Southern Testing
Environmental & Geotechnical

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Remediation Strategy and Verification Plan

Desk Studies | Risk Assessments | Site Investigations | Geotechnical | Contamination Investigations | Remediation Design and Validation

Site: 35a Broadhurst Gardens, Camden, London

Client: Circle East Limited

Report Date: 18th September 2018

Project Reference: JN1124

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SUMMARY

The property occupies the lowest floor and rear garden/yard area of no. 35 Broadhurst Gardens, in Camden, north-west London. This is a detached brick-built Victorian residential building with three further floors, including attic space. The site is the subject of a Prior Approval application for a change of use from the current B1 business class to residential C3 class.

A desk study was carried out and indicates that the site was part of a field before construction of the property in the late 19th Century. It has been used for residential purposes and, most recently, as recording studio.

A single phase of intrusive investigation was carried out, which comprised 4 No trial holes to a maximum depth of 2m bgl by way of hand-held equipment.

The soils analysed, at times, were impacted with lead and arsenic.

Recommendations are made for some basic remediation of the garden area proposed, along with implementation of a discovery strategy.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based upon them. Their validity should be confirmed at the time of site development.

		
J Kelly		A Moffatt
(Countersigned)		(Signed)

For and on behalf of Southern Testing Laboratories Limited

STL: JN1124
18 September 2018

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A INTRODUCTION

1 Authority

Our authority for carrying out this work is contained in an email from Katie Turvey of Planning Potential, dated 21st August 2018.

2 Location

The site is located at 35a Broadhurst Gardens, Camden, London NW6 3QT.

3 Proposed Construction

It is proposed to change of use of an existing Victorian property from the current B1 business class to residential C3 class. The proposed layout is shown in Appendix A.

For the purposes of the contamination risk assessment, the proposed development land use is classified as Residential with plant uptake.

4 Scope

This report presents our Remediation Options Appraisal, Remediation Strategy, and Verification Plan for the proposed remedial works at the site.

As with any site there may be differences in soil conditions between exploratory hole positions.

The findings and opinions conveyed via this report are based on information obtained from a variety of sources as detailed within this report, and which Southern Testing Laboratories Limited believes are reliable. Nevertheless, Southern Testing Laboratories Limited cannot and does not guarantee the authenticity or reliability of the information it has obtained from others.

This report has been prepared for the sole internal use and reliance of Circle East Limited and their representatives. This report shall not be relied upon or transferred to any other parties without the express written authorization of Southern Testing Laboratories Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The recommendations contained in this report may not be appropriate to alternative development schemes.

The contamination screening values used are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based upon them. Their validity should be confirmed at the time of site development.

B BACKGROUND INFORMATION

5 Site Investigation Works

The site has been the subject of a series of site investigation reports, as listed below

Ref	Date	Author	Title/Ref No.	Subject
1	20th April 2018	Southern Testing	J13567	Desk Study
2	25th June 2018	Southern Testing	JN1124rev1	Phase II contamination investigation

These reports provided reasonable coverage and characterisation of the site, for accessible external areas, and information derived from these reports is discussed below. The reader is referred to the original reports for supporting detail if needed. These reports are referred to below by the number given in the left hand column of the above table.

6 Site History

The desk study, detailed in report [1] indicates that the site was undeveloped until the 1890's, when the property was constructed. This has most likely been used for residential purposes during this time, although it is now partially used as a recording studio.

The site investigation [2] identified elevated concentrations of lead, in both samples of the made ground and topsoil analysed, and a sample of the made ground tested was also impacted with arsenic.

7 Relevant Pollutant Linkages

The various site investigations and risk assessments carried out identified the following Relevant Pollutant Linkages for the site:

Contaminant/Source	Pathways	Receptors
Lead and arsenic in topsoil and made ground	*Soil/dust Dermal exposure* *Soil/dust Ingestion/inhalation* *Plant uptake*	*Site/ Construction workers* *Future residents* *Flora & Fauna*

C REMEDIAL OBJECTIVES AND OPTIONS

8 Remedial Objectives

On the basis of the investigation carried out to date and site proposals, the remediation objectives are as follows:

- Reduce any minor risk to the site workers and future residents from lead and arsenic in the made ground and topsoil.

