



16 September, 2015

Mr Peyrouz Modarres
Walsh
32 Lafone Street
London
SE1 2LX

Our ref: CG/18067A

Please reply to: James Morrice
Dan Matthews

Dear Peyrouz

Camden Lock Village, London: Remediation Method Statement

Introduction

It is proposed to demolish the existing buildings and some of the road infrastructure at Camden Lock Village and replace them with a number of medium to high rise developments with basement levels ranging in depth between approximately 4 metres below ground level (mbgl) to 16mbgl.

CGL has previously completed an extensive ground investigation for the entire Camden Lock Village site, which is reported within three geotechnical and geoenvironmental interpretative reports (GGIRs):

- Camden Lock Village: *Geotechnical and Geoenvironmental Interpretative Report (Rev1)*. Ref: CG/18067A¹;
- Camden Lock Village, *Proposed Block E: Geotechnical and Geoenvironmental Interpretative Report (Rev2)*. Ref: CG/18067C²; and
- Camden Lock Village, *Proposed School Site: Geotechnical and Geoenvironmental Interpretative Report*. Ref: CG/18067³

These reports note that due to the contaminant exceedances recorded in the Made Ground across the site, the following remediation measures are required:

- Provision of a capping layer in areas of soft landscaping;
- Disposal of excavated soils;
- Provision of suitable water supply pipes; and
- Implementation of a watching brief/discovery strategy.

These remediation measures are detailed below.

With respect to ground gas, all areas of the site conform to Characteristic Situation 1 and no ground gas protection measures are therefore required for the development.

¹ Card Geotechnics Limited. (February 2015). Camden Lock Village: *Geotechnical and Geoenvironmental Interpretative Report*. Ref: CG/18067A. Rev 1.

² Card Geotechnics Limited. (March 2015). Camden Lock Village, *Proposed Block E: Geotechnical and Geoenvironmental Interpretative Report*. Ref: CG/18067C. Rev 2.

³ Card Geotechnics Limited. (March 2015). Camden Lock Village, *Proposed School Site: Geotechnical and Geoenvironmental Interpretative Report*. Ref: CG/18067

Capping layer

The proposed developments include areas of soft landscaping; no areas of private gardens are proposed at the site.

In the areas of soft landscaping, a minimum 450mm capping layer with an underlying geotextile marker layer will be provided. The geotextile will comprise Terram® 1000 or similar (Terram® 1000 is a non-woven geotextile with a pore size of 0.15mm and a nominal thickness of 0.8mm). It is anticipated that this capping layer will comprise a minimum of 100mm topsoil and 50mm turf/sod, with the remaining capping layer thickness of 300mm made up with suitable cohesive subsoil. However, the proportion of the topsoil may be allowed to vary, provided the overall thickness of the capping remains a minimum of 450mm.

The topsoil and subsoil placed to form the capping layer will be imported from a known and reputable source at or below the maximum permissible concentrations highlighted in Appendix A (based on a *residential without homegrown produce* land use). Chemical certification of the source material, test results and details of source are to be provided by the contractor to a qualified geoenvironmental engineer for approval prior to capping material being brought to site. Topsoil will also conform to the requirements of BS 3882⁴ and will be free from propagules of aggressive weeds.

Verification testing of all soils once placed is also required. Inspection pits will be dug to validate the capping layer construction and thickness, and samples will be taken for laboratory analysis. Samples will be taken at a minimum frequency of 1 sample per 100m³ of each type of material imported and analysed for comparison against the maximum permissible concentrations presented as Appendix A.

Waste disposal and materials management

All material bound for disposal to landfill, including surplus soils from basement excavations, will require characterisation in accordance with the Hazardous Waste Regulations 2005 and disposal in accordance with the requirements of the Landfill Regulations (2002, as amended) and the Environmental Protection (Duty of Care) Regulations, 1991.

The Made Ground can generally be classified as 'not hazardous' with regards to waste disposal except Made Ground in the areas of WS6, WS11 and BH6 which has been classified as 'hazardous' due to elevated pH and PAHs at WS6 and BH6 and loose fibres of chrysotile asbestos at WS11 and BH6.

