material tested as part of the recent ground investigation indicated that some material may be disposed at an *inert* facility if required. There may be other discrete areas of material that could be classified as *inert*, which is likely to apply to areas of brick and concrete rubble that have been identified.

Effective zoning of the site should be completed in order that such material can be stockpiled to allow for further testing to be completed. A sampling frequency of 1 per 250m^3 for small waste streams and 1 per 500m^3 for larger volumes could be applied.

Screening of the arisings may permit recycling/reuse of the material for other sites under the WRAP protocol[5] or the CL:AIRE protocol[6] and would lead to a reduction in disposal requirements. Therefore, it is recommended that the excavation of the Made Ground is completed in zones in order that any potentially grossly contaminated material (identified by discolouration, odour etc.) can be segregated from potentially re-useable material, such as concrete and other hardcore materials. It is recommended that the tank removal is completed first in order that cross contamination can be minimised.

Targeted excavation of any hydrocarbon impacted soils in the vicinity of the USTs will be undertaken. The sides and base of the excavation should be visually inspected for signs of gross contamination and any visually impacted soils should be removed separately from the main basement dig. Should hydrocarbons have leached into the base of the Made Ground below the area of the tanks, it may be necessary to remove impacted soil between the basement formation level and the underlying London Clay. Additional total soils and WAC testing should be completed on arisings from below the tanks. Hazardous waste

[5] WRAP. (n.d.) *The Quality Protocol.*
[6] CL:AIRE.(2011). *The Definition of Waste: Development Industry Code of Practice.* Version 2.

thresholds for Petrol Range Organics (PRO C_6-C_{10}) and Other Oils (C_{28}+) are in the order of 1,000mg/kg and for Diesel Range Organics (DRO C_{10}-C_{28}) the threshold is in the order of 10,000mg/kg. However, classification may also be subject to additional assessment[7] and may also be dependent on the presence of other contaminants

All material intended for off-site disposal should be transported and disposed in accordance with the Environmental Protection (Duty of Care) Regulations, 1991 and the Landfill (England and Wales) Regulations, 2002 (as amended). Waste legislation stipulates that *hazardous* and *not hazardous* waste should be pre-treated prior to disposal. Pre-treatment can be undertaken either at the site of origin or may be carried out at a licensed off-site facility and can include selective segregation of soils conducted on site.

All relevant laboratory certificates, waste transfer and disposal records should be provided to CGL for inclusion into the final verification report.

4.2.3 Hazardous material

In WS4 at 0.5mbgl (from the recent ground investigation), the material was classified as hazardous on the basis of the lead concentration. It will be necessary to segregate this material to allow for separate disposal at a *hazardous* landfill. Further areas of hazardous material may be present on site particularly where the underground fuel tanks are located. Therefore, these areas particularly should be inspected by CGL in order that any grossly contaminated material can be segregated and sampled to determine a suitable end point for disposal.

Within the Made Ground in WS1 at 0.8mbgl, a small fragment of ACM was encountered in the form of cement type material comprising chrysotile fibres. Given the form and type of asbestos encountered and the isolated occurrence, this is considered to be a low risk to human health. With regard to waste disposal requirements, waste with >0.1% asbestos is considered *hazardous*, however, given the limited quantity encountered this is not considered to be a concern. Appropriate precautions will be however be required during construction works should further and more extensive ACMs be found. This could include wetting the sides/bases of excavations, covering excavated spoil to reduce risk of fibre release (considered to be low as in the form of cemented material) and appropriate personal and respirator protective equipment (PPE/RPE).

[7] EA. (2007). *How to find out if waste oil and wastes that contain oil are hazardous.* HWR08 Version 3.1 – June 2007.

4.2.4 Disposal of groundwater

Groundwater was identified during the recent investigation at depths in the range of 3.28m to 9.82m gbl. As such, there is the potential that this water may be encountered during the excavation of the Made Ground and may require dewatering. Previous leachate testing has indicated that there is potential for this water to have been impacted by contamination. Therefore, it should be extracted, stored, transported or treated and disposed of in accordance with current legislation. All relevant documentation pertaining to the transfer and disposal (including that from the tank removal) should be provided to CGL for inclusion into the final verification report.

