Remediation Method Statement

At: Branch Hill Allotments, Branch Hill, London, NW3 7LS

For: London Borough of Camden

Report Reference: LP2167/RMS

Report Date: 11th November 2021

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SCOPE OF WORKS

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Leap Environmental Ltd has used all reasonable skill, care and diligence in the design and execution of this report, taking into account the manpower and resources devoted to it in agreement with the Client. Although every reasonable effort has been made to obtain all relevant information, all potential contamination, environmental constraints or liabilities associated with the site may not necessarily have been revealed.

The conclusions reached in this report are necessarily restricted to those which can be determined from the information consulted and may be subject to amendment in the light of additional information becoming available. These conclusions may not be appropriate for alternative schemes.

This report is confidential to the Client and Leap Environmental Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Leap Environmental Ltd beforehand. Any such party relies upon the report at their own risk.

Signed:	 Dr Paul Adams BSc PhD MIEnvSc CSci
Countersigned:	 Richard Brinkworth BEng CEng MICE
Issue Date:	11th November 2021
Revision:	Issue 1

EXECUTIVE SUMMARY

Leap Environmental Ltd (hereafter referred to as LEAP) was appointed by London Borough of Camden (LBC) to produce a Remediation Method Statement (RMS) for a site referred to as Branch Hill Allotments, Branch Hill, London, NW3 7LS.

The active allotment site reportedly formally comprised part of the gardens of Branch Hill House. The site is located within a residential area within the London Borough of Camden. The site is intended for continued use as allotment gardens.

The site is underlain by bedrock comprising Bagshot Formation over Claygate Member.

The site has been subjected to a number of phases of intrusive geoenvironmental site investigation by third parties and LEAP Environmental. Lead, benzo[a]pyrene and asbestos were concluded to be present at levels presenting a risk to current site users but not at sufficient levels to determine the site as contaminated under Part 2A of the Environmental Protection Act. Instead, the decision was taken for the landowner (LBC) to undertake voluntary remediation.

A remediation options appraisal concluded clean cover systems to be the most practical remedial solution. Following a formal tender process, some modifications to the proposed designs were made and these changes are discussed and justified herein.

Remediation will comprise the application of clean cover soils across the full area of all 28 no. plots which will be enclosed within gabion walls. A deter to dig membrane and 500mm of clean cover will be required.

Requirements are set out for imported material and waste disposal.

Validation of the membrane installation and the application of clean cover will be undertaken by an independent Environmental Consultant who will also produce a validation report.

A INTRODUCTION AND BACKGROUND

1 Introduction and Background

Leap Environmental Ltd (hereafter referred to as LEAP) was appointed by London Borough of Camden (LBC) to produce a Remediation Method Statement (RMS) for a site referred to as Branch Hill Allotments, Branch Hill, London, NW3 7LS.

It is understood that suspected asbestos on a single plot (#28 in the west of the site) was highlighted to the council in the summer of 2018. A survey was subsequently undertaken by Manestream who reported seven instances of ACMs which comprised pieces of cemented panels on the surface of the soil. This material was subsequently removed by a specialist. It is further understood that the council then took the decision to investigate the remainder of the site in light of the asbestos being found. This led to the first of three intrusive investigations which identified potential risks from three contaminants namely lead, benzo[a]pyrene and asbestos. In light of the information obtained, the council sought further advice from Public Health England (PHE) and took the decision not to close the site but instead issued advice and guidance to the plot holders via both letter and poster on the allotment site's notice board.

LEAP undertook a review of the previous site investigations in March 2020. A subsequent intrusive site investigation was then undertaken in July 2020. Following the additional site investigation, the decision was taken not to designate the land as contaminated as defined by Part 2A of the Environmental Protection Act (1990). Instead, the council decided to undertake voluntary remediation. A Remediation Options Appraisal was produced in November 2020.

1.1 Previous Reports

- Ground Investigation Report. WSP. Project Ref: 70049152 v1, dated August 2018;
- Human Health Detailed Quantitative Risk Assessment. WSP. Project Ref: 70049152 v1, dated October 2018;
- Ground Investigation Report. Hydrock. Ref: BHA-HYD-XX-GI-GO-0001-P2, dated 4th June 2019;
- Letter Report: 'Review and discussion of previous investigative reports to determine the risk of 'SPOSH' and in turn the designation of contaminated land under Part 2A of the EPA 1990'. LEAP Environmental Ltd. Report Ref: PA/20/LP2167/v3, dated 9th March 2020;
- Supplementary Phase II Site Investigation Report. Report. LEAP Environmental Ltd. Ref: LP2167/Further SI, dated 28th July 2020; and
- Remediation Options Appraisal. LEAP Environmental Ltd. Ref: LP2167/ROA/Final, dated 3rd November 2020.

This method statement presents the recommendations for remediation to remove the identified unacceptable risks to site users to enable the continued use of the site as allotment gardens.

2 Objective

The objective of this report is to outline a methodology to remediate the identified contamination taking into account the conclusions of the Remediation Options Appraisal. This document also presents a verification plan.

3 The Site

3.1 Site Location and Description

The approximately 0.2 ha site is located on Branch Hill, in the LB Camden in northwest London (postcode NW3 7LS). The main entrance is located on Frognal Rise opposite the junction with Lower Terrace. A second entrance is located off (private) Spedan Close where the site is accessed via a flight of stairs. The site is bowl shaped with the central regions at the lowest point and the site rising substantially in all directions towards the boundaries. Hence, substantial parts of the inner perimeters of the site are not suitable for plots and are vegetated with mature trees and associated undergrowth.

The allotments are located in a residential area and form 1 of 4 allotment sites in the LB of Camden which are run by allotment associations with the support of the council's parks team. At Branch Hill, there are 28 No. plots of varying size and shape along with a communal area, shed and pond. The plot numbers range from 1 to 35. There is no plot #5, 22-24 and 31-33.

3.2 Proposed Land Use

The proposed land use is the continuation of use as allotment gardens.

3.3 Site History

The site is understood to have once comprised part of the gardens of Branch Hill House. There is anecdotal evidence of small buildings once being present in the western region of the site. Based on observations during the intrusive site investigation undertaken by LEAP in July 2020, evidence of foundations were occasionally encountered which may have been related to walls and hence a walled garden.

3.4 Intrusive Site Investigations

The third party site investigations and assessment identified lead, benzo[a]pyrene and asbestos as the contaminants of concern (CoC). The LEAP intrusive site investigation of July 2020 was designed to ensure that a minimum of 8 results were available from each plot for the three CoC thus enabling statistical assessment to be undertaken (previous work had resulted in uneven site coverage with data gaps identified for some contaminants of concern within selected plots).