WAC testing has identified that the 'hazardous' samples may be disposed of as 'stable non-reactive waste in non-hazardous landfill'. Arisings from the vicinity of WS11 and BH6 would require disposal at a disposal facility which can accept asbestos-containing waste. Asbestos quantification testing will be undertaken to confirm whether the asbestos concentration is below/above the hazardous waste threshold and the material will be classified accordingly.

The natural soils would be suitable for disposal at an inert landfill as listed inert waste.

Underground services

Based on current guidance and the measured concentrations of contaminants within the Made Ground, it is anticipated that PE or PVC pipes will be suitable for use at the site. However, the water supply company will be provided with copies of the ground investigation report so that they can make the necessary provisions to safeguard their installations.

⁴ British Standards. 2007. *BS 3882. Specification for topsoil and requirements for use.*

Watching brief and discovery strategy

A watching brief will be maintained by the Main Contractor. Should any previously unidentified 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 geoenvironmental engineer, to attend site and sample material. Notify Environmental Health Officer at Camden Council.
3. Geoenvironmental engineer to supervise the excavation of contaminated material, which should be placed in a bunded area and covered to prevent rainwater infiltration.
4. Soil samples should be obtained by the geoenvironmental engineer 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.
6. Detailed records, including photographs and duty of care records, of the excavations, stockpile sizes, source and location should be kept and regularly updated to allow materials to be easily tracked from excavation until disposal off site.
7. Backfilling to be undertaken with material certificated as suitable for the proposed end land use.

Verification Plan and Verification Report

A *Verification Plan*, which details the activities and information required to ensure the remediation of the site is carried out in compliance with this remediation method statement is presented as Appendix B.

On completion of the remediation works, a *Verification Report* will be prepared. This report will detail the works undertaken and will include copies of all relevant information listed above including waste transfer records, validation test results, inspection records and source certificates for imported soils.

This document will be made available to the Planning Authority and Environmental Health Officer at Camden Council and the Environment Agency, as required, as evidence of the works carried out, and will eventually form part of the health and safety file for the site.

Concluding remarks

We recommend that this remediation method statement is forwarded to the local planning authority for approval, along with an indication of the timescales for the works. Should you require any further information, please do not hesitate to contact us.

Yours sincerely

A handwritten signature in black ink, appearing to read 'J Morrice'.

James Morrice, Engineer
Card Geotechnics Limited

A handwritten signature in black ink, appearing to read 'Dan Matthews'.

Dan Matthews, Regional Director
Card Geotechnics Limited

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

Determinant		Maximum permissible concentration ¹ (mg/kg) ²				Rationale
		Residential with plant uptake		Residential without plant uptake		
		6% SOM	1% SOM	6% SOM	1% SOM	
Arsenic		32	32	35	35	GAC ⁴
Beryllium		56	56	88	88	GAC ⁴
Boron		5	5	5	5	Limit for phytotoxic effect ⁵
Cadmium		11	11	87	87	GAC ⁴
Chromium (III)		3,200	3,200	3,300	3,300	GAC ⁴
Chromium (VI)		6.3	6.3	6.3	6.3	GAC ⁴
Lead		200	200	310	310	C4SL ¹⁰
Mercury		180	180	250	250	GAC ⁴
Selenium		350	350	600	600	GAC ⁴
Copper		135 ³	135 ³	135 ³	135 ³	BS 3882:2007 Specification for Topsoil ³
Nickel		75 ³	75 ³	75 ³	75 ³	BS 3882:2007 Specification for Topsoil ³
Zinc		200 ³	200 ³	200 ³	200 ³	BS 3882:2007 Specification for Topsoil ³
Vanadium		720	720	1100	1100	GAC ⁴
Benzo(a)pyrene		3.3	2.4	3.6	3.6	GAC ⁴
Benzo(a)anthracene		19	11	22	18	GAC ⁴
Benzo(b)fluoranthene		21	14	23	23	
Benzo(k)fluoranthene		21	16	23	23	
Chrysene		190	100	230	220	
Dibenzo(a,h)anthracene		2.2	1.7	2.3	2.2	
Indeno(1,2,3-cd)pyrene		20	13	23	26	
Naphthalene		29	5	35	6.3	
TPH aliphatic ⁶	EC5-6	260	80	260	80	GAC ⁴
	EC>6-8	750	160	750	160	GAC ⁴
	EC>8-10	190	34	190	34	GAC ⁴
	EC>10-12	1,000 ⁷	1,000 ⁷	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>12-16	1,000 ⁷	1,000 ⁷	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
	EC>16-35	1,000 ⁷	1,000 ⁷	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
TPH aromatic ⁶	EC5-7	0.43	0.10	3.2	0.88	GAC ⁴
	EC>7-8	720	140	1,000 ⁷	870	GAC ⁴ / Hazardous waste threshold ⁷
	EC>8-10	210	37	310	55	GAC ⁴
	EC>10-12	390	75	1,000	290	GAC ⁴ / Hazardous waste threshold ⁷
	EC>12-16	660	140	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>16-21	990	290	1,000 ⁷	1,000 ⁷	GAC ⁴ / Hazardous waste threshold ⁷
	EC>21-35	1,000 ⁷	1,000 ⁷	1,000 ⁷	1,000 ⁷	Hazardous waste threshold ⁷
Sum of TPH aliphatic & aromatic C5-C10		< 1,000	< 1,000	< 1,000	< 1,000	Hazardous waste thresholds ⁸ (C10+ MPC based on threshold for C25+)
Sum of TPH aliphatic & aromatic C10+		< 1,000	< 1,000	< 1,000	< 1,000	
pH		5-10	5-10	5-10	5-10	
Phenols		1,200	280	6,000	2,000	GAC ⁴
Asbestos		No detectable fibres ⁹				