4.3 Encapsulation

Beneath the building footprint the floorslab will act as a physical barrier to isolate any residual soil contamination and prevent vertical infiltration of surface water. No remediation measures are expected in this part of the development.

The capping layer should consist of a thickness of 300mm of topsoil and subsoil. It is anticipated that this thickness of cover will be appropriate to act as a barrier to above ground receptors and promote healthy plant growth in the areas of soft landscaping.

The imported soil should be clean, 'non waste' soil imported from a known and reputable source. Chemical test results and details of the source should be provided to CGL by the contractor prior to the material being brought to site. The material should not exceed the Maximum Permissible Concentrations set out below. In addition, the topsoil will meet the requirements of BS 3882:2007 Classification – General Purpose Grade or better, and should be free from propagules of aggressive weeds.

Once on site, the imported material will be subject to verification testing to be completed by CGL. At least one chemical test will be undertaken for every 50m^3 of imported material. Imported earthworks material, including general fill, should be subjected to a similar testing regime if any is required. The final results from testing of capping materials will be included in the final verification report.

Table 2 Import specification- topsoil/subsoil

Determinand		Public open spaces[15]	Rationale
Arsenic		35	SGV[4]
Cadmium		85	SGV[4]
Chromium (total)		38	GAC[5]
Lead		450	SGV[4]
Mercury		240	SGV[4]
Selenium		600	SGV[4]
Copper		135 (6,700)[3]	Sludge Regulations 1989[6] (GAC[5])
Nickel		130	SGV[4]
Zinc		300 (20,000)[3]	Sludge Regulations 1989[6] (GAC[5])
Boron		5	Limit for phytotoxic effect[7]
Barium		300	Former GAC[14]
Beryllium		26	GAC[5]
Vanadium		210	GAC[5]
Benzo(a)pyrene		[2.5]	(GAC[±])
Benzo(a)anthracene		18	GAC[5]
Benzo(b)fluoranthene		24	
Benzo(k)fluoranthene		25	
Chrysene		230	
Dibenzo(a,h)anthracene		2.4	
Indeno(1,2,3-cd)pyrene		24	
Naphthalene		9.2	
TPH aliphatic[8]	EC_{5-6}	79	GAC[5] Comparison of TPH must also be made against the TPH waste assessment banding below to confirm the material does not classify as hazardous waste.
	$EC>_{6-8}$	230	
	$EC>_{8-10}$	59	
	$EC>_{10-12}$	**540**	
	$EC>_{12-16}$	1,000[9]	
	$EC>_{16-35}$	1,000[9]	
TPH aromatic[8]	EC_{5-7}	**1.0**	
	$EC>_{7-8}$	**1,000**[9]	
	$EC>_{8-10}$	**96**	
	$EC>_{10-12}$	**480**	
	$EC>_{12-16}$	**1,000**[9]	
	$EC>_{16-21}$	**1,000**[9]	
	$EC>_{21-35}$	**1,000**[9]	
Sum of TPH aliphatic & aromatic C_5-C_{10}		< 1,000	Hazardous waste thresholds[10] (C_{10}+ MPC based on threshold for C_{25}+)
Sum of TPH aliphatic & aromatic C_{10}+		< 1,000	
pH		5-10	
Phenols		520	SGV[4]
Sulphate - 2:1 water/soil extract (SO_4 mg/l)		500[11]	Limit for Design Sulphate Class DS-1[12]
Total Cyanide		17	GAC[5]
Asbestos		No fibres detected	-

Notes:

1. These maximum permissible concentrations (MPCs) are import criteria only and are not necessarily appropriate for human health risk assessment.
2. In mg/kg dry soil except sulphate and pH.
3. MPCs limited by waste assessment thresholds - if failure occurs further assessment can be made– copper and zinc concentrations may individually exceed MPC, subject to the assessment of the cumulative effect of copper and zinc, but may not exceed bracketed human health GAC values.
4. Soil Guideline Value for residential with plant uptake assuming 6% SOM.
5. Generic Assessment Criteria generated 'in-house' based on CLEA model.
6. Schedule 2, Sludge (Use in Agriculture) Regulations 1989. Values taken for pH 6-7.
7. Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
8. Speciated TPH values must not exceed GAC. Assessment of TPH must also be made against hazardous waste thresholds to confirm imported soils do not classify as hazardous material.
9. GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
10. Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
11. If failure occurs further assessment can be made.
12. 2:1 water/soil sulphate extract limit for DS-1 in accordance with BRE SD1.
13. Laboratory screen by microscopy may be required subject to source of material.
14. GAC created under the old approach (Dutch Intervention Value is 625mg/kg, so the GAC is considered conservative).
15. Based on GAC derived for a "residential without plant uptake" land use scenario, unless otherwise stated.

4.4 Gas protection measures

Gas screening values have been calculated in accordance with CIRIA 665[8]. Using the maximum flow rate and based on the maximum concentration for CO_2, the Gas Screening Value (GSV) is calculated as 0.009l/hr. Therefore, the site conforms to Characteristic Situation 1 and hence no specific gas protection measures are required.

4.5 Water supply pipes

Based on the lack of site specific data relating to the proposed locations of pipe runs, and in accordance with current UKWIR[12] guidance, the use of barrier pipes for water supply may be required. Water supply pipes should be non-plastic, ductile iron or proprietary hydrocarbon resistant pipes such as Protectaline, to prevent possible permeation of residual hydrocarbons into drinking water supplies.

The local water supply company should be contacted for the exact specification that is required in light of the remaining concentrations of contaminants in the remaining Made Ground.

Correspondence with the water supply company, plans indicating the locations of potable water supply pipework and photographs of the final materials laid in-situ should be provided to CGL for inclusion into the final verification report.

4.6 Protection of Canal

The location of the site adjacent to the Regent's Canal will require that measures are undertaken to see that spills or run-off from the site cannot enter the water body. This end the following measures will be taken.

- The removal of the underground storage tanks and associated impacted soils will be undertaken whilst the western site boundary wall, or suitable alternative, is still in place.

- Upon removal of the western wall the ground level at the western boundary will be kept higher relative to the general site dig level during the excavation works to prevent run-off migrating towards the Canal.

[8] CIRIA (2007). Assessing risks posed by hazardous ground gases to buildings, CIRIA Report C665, London

- Groundwater control will be effected where necessary, to prevent migration of water towards the Canal.

- The edge of the site, the towpath and the Canal will be inspected on a daily basis during the reduced dig.

- Spill kits will be available on site during the period of basement excavation and construction.

- Discovery strategy

Inspection records and any other relevant information pertaining to the protection of the water course should be provided to CGL for inclusion into the final verification report.

4.7 Discovery strategy

CGL will be present on site throughout much of the ground works. However, during times when this is not possible, then a watching brief should be maintained by the Main Contractor. Should any gross contamination, such as oily material or material of an unusual colour or odour, be encountered during excavation, the following strategy is recommended:

1. Work to cease in that area.

2. Notify CGL to attend site and sample material in case it is spread around. Notify Contaminated Land Officers of the London Borough of Camden.

3. CGL to supervise the excavation of contaminated material, which should be placed in a bunded area and covered to prevent rainwater infiltration.

4. Soil samples will be obtained by CGL from both the excavated material, and the soils in the sides and base of the excavation to demonstrate that the full area of contamination has been excavated. If appropriate, in-situ testing should be undertaken on the sides and base of the excavation to assess the presence of residual contamination in the soils.

5. On receipt of chemical test results, the soils may be appropriately classified for treatment or disposal, and dealt with accordingly.