REMEDIATION METHOD STATEMENT

Site **63 SANDYCOMBE ROAD,RICHMOND, GREATER LONDON TW9 2EP**

Client **WOODCROFT DEVELOPMENTS**

Report Ref
20/11527/A/KJC

Issued
NOVEMBER 2020

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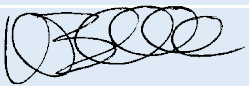
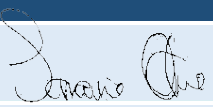
DOCUMENT CONTROL			
Report Title	Remediation Method Statement		
Contract	Sandycombe Road, Richmond		
Report Reference	20/11527/A/KJC		
Client	Woodcroft Developments		
Issued by	**K J Clark** BSc Hons Director		
Revision No.	Status	Date of Issue	Final Issue Check
0	Final	16 November 2020	

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The recommendations made and opinions expressed in this Report are based on the strata conditions revealed by the fieldworks as indicated on the exploratory records, together with an assessment of the data from in situ and laboratory tests. No liability can be accepted for conditions which have not been revealed by the fieldworks, for example, between exploratory positions. While this Report may offer opinions on the possible configuration of strata, both between the excavations and below the maximum depth achieved by the investigation, these comments are for guidance only and no liability can be accepted for their accuracy. The data obtained relate to the conditions which are relevant at the time of the investigation.

The groundwater observations entered on exploratory records are those noted at the time of the investigation. The normal rate of progress does not usually permit the recording of any equilibrium water level for any one water strike. It should be noted that groundwater levels are prone to seasonal variation and to changes in local drainage conditions. The word 'none' indicates that groundwater was sealed off by the borehole casing or that no water was observed in the exploratory hole upon completion.

REPORT REF: 20/11527/A/KJC
CONTRACT: SANDYCOMBE ROAD, RICHMOND

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1 INTRODUCTION

The Client proposes to construct two mixed use buildings at 63 Sandycombe Road, Richmond ("the site"). The previous investigation of the site has revealed elevated levels of PAH's, arsenic and lead within the shallow soils, such that remedial measures will need to be incorporated in soft landscaped areas. This Remediation Statement provides details of the procedures to be adopted during construction and summarises the recommendations made in earlier site investigation reports by Albury S.I. Ltd. The Remediation Method Statement should be supplemented by a final validation report to verify that the works have been implemented.

2 SUMMARY OF PREVIOUS INVESTIGATIONS

The site comprises and area of land to the rear of 63 Sandycombe Road, Richmond. A Phase 1 Desk Study was undertaken by Land Science, dated in June 2016, which recommended that an intrusive investigation should be undertaken.

The following reports should be read in conjunction with this RMS:

- Phase 2 Report on a Site Investigation – Report Ref. 20/11527/KJC
  Issued April 2019

The intrusive investigation revealed elevated levels of arsenic, lead and PAH's within the shallow made ground at 0.1m, 0.3m and 0.5m depth. Therefore, remedial measures are required in all areas of soft landscaping.

3 REMEDIATION PROPOSALS

The following remedial measures are proposed to protect future occupiers from long-term exposure to residual soil contamination.

3.1 Soft Landscaping

Based on the findings and conclusions of the earlier report it was proposed within soft landscaping areas to remove 600mm of soil to be replaced with a cover of clean topsoil and subsoil. It should be noted that these measures are not necessary beneath permanent hardstanding or buildings.

A total thickness of clean cover of 600mm should be incorporated within areas of soft landscaping. The impacted soils should be excavated to a depth of 600mm below formation level and a hi-visibility geotextile placed at the base. The excavated soils should then be replaced with 450mm of inert, clean (non-waste), subsoil and an upper layer comprising certified topsoil of 150mm thickness to act as a growing medium.

The final thickness of topsoil will be dependent upon the proposed landscape scheme and additional topsoil can be substituted for the subsoil as long as the total soil thickness is maintained. Greater thicknesses of topsoil or clean cover may be required for any proposed shrubs or trees. Allowances should be made for any subsequent settlement or compaction of the topsoil layer, which can occur following periods of heavy rainfall and foot traffic.