9 Options Appraisal

9.1 Lead and Arsenic in Made Ground and Topsoil

The risks to human health receptors from lead and arsenic in the Made Ground could be dealt with by several methods.

In respect of construction and maintenance workers, the use of PPE and safe working practices (minimising disturbance of the soil, creation of dust and the extent and duration of contact with soils) can reduce risk by helping to break the exposure pathways. However, while use of these measures should be considered as part of good practice in construction and maintenance, they typically are looked upon as a measure of last resort and need to be used in combination with other measures. Neither are such measures appropriate for future site users (residents).

Breaking the exposure pathway prior to construction by emplacement of imported clean material and/or impermeable cover over the made ground could reduce risks to human health receptors including future site users. Buildings, access roads and car parking spaces constitute impermeable cover and therefore imported soils would only be needed for areas of the site proposed as soft landscaping in gardens.

Removing the source by careful selective excavation of affected soils and subsequent off-site disposal to an appropriately licensed facility is also capable of reducing/eliminating the risk to human health receptors. As with emplacement of a barrier of clean material, this would only be required for soft landscaping in gardens areas, as buildings, access roads and car parking spaces will break the pathway.

Off-site disposal of contaminated soils and importation of clean materials place additional demands on aggregate resources and waste disposal capacity, and both require significant road haulage. Use of these remediation methods therefore requires that the quantities involved be minimised to ensure the approach remains sustainable in respect of resources, energy and traffic impacts.

An approach combining source removal and replacement with clean material to limited areas of the site, with carefully considered safe working methods for construction is considered most likely to be effective and sustainable in respect of lead and arsenic in the Made Ground.

For the topsoil, the risk from the lead impact can be mitigated by not re-using this material.

D PRELIMINARY REMEDIATION STRATEGY

11 Remediation Methods

The Remediation Strategy will comprise the following:

Location	Details
For soft landscaped and any garden bed areas only	For soft landscaped areas and any garden bed areas only, removal of 600mm and replacement with the same depth of certified clean subsoil and topsoil. This should comprise 450mm of certified clean subsoil and 150mm of certified clean topsoil to act as growing medium. The proposed garden area is shown on the plan in Appendix A.

12 Assessment Criteria

No additional assessment criteria are anticipated, assuming the source of topsoil will be from the open areas of the site, remote from the buildings, which has been assessed as suitable for reuse.

Should imported soils be required then they shall be free from deleterious materials, weeds and contamination. The material to be used will comply with the appropriate BS Specifications for Topsoil (BS 3882:2007) and Subsoil (BS 8601:2013) and the analysis shall also comply with the values given for (insert appropriate land use) in the table in Appendix B. These values are valid at the time of writing but may be subject to change and any such changes will have implications for the assessments based on them. Their validity should be confirmed at the time of site development.

E VERIFICATION PLAN

13 Data Collection

Location	Data	Responsible party
Soft Landscaped and any garden bed areas only	*Placement of certified clean subsoil and topsoil*	*Main contractor*
	Post placement check of thickness	*ST Consult*
	Post placement soil validation samples (if requested)	*ST Consult*
	Consignment Notes	*Main contractor*

14 Analytical Framework

The imported topsoil and subsoil will need to be certified clean by the supplier and may need additional testing to confirm suitability as clean cover in a residential garden.

15 Reporting

At the end of the remediation, a verification report will be produced by Southern Testing.

16 Discovery Strategy

As with any site, areas of contamination not identified during site investigation works may come to light in the course of redevelopment. Accordingly, a discovery strategy will be adopted to ensure that any hitherto unknown contamination is identified and dealt with in an appropriate manner, as follows:

- A close watch will be maintained during all demolition and excavation works.
- In the event that unexpected or malodorous soils or liquids are encountered, excavation work shall cease in the affected area.
- The affected area shall be made safe and fenced off to prevent unauthorised access.
- The Site Manager shall notify ST Consult of the discovery, who will attend site to inspect the suspect materials, provide advice and take samples as necessary. Within Southern Testing Laboratories, Dr Joe Kelly shall be the first point of contact.
- The Site Manager shall notify the London Borough of Camden of the discovery. The contact will be Nick Priddle.