Table 1: Summary of dataset

CoC	No. Samples
Lead	377
Benzo[a]pyrene	275
Asbestos	226

4 Ground conditions

4.1 Soil Profile

The published geology comprises Bagshot Formation (sand) over Claygate Member (silty, sandy clay). No superficial deposits are mapped.

The soils encountered during the June 2020 site investigation ranged from dry light brown to grey fine sand with occasional medium to coarse rounded flints to dark brown, moist soft sandy clay also with occasional medium to coarse rounded flints. The nature of the soil was influenced by both the location of the plot (drier and sandier at higher points of the site receiving more direct sunshine and moisture and more clayey on lower lying, more shaded plots) as well as the degree to which the plots had been worked / mulched. The anthropogenic inclusions encountered in the top 300mm were generally limited to rare fine pieces of brick, tile and glass. No suspected ACM was observed at surface level in any plot. Anthropogenic inclusions generally increased with depth and were encountered with greater frequency below 0.3-0.4m bgl (typically the depth limit at which the soils were actively being worked by most plot holders). Below this depth, red and yellow brick were frequently encountered with evidence in some instances of residual structures (Plots 11, 13 and 25 in the northern and western site regions). Clinker was also frequently encountered along with rarer suspected ACM, metal, concrete, glass and plastic. Table 2 summarises where suspected ACM and clinker were most notably encountered along with significant inclusions of brick or concrete.

Table 2: Visual evidence of contamination and significant buried materials

Plot	Description
1	Clinker
2	Possible ACM (disproved by laboratory testing)
6	Clinker
7	Possible ACM from c. 0.4m (proven by laboratory testing)
9	Clinker
10	Ash and clinker from c. 0.4m
11	Significant brick obstructions and c. 6 pieces of suspected ACM
12	Ash and clinker from c. 0.4m
13	Hand pit refused on a layer of bricks at c. 0.4m
15	Clinker from c. 0.3m
	Visible pieces of suspected ACM in sample and hand pit arisings from c 0.4m (proven by laboratory testing)
19	Some clinker at c. 0.3m in some hand pits
21	Clinker
25	Large volume of c. 25mm diameter pieces of clinker
	Large concrete and brick obstructions present throughout the hand pit
35	Clinker
	Pieces of suspected ACM (proven by laboratory testing)

The Claygate Member was only encountered on a very limited number of occasions with no distinct trend evident. The material encountered was light brown silty clay.

No groundwater was encountered in any location (but exploratory holes were limited to 0.6m in depth).

4.2 Hydrogeology and Hydrology

The Bagshot Formation is classified as a Secondary (A) Aquifer whilst the Claygate Member is classified as an unproductive stratum. The site is not located within a groundwater source protection zone (SPZ). There is one pond on site with further ponds and water features present within parkland c.50m north / northeast of the site.

The risk to controlled waters is perceived as being very low.

4.3 Contamination Assessment and Determination of the Need to Remediate

4.3.1 Lead

All 377 samples taken at the site exceeded the generic assessment criteria for lead (the Category 4 Screening Level) of 80 mg/kg.

Table 3: Statistical analysis of lead concentrations

CoC	No. Samples	Mean [mg/kg]	Max [mg/kg]	U95 Norm* [mg/kg]
Lead	377	533	2,990	560

*assuming a normal distribution

LEAP undertook further assessment of the data comparing the mean and upper 95% confidence limits to available borough-wide historical background data and against a site-specific assessment criteria (SSAC) range developed from a recent academic study into the effects of lead within soils at urban agricultural sites undertaken by the University of Newcastle[1]. These data were presented to LBC allowing the council to make an informed decision on the criteria for undertaking remediation (the published guidance states that this decision must be undertaken by the Local Authority). A summary of this assessment is presented in Section 4 of the Remediation Options Appraisal.

LBC took the decision to adopt the lower end of the Newcastle academic study-derived SSAC range (722 mg/kg) as the critical concentration above which remediation would be required. These were plot #s 9, 10, 12, 15, 26, 28 and 29.

NOTE ON NEWCASTLE ACADEMIC STUDY:

This study sampled 280 paired soil and crop samples from 31 plots across 3 different 'urban agricultural sites' (UAS). Plot holders were asked to complete an exposure and food frequency questionnaire and had blood lead levels measured and compared to those of non-gardeners. 98% of samples exceeded the GAC for lead with a mean concentration of 324 mg/kg and an average lead bioaccessibility of 59%. Despite this, there was no significant difference in the blood levels of gardeners and non-gardeners surveyed. The study concludes a site-specific assessment criteria (SSAC) for urban agriculture sites of between 722-1,634 mg/kg. It should be noted that the SSAC derived by the Newcastle study was for adults only.

4.3.2 Benzo[a]pyrene

Twelve of 275 samples taken at the site exceeded the generic assessment criteria (the Category 4 Screening Level) of 5.7 mg/kg. The site-wide upper 95% confidence limit was below the assessment criteria at 2.34 mg/kg.

The data indicated that the upper 95% confidence limit for three plots exceeded the GAC. These comprised Plot #s 1, 4 and 20. The exceedances on Plots 1 and 4 are the result of one

[1] An apple a day? Assessing gardeners' lead exposure in urban agriculture sites to improve the derivation of soil assessment criteria. Entwistle et al., Environment International 122 (2019) 130-141.

high value in a small dataset of eight samples. All other samples in these two plots yielded results below the GAC. LBC took the decision to remediate all three of these plots.

4.3.3 Asbestos

There is currently no published assessment criteria / acceptable concentration for asbestos in soil in the UK.

Asbestos was detected on at least one occasion on nineteen of the twenty-eight plots. Asbestos was detected in at least 25% of samples taken on eleven of the twenty-eight plots and in at least 50% of samples taken on five plots (plot #s 7, 16-18 and 20).

Fourteen of the plots where asbestos was detected returned at least one quantification result at or above the limit of quantification (plot #s 6, 7, 9, 11-13, 15-20, 34 and 35). There were seven plots with an average quantification above 0.01% by weight (plot #s 6, 7, 11, 13, 17, 18 and 35) and three plots with an average quantification above 0.1% by weight (plot #s 6, 11 and 13).

Both Chrysotile (white) and Amosite (brown) asbestos was identified at the site. Both were reportedly detected in both loose fibre and bonded form (Chrysotile largely bonded within cement fragments and Amosite largely as insulation board). Amosite was notably also detected as insulation material.

Loose fibres are considered more hazardous than bonded materials as free fibres are more readily respirable. Amosite is also considered more hazardous than Chrysotile as the fibre shape results in the fibres being able to get further into the lungs. Cement bonded materials are considered the least hazardous as the cement holds the fibres strongly within a stable matrix. AIB is considered somewhat less stable and hence a higher risk than asbestos cement.