The proposed cover system is outlined in the following table:

Table 1 – Proposed Cover System

Component	Thickness mm
Topsoil	150
Cohesive subsoil	450
Hi-visibility Geotextile	1

This measure of incorporating clean cover will adequately reduce the risk to future receptors. Any imported materials should be from a certified source, with supplier geochemical certification or independent validation testing. Relevant export dockets (muckaway) and import delivery tickets should be retained to form part of a final validation report. It would be prudent to review any geochemical data for any material, to confirm its suitability prior to it being imported to site.

The imported topsoil and subsoil will be from a certified source and chemical test results are to be supplied prior to the material being brought to site. It may be a Local Authority for independent sampling and testing to be undertaken. It is suggested that a sample of each layer at one location within each area would be appropriate. The chemical test results for all imported materials should be compared with current available guidance. The chemical

specification will comprise the Category 4 Screening Levels [C4SLs] (DEFRA, 2014) and Suitable for Use Levels [S4ULs] (LQM/CIEH, 2014) that are derived using the CLEA software. A table detailing the chemical specification for imported soils is included in Appendix 1. An assessment should also be made for the presence of the phytotoxic metals: zinc, copper and lead published by DEFRA (2005), PTE Levels in Soil Following Application of Sewage Sludge.

3.2 Health and Safety

It is considered that any risks to site operatives and ground workers can be managed through the use of appropriate PPE, safety procedures and precautions such as hand washing facilities.

3.3 Services

The specification of water supply pipes will depend upon the specific requirements of the utility service provider and this report, including all previous reports, should be submitted to them for their consideration.

4 DISCOVERY STRATEGY

It is recommended that the site manager maintain a discovery strategy or watching brief during the development. The watching brief would comprise the regular inspection of all excavations. If any materials suspected of containing contamination, such as oily material or soils of unusual colouration or odour are identified, then the following procedures should be adopted:

- Work to cease in that area.
- Notify the geoenvironmental engineer to attend site and carry out sampling and testing of suspected contaminated material, which should be segregated and stockpiled within a bunded area and covered to prevent rainfall infiltration.
- Notify the Local Authority Contaminated Land Officer, where appropriate, if amendments to the remediation plan area are necessary.
- Soil sampling of excavated area from bases and sides to demonstrate the area of contamination has been excavated.
- Photographic evidence of all stages of the development, particularly of any excavations, should be routinely kept and retained. Detailed records of any stockpiled material, its size and location, together with any duty of care transfer notes. Where necessary this information should be incorporated within the final validation report.

5 VALIDATION AND VERIFICATION

This report should be submitted to the Local Authority for their comment and approval prior to implementation. Once all the remedial works and site inspections have been completed, a validation statement is to be issued detailing the works completed and providing a declaration that the development is now suitable for the intended use.

The following documentation should be retained for inclusion in a final validation statement:

- Records of site visits, inspections and photographs of the development stages, including of any excavations during demolition.
- Duty of care waste transfer and disposal notes, as well as details of any waste carrier/soil hub and/or landfill licenses, for all soils removed from site during the development.
- Details of any imported soils and accompanying third party geochemical testing of materials used to form the capping layer. The source of imported soils, frequency of testing and assessment are outlined in section 3.1.
- Details of the geotextile to be used, which should be a hi-visibility orange or similar warning colour.
- Confirmation of capping layer thickness, with photographic evidence of the capping layer construction, placement of geotextile and geochemical testing of materials used to form the capping layer.