Any suspect excavated soil will be stockpiled separately on polythene sheeting, covered, and tested before being removed.

17 General Guidance

In general terms, the workforce and general public should be protected from contact with contaminated material. There is a range of relevant documents published by the Health and Safety Executive, and organisations such as CIRIA, and the BRE.

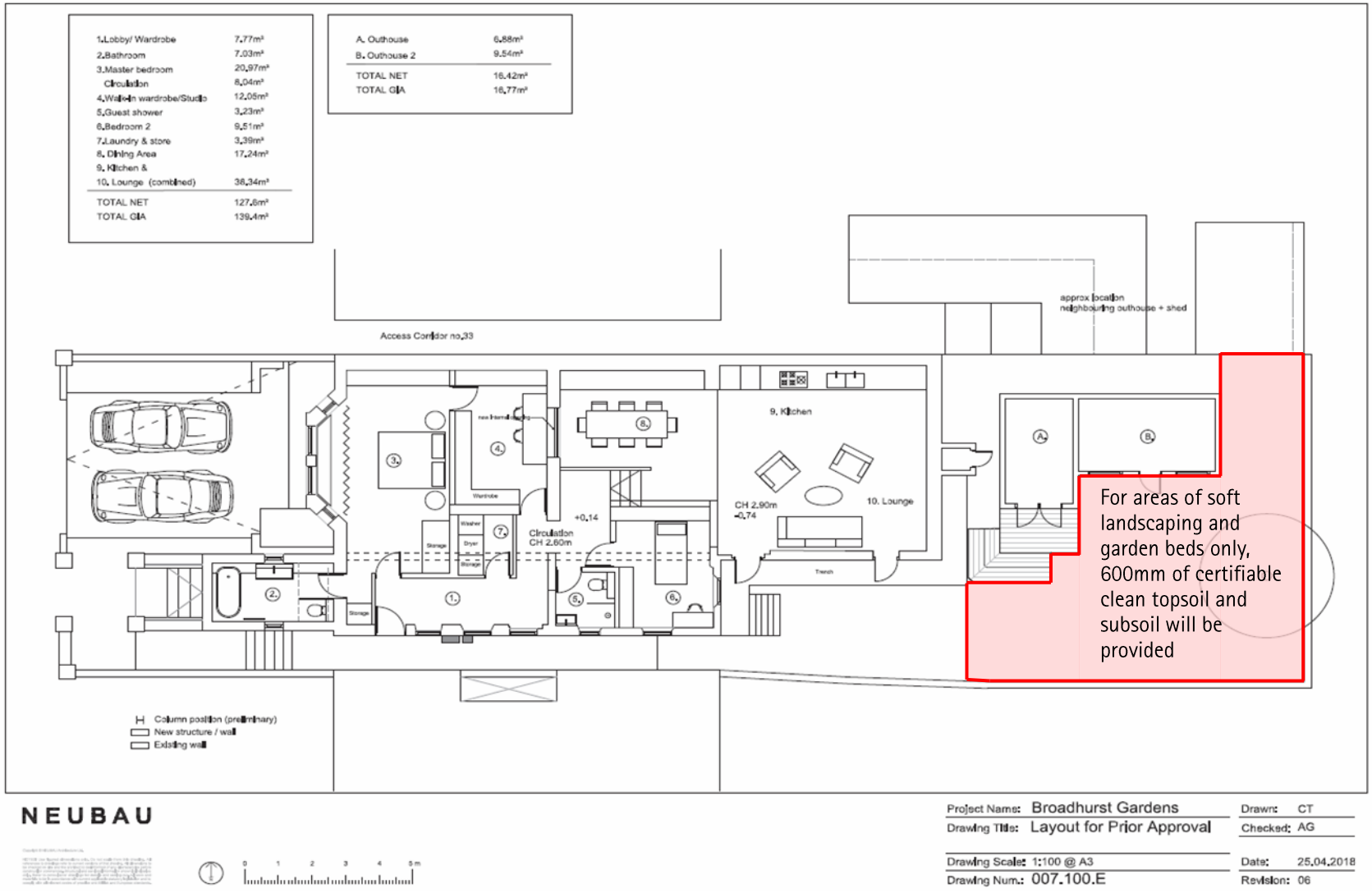
Some soils will require removal from site and disposal to suitably licensed landfills. Different guidelines and charges will apply to different waste classifications. As waste producers, the Developer holds responsibilities under the various governing regulations, including:-