There appeared to be some differences in the asbestos results in the third party and LEAP studies. The third party studies recorded more instances of 'free' or 'loose' fibres but then did not have any data quantifying the 'free fibre element' in the quantification result. The LEAP data suggested that the majority of the asbestos is in bonded form. Every single quantification result returned a free fibre concentration below the laboratory limit of quantification (<0.001% by weight) in the LEAP dataset.

LBC took the decision to remediate all plots where the average quantification result exceeded 0.01% by weight (10% of the hazardous waste threshold). Hence plot #s 6, 7, 11, 13, 17, 18 and 35 were selected for remediation on the basis of asbestos.

4.3.4 Plots selected for remediation

Based on the adopted criteria outlined in Sections 4.3.1 to 4.3.3. above, the following plots were selected for remediation: #s 1 ,4, 6, 7, 9, 10, 11, 12, 13, 15, 17 ,18, 20, 26, 28, 29 and 35 (17 plots in total out of the total of 28).

5 Update to Remediation Options Appraisal

The remediation options appraisal identified that clean cover systems were the most viable remedial option. Three variations were assessed with a modular raised bed system (Option 2B) concluded to be the most suitable. A full explanation and discussion of the proposed options and their respective merits and shortcomings is provided in the ROA.

LBC commissioned a formal tender process inviting six contractors to price the remedial works. It is understood that quotations were considerably higher than outline costs estimates presented within the ROA and that this was primarily due to the cost of the large quantity of timber construction required to realise the specified design. LBC proposed a modification to the design namely a gabion system (metal cages containing cobbles to act as a retaining border system) whereby groups of plots would be raised by 500mm with certified clean imported soil used to infill the areas created by the gabions. Drawings are provided in Appendix A. The base and sides would be lined with Terram, internal paths between individual plots would be re-created and ramped access would be provided to the raised plots.

For completeness (and to ensure compliance with the published guidance), this revised option (designated as Option 3) has been included within the updated quantitative options appraisal below:

Table 4: Quantitative Options Appraisal

		OPTION 1 Complete Excavation	OPTION 2A Blending of Soils	OPTION 2B Raised Beds	OPTION 3 Gabion Walls	Notes
PRACTICABILITY						
Technical Constraints (7pts)	i) Available ii) Conflict	4 3	4 3	4 3	4 3	Reference Para 6.24 (i) *Considers whether remediation option is widely available in marketplace and appropriate to proposed use (for example is there any potential conflict between the contaminants to be treated)*
Site Constraints (6pts)	i) Location / Access ii) Pollutant Types	1 3	2 3	3 3	2 3	Reference Para 6.24 (ii) *Considers access to the individual allotments and the area generally, and to the contaminated soils themselves.*
Time (6pts)	i) Permits ii) Consent iii) Procurement	1 1 1	1 1 2	2 1* 1*	2 1 2	Reference Para 6.24 (iii) *Considers the **time** required to obtain the necessary permits to carry out the work, and to obtain agreement from residents, and to procure the services of an appropriate contractor.*
Regulatory (6pts)	i) Safety & Permits	2	4	6	4	Reference Para 6.24 (iv) *Considers the **complexity** of obtaining the necessary permits (e.g. waste permitting), and approvals and being able generally to carry the work out safely.*

	OPTION 1 Complete Excavation	OPTION 2A Blending of Soils	OPTION 2B Raised Beds	OPTION 3 Gabion Walls	Notes
EFFECTIVENESS					
Objectives (25pts)	25	20	25	20	Reference Para 6.27 *Considers whether remediation option is able to achieve the objectives of the remediation, and the time required to achieve those objectives.*
DURABILITY					
Overall Timeframe (8pts)	8	7	6	7	Reference Para 6.25-6.26 *Considers the **longevity** of the remediation option, and the allowance for future monitoring and maintenance.*
Maintenance & Repair (8pts)	8	6	4	7	
Monitoring Requirement (7pts)	7	5	3	6	
HEALTH & ENVIRONMENTAL IMPACTS					
Potential Health Impacts of Remediation (15pts)	5	10	15	15	Reference Para 6.34 *Considers the direct and indirect (e.g. stress) health effects to local residents*
Potential Environmental Impacts of Remediation	5	10	10	8	Reference Para 6.35

(10pts)					*Considers the potential damage to local environment (e.g. soil, water, air and animals), and nuisance risks.*
TOTAL	**76**	**78**	**86**	**84**	**MARKS OUT OF 100**

*reduced from the original assessment from 2 to 1 following the tender process

Option 3 scores only marginally less than the previously preferred remedial solution (Option 2B). Scores are generally fairly similar throughout the assessment with the exceptions that Option 3 scores lower on effectiveness due to the loss of space incurred from the size of the perimeter gabion walls and the need to redefine plot boundaries, inter-plot paths and provide ramped access. Conversely, Option 3 scores better than Option 2B with respect to durability as the perimeter walls will be constructed from metal cages and cobbles as opposed to timber. Finally, Option 3 scores slightly less in the Health and Environmental Impacts section as natural stone is required (non-renewable) along with requiring a greater volume of soil import compared to Option 2B. Given the similarity between the scores and the cost savings (public funds) as indicated by the tender process, it is considered that there is sufficient justification to adopt the gabion solution.

LBC had originally intended to undertake Option 2A (blending of clean cover soils into the top 300mm with an associated land raise) on the 11 plots not otherwise scheduled for remediation via Option 2B. This was intended to provide additional assurance that the remedial works were sufficiently robust and any other residual risks were addressed. With the nature of the gabion solution (needing to encompass 'blocks' of adjacent plots) it was concluded that it would be most practical to subject all 28 plots to remediation via Option 3.

B REMEDIATION STRATEGY

6 Remediation of on-site Contamination

The following summarises the remedial activities that are proposed for the site:

- *Application of a 500mm deep gabion-bordered clean cover system in all gardened areas of the site; and*
- *Independent verification of remediation measures.*

6.1 Site Clearance

Plots will need to be cleared pre installation of the gabions. This will include any temporary buildings such as sheds, greenhouses and other storage facilities in addition to perennial plants. It may prove possible to retain some fruit trees if a suitably engineered raised collar were to be constructed around the base of the tree extending beyond the final level of the soil. It will be important to provide plot holders with plenty of notice prior to the commencement of the remediation to allow them to remove or propagate existing plants.

Any arrangements to store, replant/rebuild or replace items within a residents plot will need to be agreed in advance between plot holders and the council.

It is envisaged that any remaining vegetation will be cleared by the contractor and placed in green waste skips for recycling.

6.2 Site Constraints

The ROA identifies and discusses a number of site-specific constraints namely:

- Limited access for plant that is available at the subject site;
- Variable nature of the plots (size, shape, relative levels, proximity to other plots); and
- Restrictions on vehicle movements in the vicinity of the site.