Notes:

- These maximum permissible concentrations (MPCs) are import criteria only and are not necessarily appropriate for human health risk assessment.
- In mg/kg dry soil except pH and asbestos.
- British Standard BS3881:2015 Specification for Topsoil and requirements for use. Table 1. Values taken for pH 6-7.
- Generic Assessment Criteria generated 'in-house' based on CLEA model Version 1.06. Barium and total cyanide GACs are derived from previously endorsed human health risk assessment models and are conservative values with reference to Dutch Intervention Values.
- Nable, Banuelos and Paul. (1997). *Boron Toxicity*. Plant and Soil, **Vol. 193**, pp1 81-198.
- Speciated TPH values must not exceed GAC, or hazardous waste threshold, where indicated above. Assessment of TPH must be made against hazardous waste threshold to confirm imported soils do not classify as hazardous material.
- GAC derived MPC for TPH fraction limited to 1,000mg/kg based on 'waste thresholds'.
- Environment Agency. (2007). *A Guide to Hazardous Waste Regulations: How to find out if waste oil and waste that contain oil are hazardous*. HWR08.
- Laboratory screen by microscopy may be required subject to source of material.
- Published C4SL for lead (DEFRA, 2014)

Reference	Principal requirements	Remediation or construction related	Site visit required by qualified geoenvironmental engineer	Supporting documentation
1. General principles	<p>The site remediation requirements are as follows:</p> <ul style="list-style-type: none"> Provision of a capping layer in areas of soft landscaping; Disposal of excavated soils; Provision of suitable water supply pipes; and Implementation of a watching brief/discovery strategy. <p>Amendments will be made to accord with any differing conditions encountered during the progress of the remediation works.</p>	Remediation & construction	<p>YES</p> <ul style="list-style-type: none"> As detailed below 	Details of construction programme to be provided by client/contractor.
2. Compliance with legislation	The construction and remediation activities on the site will be undertaken in accordance with current health and safety and environmental legislation.	Remediation & construction	-	-
3. Health and Safety requirements	This verification plan does not specifically cover health and safety requirements. This will be addressed in the Contractor's Health and Safety Plan.	Remediation & construction	-	-
4. Capping layer	<p>Soft landscaping</p> <p>A minimum 450mm subsoil/topsoil layer comprising:</p> <ul style="list-style-type: none"> 100mm topsoil + 50mm turf/sod 300mm cohesive subsoil A geotextile marker layer is required beneath the capping soils, which will comprise Terram® 1000 or similar. <p>General</p> <ul style="list-style-type: none"> Additional topsoil can be substituted for the subsoil; as long as the total soil thickness is maintained at a minimum of 450mm. Depth of capping layer to be increased for trees/large shrubs. <p>Topsoil/subsoil will be soil imported from a known and reputable source. Concentrations within 'as received' material are to be below the Maximum Permissible Concentrations detailed in Appendix A, tested at a minimum frequency of 1 sample per 100m³. Pre-delivery chemical test results will be provided by the contractor and reviewed by a qualified geoenvironmental engineer prior to the material being brought onto site with subsequent onsite inspection of the capping layer and sampling once placed.</p>	Remediation & construction	<p>YES</p> <ul style="list-style-type: none"> To validate construction and thickness of capping layer To take samples for chemical analysis Testing at 1 per 100m³ of each type of soil imported. 	<p>Source certificates and pre-delivery test data (to be provided by Contractor)</p> <p>Site visit records including photographs</p> <p>Chemical test results</p> <p>Layout drawings showing location of areas of soft landscaping and gardens</p>