- Ensuring that waste is characterised in accordance with current Technical Guidance (with suitable testing)
- Ensuring that waste is disposed of at a facility appropriately licensed to receive the waste as classified.
- Keeping accurate records of all waste classification, transfer and a disposal log including information such as:
    - Date, Waste Classification, Carrier's Registration Number, Transfer Note Number, Ultimate Destination.
- Submitting full copies of those records for inclusion in validation/closure reports.

Maintaining those records for potential future regulatory inspection.

APPENDIX A

Site Plans



Site: Camden, London	STL: JN1124	Fig No:
Date: 18 September 2018	Proposed Site Layout with Garden & Soft Landscaped Areas Highlighted in Red	

Southern Testing

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ST Consult

APPENDIX B

Verification Criteria

Contaminant Screening Values for Imported Soils

Contaminant	Units	Proposed Land Use					
		Residential with homegrown produce consumption	Residential without homegrown produce consumption	Open Space* (Residential)	Open Space* (Park)	Allotments	Commercial / Industrial
Arsenic (As) [2]	mg/kg	37	40	79	170	43	640
Cadmium (Cd) [2]	mg/kg	11	85	120	555	1.9	190
Trivalent Chromium (CrIII) [2]	mg/kg	910	910	1,500	33,000	18,000	8600
Hexavalent Chromium (CrVI) [2]	mg/kg	6	6	7.7	220	1.8	33
Lead (Pb) [3]	mg/kg	200	310	630	1300	80	2330
Mercury (Hg) [1,2,7]	mg/kg	7.6-11	9.2-15	40	68-71	6.0	29-320
Selenium (Se) [2]	mg/kg	250	430	1,100	1,800	88	12,000
Nickel (Ni) [1,4]	mg/kg	pH<6.0 60 pH 6.0-7.0 75 pH>7.0 110					
Copper (Cu) [1,4]	mg/kg	pH<6.0 100 pH 6.0-7.0 135 pH>7.0 200					
Zinc (Zn) [1,4]	mg/kg	pH<6.0 200 pH 6.0-7.0 200 pH>7.0 300					
Phenol [1,2]	mg/kg	120-380	440-1200	440-1300	440-1300	23-83	440-1300
Benzo[a]pyrene [1,5]	mg/kg	1.7-2.4	2.6	4.9	10	0.67-2.7	36
Naphthalene [1,2]	mg/kg	2.3-13	2.3-13	77-430+	77-430+	4.1-24	77-430+
Total Cyanide (CN) [6]	mg/kg	/	/			/	/
Free Cyanide [6]	mg/kg	/	/			/	/
Complex Cyanides [6]	mg/kg	/	/			/	/
Thiocyanate [6]	mg/kg	/	/			/	/

Notes:

* Open Space levels calculated on the basis of the exposure modelling developed in the C4SL research.

+ Screening values constrained to saturation limit. Higher values may be acceptable on a site specific basis.

[1] Where ranges of values are given for organic contaminants, the screening value is dependent on the Soil Organic Matter. Where ranges are given for inorganic contaminants, the screening value is dependent on the pH.

[2] LQM/CIEH S4UL (2014). Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4UL 3116. All rights reserved.

[3] C4SL (DEFRA 2014).

[4] Copper Zinc and Nickel may have phototoxic effects at the GAC or SGV concentrations and alternative criteria are given for importation of Topsoil or other soils for cultivation, based on BS3882:2007 (Topsoil) and BS8601:2013 (Subsoil).

[5] Based on the Surrogate Marker approach and modelled using the modified exposure parameters of C4SL but retaining 'minimal risk' HCV.

[6] Usually Non-Detect concentrations. Screening criteria to be derived on a site specific basis if test results indicate.

[7] SGV/GAC for Methyl Mercury, higher concentrations may be tolerable if inorganic mercury is the only species present. Lower concentrations apply for elemental mercury.

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