The gates of the main entrance are sufficiently wide to allow a small vehicle / plant (such as a small rubber tracked excavator) onto site. However, the hard surfaced path only runs alongside Plots 1-4. The remaining paths across the site are generally grassed and fairly narrow.

The plots at Branch Hill are not of a standard size. They vary significantly in size and many are irregular in shape (such that the boundaries between one plot and another are by no means clearly defined). A makeshift retaining wall is present between Plots 28 and 29. It is understood that a topographical survey has been undertaken.

The junction with Frognal Rise, Branch Hill and Lower Terrace is busy (given the residential setting) and entering the junction from Lower Terrace is semi-blind due to parked vehicles. All vehicle parking is permit holders only. Parking of any vehicles, welfare facilities or skips would require permitting and careful consideration so as not to cause further visual impairment at the junction. Remediation engineers transferring materials to an off-site skip or bringing in materials stored offsite would also need to take considerable care when negotiating the junction on foot with a wheelbarrow or equivalent.

Allotment gardening is primarily undertaken in the spring and summer months. Thus, the works should be scheduled from late autumn and completed by early spring (c. late October / early November to the end of February). This will minimise disruption to plot holders and also minimise any dust generation which could conceivably contain asbestos. Given the site setting and the works programme, environmental monitoring may not be necessary provided that the site is closed to plot holders during the remedial works and the remediation engineers are adequately protected.

The contractor will need to consider these items carefully and propose appropriate solutions some of which will need to be included within the Health and Safety Plan for the works.

6.3 Gabion Perimeter Wall Construction

The finer details of the construction are beyond the scope of this document but design drawings have been provided by the contractor who has been awarded the contract and these are included in Appendix A. The base and sides of the raised plot areas will need to be lined with Terram to prevent mixing with impacted soils at the base and to prevent fines from entering the gabions on the sides. Suitable access to the raised areas will also need to be engineered taking into consideration access for wheelbarrows and ensuring that less physically able plot holders can easily access their plots. The inter-plot paths will need to be suitably engineered to ensure that excessive settlement does not occur and that the paths are suitable for loads generated by wheel barrows and regular footfall. Consideration should also be made as to the requirement for edge protection.

6.4 Application of Imported Clean Cover

Application of 500mm of certified clean cover and a deter-to-dig geotextile (Terram) membrane across the full area of all 28 plots is required. The clean cover must comprise at least 300mm of topsoil with the remainder being made up of subsoil.

All material used within the cover system must be from an organic source, free of propagules of aggressive weeds, fragments of glass, bricks, concrete, wire or other potentially hazardous foreign matter and bulk vegetative growth. Appendix B sets out the specification for imported soils.

NOTE:
Allotment criteria are amongst the most stringent land use criteria. Close attention should be paid to these criteria when sourcing clean cover soils noting that many determinant concentrations are lower than those published for residential with home-grown produce.

6.5 Settlement and Augmentation

Some settlement is considered inevitable. The effect of this could potentially be minimised by applying / mounding soils slightly thicker in the more central regions of the plots and allowing plot holders to level these soils over the first 6-12 months during which time the majority of the settlement would be anticipated to occur. Any additional topsoil imported to site to compensate for settlement would also be subject to the verification procedures outlined in Section 7.

Applied clean cover soils will likely require augmentation / mulching with organic matter (rotted horse manure or compost) to enrich the soils for effective fruit and vegetable cultivation. A decision will be required as to whether this is done immediately post remediation by the contractor, by plot holders with the material supplied by LBC or by plot holders with the material supplied by themselves. The environmental consultant should be advised regarding the agreed arrangements so the details can be included in the verification report for completeness.

6.6 Restrictions on Future Use

The remediation has been designed to minimise future restrictions on the way that the plots are gardened as well as to minimise any requirement for monitoring / policing.

The future planting of trees merits consideration as the tree roots would likely penetrate the underlying Terram membrane over time. This is not considered to represent a significant risk as tree fruit is least affected by soil contaminants due to the distance contaminants would need to travel (compared to root and leaf vegetables and even soft fruit) to enter the edible part of the plant. Nevertheless, it is recommended that it is communicated to plot holders that occasional, small trees are acceptable but large / numerous trees should be avoided.

7 Importation of Clean Cover Soils

Certified clean topsoil and subsoil are required to meet the requirements of this RMS. Both materials will need to be imported. It is ***not*** recommended that topsoil be applied at thicknesses in excess of 300mm as soils can become anaerobic, organic matter can degrade and the soils can lose their structure and become wet, boggy and odourous.

7.1 Validation testing of imported soils

In general terms, all imported soils will be approved by the environmental consultant (EC) prior to importation. The proposed sources will be assessed on the basis of either a detailed site investigation or laboratory test results in the case of a manufactured topsoil. In the absence of this data then the EC will then advise what further testing, if any, is required ***prior to*** importation.

The test frequency ***post import*** will be as follows (to be advised by the EC on a source by source basis depending on the quality of data provided prior to importation).

Subsoil – 1 sample per 150m³ (minimum of three samples to be taken ***per source***)

Topsoil – 1 sample per 100m³ (minimum of three samples to be taken ***per source***)

All imported soils will be subject to the test parameters attached in Appendix B irrespective of the depth at which they are to be placed. In addition, a topsoil compliance test as defined within BS3882:2015 for a multipurpose grade material should be undertaken at a rate of one test per source.

7.2 Organic Requirement

Organic gardening is an important consideration for many gardeners and was raised by plot holders during meetings held with LBC. Hence, clean cover soils imported to the site must be demonstrated to be from an organic origin. When considering this requirement coupled with the stringent import criteria, it may prove simpler to source manufactured topsoil and 'as dug' subsoil as opposed to materials from an alternative site (the latter of which would require a materials management plan). In the case of soils imported from another site, evidence of the organic nature of the soils will need to be provided to the satisfaction of the EC. This may comprise:

- Laboratory test results demonstrating the absence of pesticides (organochlorine, organophosphorus and triazine compounds);
- A Phase I Desk Study and historic mapping demonstrating the nature of the former land use;
- Signed declaration(s) by landowner(s) of 'donor' site(s).

8 Waste Disposal

Given the nature of the proposed clean cover system, it is not envisaged that any waste soils will be produced. Green waste will be produced and should be sent for recycling. In the event that waste soils are generated (i.e. finished levels require a reduction in existing ground level to accommodate the 500mm thick clean cover system) it is the duty of the waste producer, to ensure that all waste is disposed of appropriately and that any that is sent to landfill is sent to an appropriately licensed one. All waste sent to landfill must be classified and must be pre-treated. The form of pre-treatment should be documented in the Site Waste Management Plan. There are various forms of pre-treatment that are acceptable.

