LCRM: Remediation strategy Cover soils: import acceptability procedure

Title	Details				
Project	Finchley Road (O2 Masterplan Site)				
Report Title	LCRM: Remediation - imported soil acceptability procedure				
Prepared by/for	Pell Frischmann Prepared for LS (Finchley Road) Limited				
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Date	26 April 2023				
Introduction	Pell Frischmann have been commissioned by LS (Finchley Road) Limited ('the client') to provide land contamination risk management (LCRM) services for the proposed Finchley Road development. This report summarises the LCRM ' <i>soil import acceptability</i> ' part of the Remediation Strategy for the proposed development. The Client will need to ensure that the landscape team (design and implementation) comply with				
Aims and limitations	 This document summarises the soil import acceptability process for assessing topsoil and subsoil suitability with respect to land contamination risk management, including: Soil import procedure flow chart, 				
	 Soil Acceptability Criteria limit values, Soil sampling frequencies. The contractor will be responsible for identifying appropriate soil sources and ensuring that the imported soils meet the requirements set out in this document. This document is based on soils being imported from a supplier under delivery tickets, therefore End of Waste processes (for example DoWCoP Material Management Plans) are not included. 				
Background	This document forms part of the Pell Frischmann <i>Remediation Strategy (ref. 4602_001-PEF-XXX-XX-RP-GG-600004, April 2023</i>). The 'composite clean cover system' remediation includes the need to source, import, place and verify suitable/ clean topsoil and subsoil onsite. Remediation details including objectives, locations and depth of soil are provided in the Remediation Strategy and are not repeated here. In addition, topsoil and subsoil will be imported as part of the above ground soft landscaping design in podium and roof garden areas. These soils will need to be 'suitable for use' to prevent				
	"new contamination" risks from being introduced to the site. Therefore, soil import acceptability criteria (SAC) and appropriate soil import acceptability procedures will also apply to these soils, as outlined in this document.				
Soil import acceptability procedure key steps	Figure 1 summarises the soil import acception of the soil import acceptability sequence Identify soil sources Suitability	ptability sequence. e Import & Plac inspect & r	e soils ecord Verify & report		
Soil sources	Potential soil sources typically include (in a. Topsoil/subsoil supplier (including ma b. Natural uncontaminated soil (in-situ/u c. Natural uncontaminated soils (excava d. Soil from soil treatment/waste transfe The contractor should aim to identify soil potentially contaminative land-uses (e.g. g that is free from asbestos and where satis provenance of the soil. If soils are being be considered and only when the natural to be clean.	order of likelihood): anufactured soil) nexcavated, at another of ated and stockpiled on an r station (stockpiled) that originates from sites greenfield sites not subje sfactory information is av sourced from brownfield soils have been extensiv	construction site), nother construction site) with no particular history of act to past contaminative use), ailable to confirm the sites, only the natural soils can rely characterised and proven		

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Finchley Road

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Assess suitability prior to import	Soil from potential sources will need to undergo suitable sampling, analysis and assessment to characterise the soils and to assess whether the imported soils meet the remediation objectives and are 'suitable for use' (Figure 2). Soils must not be imported to site without an upfront assessment of suitability.				
	Figure 2 Sampling, analysis and asse	essment			
	Soil sampling Geochemical laboratory Assess against limit values*				
	The geochemical composition of manufactured soils (a) is likely to be more variable than natural soils (b) and (c). Natural soils from brownfield sites require more detailed assessment compared to natural soils from 'greenfield sites'. Manufactured soils from a soil treatment/waste transfer stations (d) can be highly variable (d). Therefore, higher sampling frequency is recommended for soils sourced from brownfield sites and manufactured soil suppliers.				
Soil acceptability criteria	The land contamination risk assessment report included a generic quantitative risk assessment (GQRA) which referenced published generic assessment criteria (GACs) based on the Category 4 Screening Levels (C4SLs) and Suitable 4 Use Levels (S4ULs) published by Defra and Land Quality Management (LQM)/ Chartered Institute of Environmental Health (CIEH) respectively. GACs have been published for several land use scenarios.				
	Potential landscaping/soil placement for the site will be in areas of shared Public Open Space (POS) near to residential properties therefore the GACs for POS _{Resi} have been referenced in the first instance as the basis of Soil Acceptability Criteria for imported soil. Other factors such as soil saturation limits, hazardous properties and topsoil specifications have also been considered Hence, in some circumstances the specified SAC may be lower than published GAC.				
	Soil Acceptability Criteria (SAC) for the Finchley Road remediation are summarised in Table 3.				
Soil screening values (SSV)	Table 3 also includes conservative soil screening values (SSVs) for total polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) and sum of BTEX (Benzene, Toluene, Ethylbenzene and Xylene) which can be used as part of an initial screening assessment for soil suitability as follows:				
	where the geochemical results for a soil sample exceed these SSVs the soils should not be considered suitable for use.				
Where the SSVs are met the soils can then be assessed in more of the specified speciated PAH, TPH and BTEX components.				e details against the SAC for	
	Where there is any doubt about the suitability of a soil source or individual soil samples, specialist advice should be sought from a suitably experienced land contamination consultant.				
Topsoil and subsoil	 The overall soil specification is likely to be determined by the landscape team for the development and will include reference to the British Standards BS3882:2015 Specification for Topsoil. BS3882:2015 includes geochemical thresholds for the potentially phytotoxic elements zinc (Zn), copper (Cu) and Nickel (Ni) only, and pH, as summarised in Table 1. Table 1 BS3882:2015 Table 1 (extract) Potentially phytotoxic elements (by soil pH) 				
	Substance	Threst	nold concentration (n	ng/kg)	
	Copper, Cu (Nitric acid extractable)	<pre>Soil pH <6.0 <100</pre>	Soll pH 6.0 – 7.0	<pre>Soil pH >7-8.0</pre>	
	Nickel, Ni (Nitric acid extractable)	<60	<75	<110	
	Zinc. Zn (Nitric acid extractable)	<200	<200	<300	
	pH 5.5 – 8.5 pH				
	The thresholds included in BS3882: risks to plants and are not a substitu health in the context of land contam	2015 are intended to ite for SAC which are ination risk assessme	ensure soils will not e specified to be prot ent or remediation.	t present adverse tective of human	