Reference	Principal requirements	Remediation or construction related	Site visit required by qualified geoenvironmental engineer	Supporting documentation
5. Waste disposal and materials management	<p>All material bound for disposal to landfill, including surplus soils from basement excavations, will require characterisation in accordance with the Hazardous Waste Regulations 2005 and disposal in accordance with the requirements of the Landfill Regulations (2002, as amended) and the Environmental Protection (Duty of Care) Regulations, 1991.</p> <p>The Made Ground can generally be classified as 'not hazardous' with regards to waste disposal except Made Ground in the areas of WS6, WS11 and BH6 which has been classified as 'hazardous' due to elevated pH and PAHs at WS6 and BH6 and loose fibres of chrysotile asbestos at WS11 and BH6.</p> <p>WAC testing on has shown that the 'hazardous' samples may be disposed of as 'stable non-reactive waste in non-hazardous landfill'. Arisings from the vicinity of WS11 and BH6 would require disposal at disposal facilities which can accept asbestos-containing waste. Asbestos quantification testing will be undertaken to confirm if the asbestos concentration is below/above the hazardous waste threshold and the material will be classified accordingly.</p> <p>The natural soils would be suitable for disposal at an inert landfill as listed inert waste.</p>	Remediation & construction	YES <ul style="list-style-type: none"> Should additional classification of arisings be required prior to disposal or sampling of soils/hardcore prior to re-use on site 	<p>Duty of care records for disposal of waste, including permits for receiving facility and haulage contractor.</p> <p>Evidence of material management procedures in place for reuse of materials (i.e. permit, exemption etc.)</p> <p>Laboratory test results</p> <p>Copy of Environment Agency notification registering site as a hazardous waste producer (if hazardous waste is disposed of off site)</p>
6. Underground services	Based on current guidance and the measured concentrations of contaminants within the Made Ground, it is anticipated that PE or PVC pipes will be suitable for use at the site. However, the water supply company will be provided with copies of the ground investigation report so that they can make the necessary provisions to safe guard their installations.	Construction	-	Confirmation of pipework material and acceptance of material choice by water supply company (provided by Contractor).

Reference	Principal requirements	Remediation or construction related	Site visit required by qualified geoenvironmental engineer	Supporting documentation
7. Watching brief and discovery strategy	<p>A watching brief will be maintained by the Main Contractor. Should any previously unidentified gross contamination, such as oily material or material of an unusual colour or odour, be encountered during excavation, the following strategy is recommended:</p> <ol style="list-style-type: none"> 1. Work to cease in that area. 2. Notify geoenvironmental engineer, to attend site and sample material. Notify Environmental Health Officer at Camden Council. 3. Geoenvironmental engineer to supervise the excavation of contaminated material, which should be placed in a bunded area and covered to prevent rainwater infiltration. 4. Soil samples should be obtained by the geoenvironmental engineer 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. 6. Detailed records, including photographs and duty of care records, of the excavations, stockpile sizes, source and location should be kept and regularly updated to allow materials to be easily tracked from excavation until disposal off site. 7. Backfilling to be undertaken with material certificated as suitable for the proposed end land use. 	Remediation & Construction	<p>YES</p> <ul style="list-style-type: none"> • To inspect areas and take samples 	<p>Site visit records including photographs</p> <p>Chemical test results</p> <p>Duty of care records for disposal of waste</p>