Waste soils awaiting disposal should be segregated, placed on plastic sheeting, potentially covered (if dust is a risk) and labelled appropriately. Soils are likely to be primarily non hazardous however testing will be required as a lead content in excess of 1,000 mg//kg, visible asbestos and/or an asbestos content greater than 0.1% by weight would result in soils being classified as hazardous. In such an instance a waste classification (WAC) test would be required to confirm suitability for acceptance at a hazardous waste landfill site without the need for pre-treatment.

Consideration should be given to hand picking and separate disposal of any visible asbestos fragments within waste soils thus preventing the soils needing to be disposed of as hazardous (assuming that it has been demonstrated that the lead content and asbestos fibre contents are suitably low).

Suitable waste facilities should be identified in advance of the required disposal dates and the laboratory test data supplied to them. An appropriately licensed haulier should also be engaged in advance of the required disposal date. Hazardous waste disposal requires the registration of the site as a waste producer and the completion of hazardous waste consignment notes.

C VERIFICATION WORKS

9 Site Works

During the remediation the EC will undertake the following verification tasks:

- Review of laboratory test data or sampling and testing of topsoil and subsoil proposed for import to site to act as clean cover;
- Sampling and testing of clean cover soils post import;
- Confirmation of the application of a deter-to-dig geotextile; and
- Confirmation of the applied clean cover thickness.

9.1 Materials Management Plan

The re-use of any naturally occurring materials imported from a third party site (unless the imported material comprises a manufactured product in the case of topsoil or an 'as dug' material in the case of a subsoil) will require a Materials Management Plan (MMP) with a declaration signed by a Qualified Person (QP) in accordance with the CL:AiRE Definition of Waste Code of Practice (DoW CoP).

9.2 Verification of Clean Cover Thickness

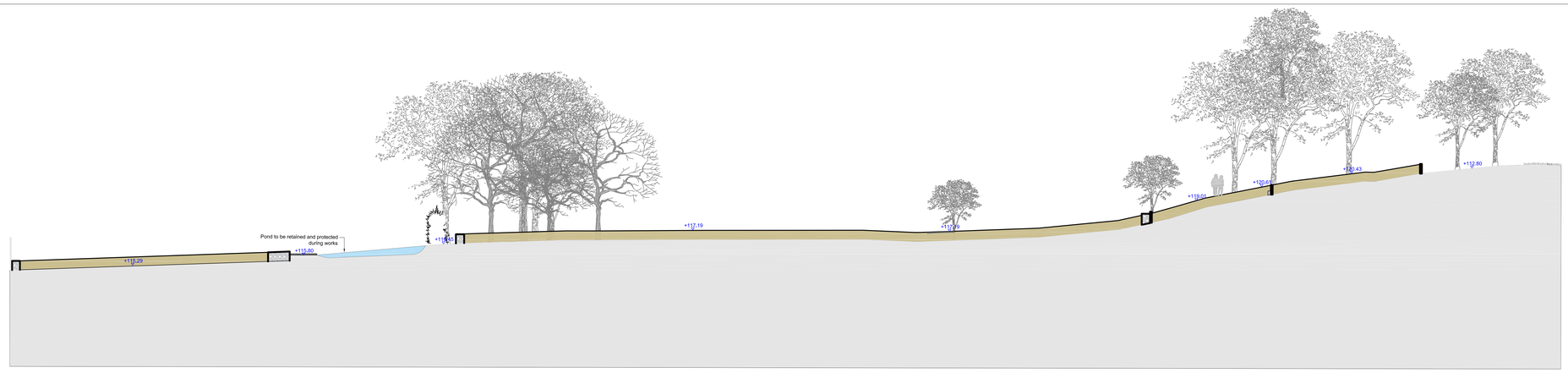
The depth of the placed clean cover will be verified by the EC by excavation of hand dug holes through completed plots. This depth will be specified to meet the requirements of this RMS i.e. 500mm. These verification holes, a minimum of 2 per plot, will be randomly positioned at the discretion of the EC.

10 Verification Report

All verification works will be presented in a final verification report upon completion. This report will include: source certificates and test results of imported soils and site photographs detailing the gabions walls, membrane installation and applied clean cover thicknesses. The report will ***not*** necessarily include waste disposal Duty of Care paperwork (transfer and consignment notes) as this is the responsibility of the contractor to maintain.

APPENDIX A

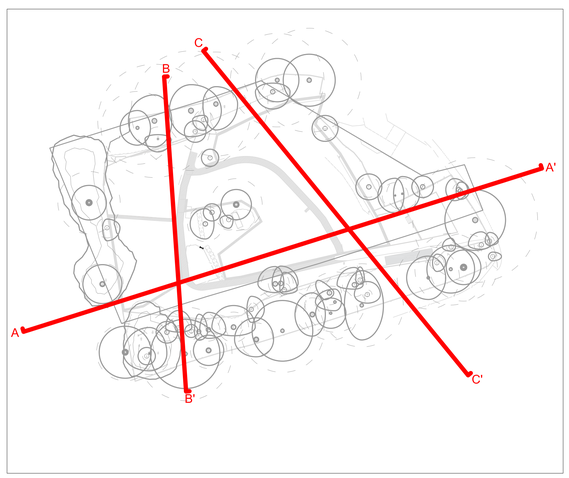
Figures



A Section A
Scale: 1:100

B Section B
Scale: 1:100

C Section C
Scale: 1:100



Location Plan 1:500

Notes
Do not scale from this drawing.
All dimensions are drawn in millimetres.

Key

Ownership boundary

Application boundary

Existing trees
To be protected during works. All works within tree canopy line to be carried out by hand. Dashed line indicates Root Protection Area.