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Soil sources and verification	Geochemical data for each and any potential topsoil and subsoil source should be reviewed prior to import. It is anticipated that the sample data will be provided by the soil supplier.			
sampling frequency	If the supplier is unable to provide suitable data, then the contractor will need to arrange for appropriate soil samples to be collected (at source where possible) and analysed. The minimum number of soil samples required are summarised in Table 2.			
	Table 2 Soil import: sampling and an	alysis frequency (minimum)		
	Sampling type and timing	Number of samples collected (minimum)	Samples analysed (minimum)	
	Potential soil source	5 (min)	3 (min)	
	Verification sampling for imported soils or a preferred soil source	5 (min) or 1 per 50m ³ *	3 (min) or 1 per 50m ³ *	
	* whichever frequency is greater			
	Once a preferred soil source (or sources) has been identified, additional verification sampling and analysis must be undertaken to ensure compliance with the soil acceptability criteria (SAC) and soil screening values (SSVs).			
	Verification sampling typically takes place once soil has been imported to site. Samples can be collected from stockpiles prior to placement or after the soil has been placed. The Contractor will need to allow sufficient time for sampling, analysis, reporting and assessment.			
Inspection	 Visual/olfactory inspection shall be undertaken to screen for the presence of any of the following as imported soil is delivered/unloaded onto site: Black staining Hydrocarbon (fuel/oil type) staining/odours Man-made objects (greater that 10mm diameter) Fibrous materials and/or cement bonded materials Other deleterious materials including refuse, plastic, metal, fabric, tarmacadam etc . Soils containing any of the should be consider unsuitable and must not be accepted or used onsite. Suitable arrangements will need to be made to reject and return unacceptable soils. 			
Out of specification materials	Any 'out of specification' material (either by visual inspection or laboratory analysis) must be segregated and removed from site. Stockpile management must be implemented to ensure that all soils excavated on site are kept separate from imported soils.			
Records	 The following records shall be collected and summarised in the remediation Verification Report': Soil source – site name and location and supplier details (name and address), Pre-import geochemical data, Import – delivery tickets including date and volume, Post import: a. Photographic records and sample location plans b. Geochemical laboratory analysis data c. Soil acceptability screening outcomes d. Records of any out of specification materials and actions taken to demonstrate that unsuitable soils were removed from site and replaced with suitable soils 			

Soil import flow chart



Soil Acceptability Criteria (SAC) and Soil Screening Values (SSVs)

Metals and metalloidsmg/kgmg/kgArsenicIndext (Argenic (Arg	Determinant	Soil Screening Values	Soil Acceptability Criteria
Arsenic(Mis)(Mis)(Mis)Boron (wis)(Mis)(Mis)Cadmium(Mis)(Mis)Cadmium III(Mis)(Mis)Chromium VI(Mis)(Mis)Copper (BS388:2015)(Mis)(Mis)Lead(Mis)(Mis)Mercury(Mis)(Mis)Selenium(Mis)(Mis)Vanadium(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Zinc (BS3882:2015)(Mis)(Mis)Selenium(Mis)(Mis)Polycyclic Aromatic Hydrocarbons(Mis)(Mis)Benzo(a)anthracene(Mis)(Mis)Benzo(a)pryrene(Mis)(Mis)Indeno[123-cd]pryrene(Mis)(Mis)Total Petroleum Hydrocarbons (TPH)(Mis)(Mis)CWG)(Mis)(Mis)(Mis)BTEX soil screen value (SSV)(Mis)(Mis)BTEX soil screen val	Metals and metalloids	mg/kg	mg/kg
Boron (w/s) (1000) Cadmium (1000) Chromium III (1000) Chromium VI (1000) Copper (BS3882:2015) (1000) Lead (1000) Mercury (1000) Nickel (BS382:2015) (1000) Selenium (1000) Vanadium (1000) Polycyclic Aromatic Hydrocarbons (PAHs) (USEPA16) (1000) Total PAHs screening value ≤100 Benzo(a)pyrene (1000) Benzo(a)pyrene (1000) Indeno(123-cd)pyrene (1000) Total Petroleum Hydrocarbons (TPH CWG) (1000) Total Petroleum Hydrocarbons (TPH CWG) (1000) Total Petroleum Hydrocarbons (TPH CWG) (1000) BTEX soil screen value (SSV) <6	Arsenic		79
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pH value 5.5 to 8.5 pH	Asbestos		No asbestos in soils (Not Detected)
	pH value		5.5 to 8.5 pH

Note 1. All values represent SAC unless these are listed as screening values

Note 2. The SACs listed for copper, nickel and zinc consider BS3882:2015 which typically specifies lower thresholds (compared to POSresi GAC).

Note 3. All values are in mg/kg u	inless stated otherwise.
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