No	Date	Description	Drn	Chk
A	22.07.21	For planning	LC	AW

0 1 2 3 4 5m

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250 Waterloo Road, London, SE1 8RD
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london@landuse.co.uk
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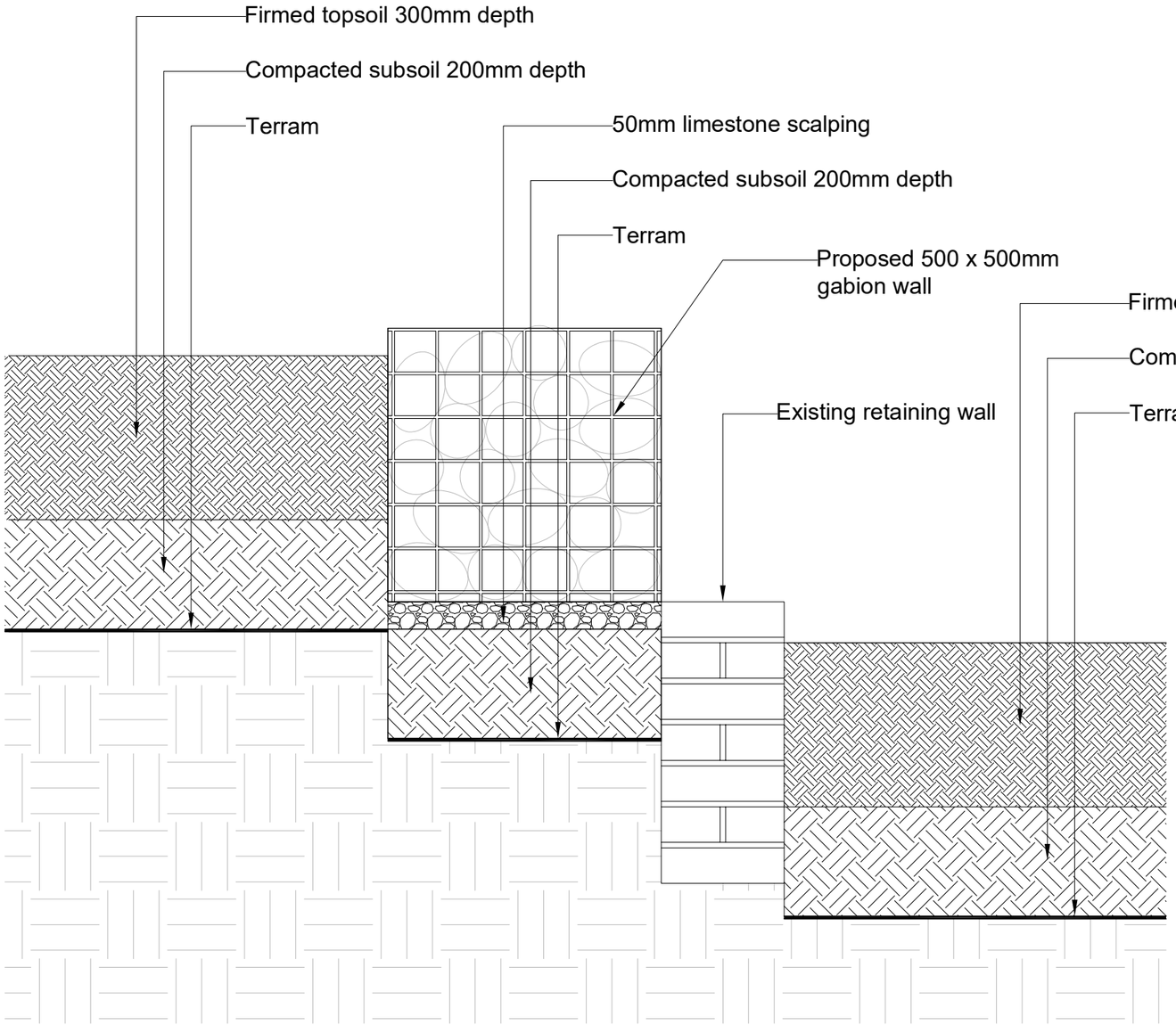
Project
Camden Allotments
Branch Hill

Client
Camden Borough Council

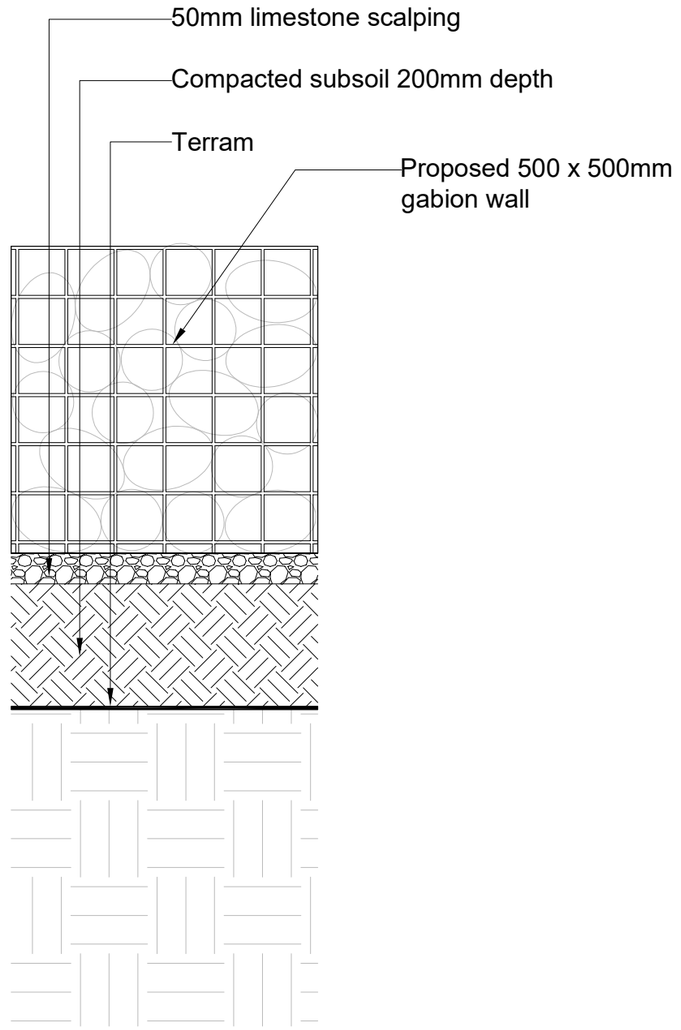
Scale @A0	Status
1:100	PLANNING

Drawing Title
Branch Hill
Proposed Site Sections

Job Nr	Drawing Nr	Issue
11358	11358-LD-PLN-615	A



Gabion and retaining wall detail
1:10



Stand alone Gabion wall detail
1:10

For Comment - Responsibility is not accepted for errors made by others in scaling from this drawing.
All construction information should be taken from figured dimensions only.

Notes

Softscape:

.

Hardscape:

.

Camden Allotment gardens

Project: Camden Allotment Gardens
Antrim Grove

Client: London Borough of Camden

Address: Antrim Grove, Belsize Park, London NW3 4XR

Date: 25th June 2021

Drawing Title: Proposed Site Details - Gabions

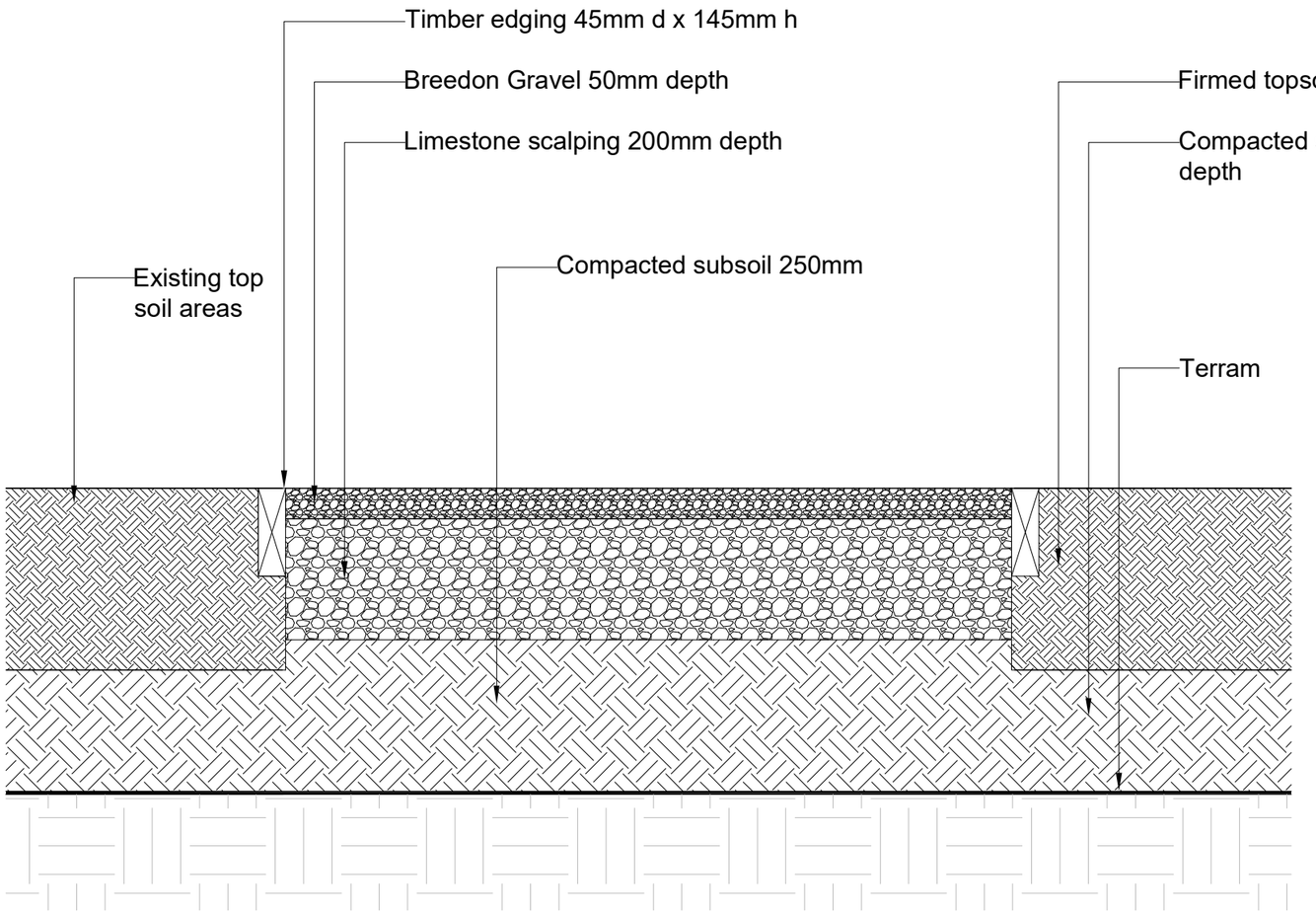
Drawing Number: 0625_SK_001

Scale: 1:10 @A3

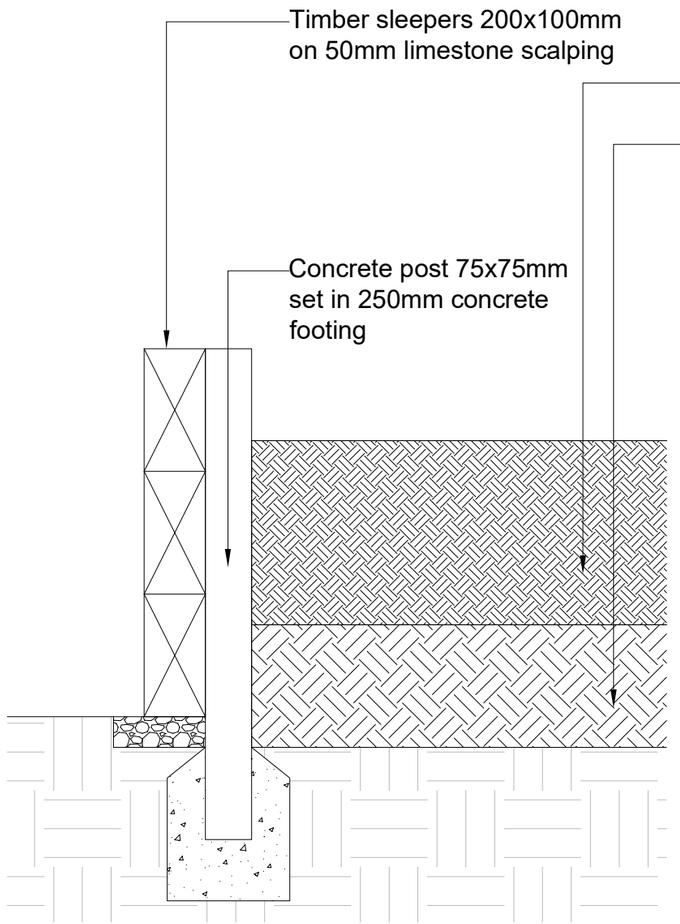
Status: For Comment

Revision:

GINKGO GARDENS
Best Horticultural Practice



Breedon Gravel footpath detail
1:10



Sleeper retaining wall detail
1:10

For Comment - Responsibility is not accepted for errors made by others in scaling from this drawing.
All construction information should be taken from figured dimensions only.

Notes

Softscape:

.

Hardscape:

.

Camden Allotment gardens

Project: Camden Allotment Gardens Branch Hill

Client: London Borough of Camden

Address: Branch Hill, Hampstead, London, NW3 7LS

Date: 25th June 2021

Drawing Title: Proposed Site Details - Sleeper walls

Drawing Number: 0625_SK_002

Scale: 1:10 @A3

Status: For Comment

Revision:

GINKGO GARDENS
Best Horticultural Practice

APPENDIX B

Specification for Cover Soils

LEAP SPECIFICATION FOR PLACEMENT OF IMPORTED FILLS AND PROCUREMENT OF IMPORTED TOPSOIL AND SUBSOIL

1 Fills

1.1 General

Filling shall be carried out in accordance with the recommendations of BS 6031:2009[1] and the CL:AIRE Definition of Waste Code of Practice (DoWCoP)[2].

Fill shall be maintained and protected in a satisfactory condition at all times until final completion.

Any material rendered unsuitable or unsatisfactory after being placed in the works shall be repaired or replaced as appropriate so that all the completed filling is in accordance with the specification.

1.2 Dimensions

Fills shall be constructed to achieve the finished levels of the development with an allowance for shrinkage and consolidation of the material subsequent to completion, and in order that the minimum clean cover as specified in the remediation method statement is achieved.

The excavated levels shall be recorded before the commencement of filling. The level of the filled areas shall be taken and recorded after filling.

2 Types of Fill

There are potentially two types of fill to be used. These are as follows:

- Topsoil
- Subsoil

The capping of plot areas will comprise a minimum of 300 mm of topsoil. Underlying subsoil thicknesses will be as required to achieve the overall finished levels and to provide the required cover layer thicknesses as detailed in the main body of this report.

[1] BS6031:2009 Code of practice for earthworks
[2] CL:AIRE The Definition of Waste: Development Industry Code of Practice Version 2, March 2011

2.1 Topsoil

It is recommended that imported topsoil complies with the requirements of BS 3882:2015[3] for a Multipurpose Grade material.

The topsoil shall be free from fragments of glass, bricks, concrete, wire or other potentially hazardous matter.

Manufactured topsoil shall not be made from waste materials.

The topsoil shall be subject to the additional limitations set out below.

2.2 Subsoil

Imported manufactured or modified subsoil shall comprise certified clean material which satisfies the conditions set out in BS8601:2013[4]. Subsoil arising from site or from a certified direct transfer (e.g. under DoWCoP) shall comprise clean natural arisings from construction activities which have been confirmed acceptable by the Engineer.

2.3 Sources of Materials

Imported materials may be obtained from any source unless otherwise stated in the Drawings or in the Specification.

It shall remain the responsibility of the Contractor to obtain only fill material complying with the Specification and Method Statement, notwithstanding any tests which may be accepted by the Engineer.

The Contractor shall demonstrate to the Validation Engineer's satisfaction that the fill materials from each source are uncontaminated by submitting to the Validation Engineer a chemical analysis of material or evidence of such other tests as the Validation Engineer may require for all proposed sources of fill, and if necessary sampling and analysing materials as they are delivered to stockpiles or the fill location on site.

Sampling rates shall be a typical of one sample per 100-150 cubic metres of imported soil – as per the frequencies stated in the main body of the report - with a minimum of three samples per source of material, unless otherwise agreed with the Engineer. Such tests for chemical composition as may be agreed by the Engineer shall be carried out on each sample and the results of tests shall be forwarded to the Engineer. Testing for contamination on samples taken shall be carried out at a testing laboratory approved by the Engineer and shall be to appropriate MCERTS standards. The Contractor shall maintain records of the source and the date of delivery to the site of each source of fill and shall submit these records to the Engineer as requested. Chemical analysis on the imported fill material shall include testing for the contaminants listed in Table B1 as a minimum. Contaminant concentrations shall be below

[3] BS3883:2015 Specification for topsoil
[4] BS8601:2013 Specification for subsoil and requirements for use

those listed in Table B1 (attached) unless agreed otherwise by the Engineer. Additional analyses may be requested depending on the source and nature of the material. The concentrations in Table B1 are derived from available assessment criteria which are considered to represent uncontaminated concentrations of soil - Suitable for Use Levels (S4ULs)[5] for an allotment land use and, in the case of the phytotoxic metals copper, nickel and zinc, the topsoil specification in BS3883:2015. The concentrations in Table B1 assume that no significant contaminant linkage to controlled waters exists that could pose an unacceptable risk.

The S4ULs represent near-minimal risk to human health. In the case of cadmium, hexavalent chromium and benzo(a)pyrene, Category 4 Screening Levels (C4SLs)[6] also exist which are higher than minimal risk but are still strongly precautionary. In instances of persistent failures of the S4ULs for these chemicals, regulators may allow the C4SL to be used instead. This approach shall require regulatory agreement before being implemented. In addition, the following shall be deemed as unacceptable for replacement fills:

- Peat, materials from swamps, marshes and bogs.
- Logs, stumps and perishable material.
- Materials in a frozen condition.
- Clay having a liquid limit determined in accordance with BS17892-12:2018[7];, exceeding 90% or plasticity index determined in accordance with BS17892-12:2018, exceeding 65%.
- Material susceptible to spontaneous combustion.

2.4 Practical Considerations

2.4.1 Out of Specification Materials

Notwithstanding the specification for maximum allowable contaminant concentrations provided in Table B1, no materials will be accepted that are odorous, stained or contain visible product as is required by DoWCoP.

Should the Contractor proceed with stockpiling or spreading of fill prior to receiving approval from the Engineer of results for the above tests, and the results of such tests show that the fill is contaminated above acceptable levels, the Contractor shall remove all contaminated material and replace it with acceptable material at his own cost as part of the main contract.

2.4.2 Suitability of Materials for Gardening

Materials laid as clean cover must not only meet the requirements to be protective against land contamination but they must also be suitable for gardening. Hence, topsoil should not contain more than the British Standard-specified percentage of clay as exceeding this value

[5] The LQM/CIEH S4ULs for Human Health Risk Assessment, Nathaniel P et al, 2015. Copyright Land Quality Management Ltd, reproduced with permission: Publication Number S4UL3509

[6] Defra 'SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document' December 2014.

[7] BS EN ISO 17892 Geotechnical investigation and testing. Laboratory testing of soil. Determination of liquid and plastic limits

may result in poor drainage and the failure of plants to establish. Subsoil should contain sufficient nutrition and be of sufficient depth to allow for the establishment of larger shrubs and trees and hence, a subsoil exceeding the British Standard-specified percentage of sand (i.e. an as-dug sand) would be unsuitable.

TABLE B1: CHEMICAL CONTAMINANT SPECIFICATION FOR **IMPORTED MATERIALS**

Determinant	**Allotments**
Arsenic	37
Cadmium	1.9[1]
Trivalent Chromium	910
Hexavalent Chromium	6[1]
Copper	100
Lead	80
Mercury (inorganic)	19
Nickel	53
Selenium	88
Zinc	200
Benzo(a)pyrene[2]	0.79[3]
Naphthalene[2]	2.3[3]
Asbestos	No asbestos detected
Pesticides[4] (suite encompassing organochlorine, organophosphorus and triazine compounds)	Below laboratory limit of detection for all determinants
BS3882:2015 Multipurpose topsoil compliance test	Pass

Notes to table

1. *C4SL also available.*
2. *Surrogate markers for all PAHs.*
3. *Higher assessment criteria are possible and may be agreed with the EC & regulator on a case by case basis, for example, depending on the Soil Organic Matter content of the imported material.*
4. One test per source post import. *Frequency of testing for other determinants is as specified within the main body of the RMS. The EC will decide on suitability should trace concentrations of any compound(s) be detected.*