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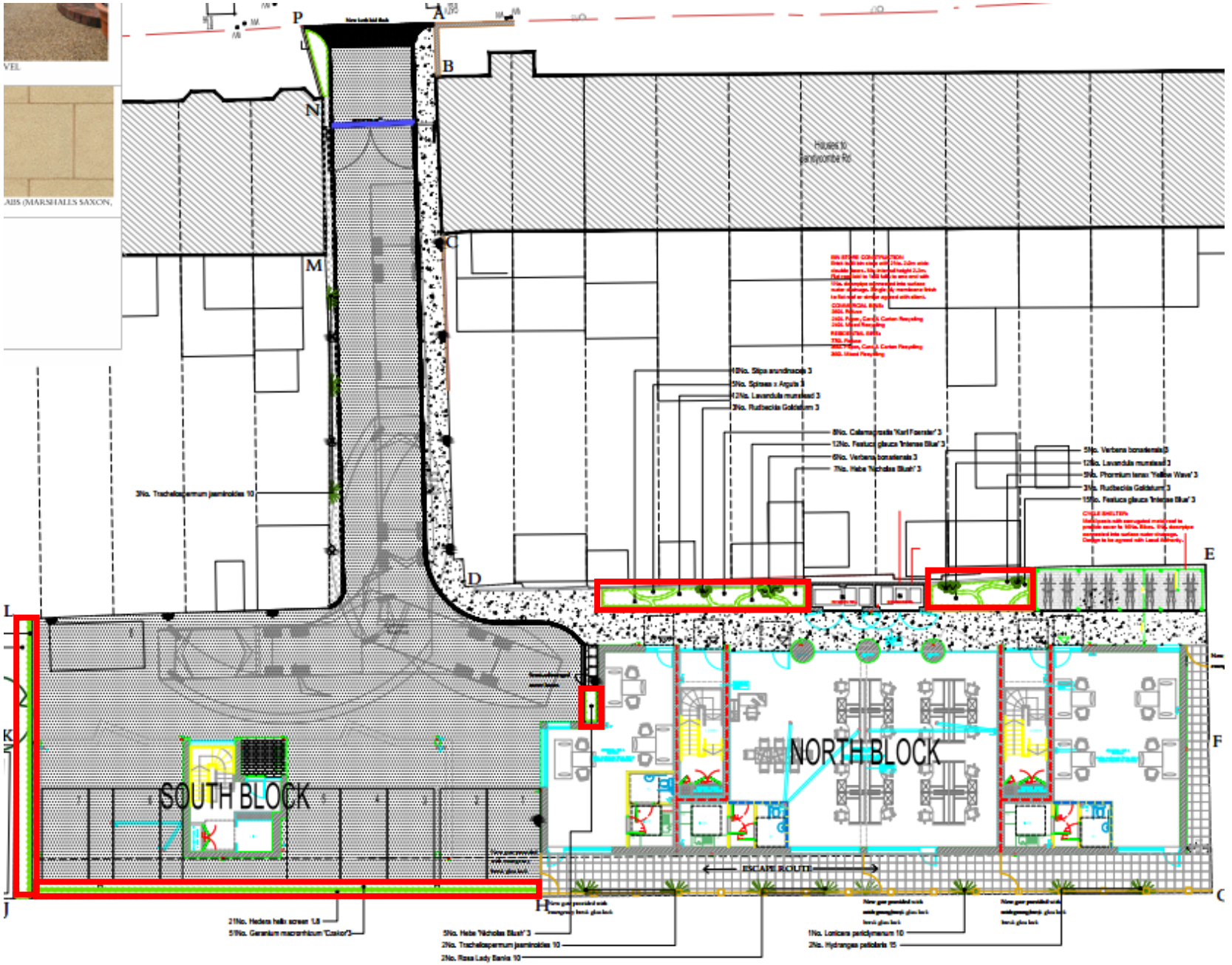
LIST OF ABBREVIATIONS

AOD	-	Above Ordnance Datum
ACM	-	Asbestos-containing Material
AST	-	Above-ground Storage Tank
BGS	-	British Geological Survey
BH	-	Borehole
BRE	-	Building Research Establishment
BSI	-	British Standards Institution
BS	-	British Standard
C4SL	-	Category Four Screening Level
CIRIA	-	Construction Industry Research and Information Association
CP	-	Cable Percussive
DPH	-	Dynamic Probing Heavy
DPSH	-	Dynamic Probing Super Heavy
EA	-	Environment Agency
GAC	-	Generic Assessment Criteria
LL	-	Liquid Limit
mAOD	-	Metres Above Ordnance Datum
mBGL	-	Metres Below Ground Level
mOD	-	Metres Ordnance Datum
OS	-	Ordnance Survey
PAH	-	Polycyclic Aromatic Hydrocarbons
PCB	-	Polychlorinated Biphenyl
PID	-	Photo Ionisation Detector
PL	-	Plastic Limit
PSD	-	Particle Size Distribution
SGV	-	Soil Guideline Value
SOM	-	Soil Organic Matter
SPT	-	Standard Penetration Test
SPZ	-	Source Protection Zone
SVOC	-	Semi-volatile Organic Compounds
TPH	-	Total Petroleum Hydrocarbon
UST	-	Underground Storage Tank
UXB	-	Unexploded Bombs
UXO	-	Unexploded Ordnance
VOC	-	Volatile Organic Compound

FIGURE 1

SITE PLAN



Legend:

Soft Landscaping

Title:	Site Layout Plan
Dwg No:	20/11527/A/1
Drawn by:	KJC
Client:	Woodcroft Developments
Contract:	Sandycombe Road, Richmond
Job Ref:	20/11527/A/KJC
Scale:	NTS
Revision:	0
Issue Date:	12/11/2020

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APPENDIX 1

SOIL ASSESSMENT CRITERIA FOR HUMAN HEALTH

ALBURY S.I. LTD Geotechnical & Environmental

Soil Generic Assessment Criteria for Human Health - Importation of Topsoil

Determinand	GAC (mg/kg^{-1})	
	Residential with home-grown produce	Source
Asbestos	No asbestos detectable	Council Requirement
Arsenic	37	S4UL (2014)
Benzene	(0.087, 0.17, 0.37)	S4UL (2014)
Toluene	(130, 290, 660)	S4UL (2014)
Ethylbenzene	(47, 110, 260)	S4UL (2014)
Xylenes - m, o or p	(56, 130, 310)	S4UL (2014)
Benzo[a]pyrene	(2.2, 2.7, 3.0)	S4UL (2014)
Beryllium	1.7	S4UL (2014)
Boron	290	S4UL (2014)
Cadmium	11	S4UL (2014)
Chromium III	910	S4UL (2014)
Chromium VI	6	S4UL (2014)
Copper	See PTE Table below	DEFRA, 2005
Lead	200	Category 4 [C4SL] (2014)
Inorganic Mercury (Hg^{2+})	40	S4UL (2014)
Nickel	See PTE Table below	DEFRA, 2005
Selenium	250	S4UL (2014)
Vanadium	410	S4UL (2014)
Zinc	See PTE Table below	DEFRA, 2005
TPH Aliphatic EC 5-6	(42, 78, 160)	S4UL (2014)
TPH Aliphatic EC >6-8	(100, 230, 530)	S4UL (2014)
TPH Aliphatic EC >8-10	(27, 65, 150)	S4UL (2014)
TPH Aliphatic EC >10-12	(130, 330, 760)	S4UL (2014)
TPH Aliphatic EC >12-16	(1100, 2400, 4300)	S4UL (2014)
TPH Aliphatic EC >16-35	(65000, 92000, 110000)	S4UL (2014)
TPH Aliphatic EC >35-44	(65000, 92000, 110000)	S4UL (2014)
TPH Aromatic EC 5-7 (benzene)	(70, 140, 300)	S4UL (2014)
TPH Aromatic EC >7-8 (toluene)	(130, 290, 660)	S4UL (2014)
TPH Aromatic EC >8-10	(34, 83, 190)	S4UL (2014)
TPH Aromatic EC >10-12	(74, 180, 380)	S4UL (2014)
TPH Aromatic EC >12-16	(140, 330, 660)	S4UL (2014)
TPH Aromatic EC >16-21	(260, 540, 930)	S4UL (2014)
TPH Aromatic EC >21-35	(1100, 1500, 1700)	S4UL (2014)
TPH Aromatic EC >35-44	(1100, 1500, 1700)	S4UL (2014)
Acenaphthene	(210, 510, 1100)	S4UL (2014)
Acenaphthylene	(170, 420, 920)	S4UL (2014)
Anthracene	(2400, 5400, 11000)	S4UL (2014)
Benz[a]anthracene	(7.2, 11, 13)	S4UL (2014)
Benzo[a]pyrene (only)	(2.2, 2.7, 3.0)	S4UL (2014)
Benzo[b]fluoranthene	(2.6, 3.3, 3.7)	S4UL (2014)
Benzo[ghi]perylene	(320, 340, 350)	S4UL (2014)
Benzo[k]fluoranthene	(77, 93, 100)	S4UL (2014)
Chrysene	(15, 22, 27)	S4UL (2014)
Dibenz[ah]anthracene	(0.24, 0.28, 0.3)	S4UL (2014)
Fluoranthene	(280, 560, 890)	S4UL (2014)
Fluorene	(170, 400, 860)	S4UL (2014)
Indeno[123-cd]pyrene	(27, 36, 41)	S4UL (2014)
Naphthalene	(2.3, 5.6, 13)	S4UL (2014)
Phenanthrene	(95, 220, 440)	S4UL (2014)
Pyrene	(620, 1200, 2000)	S4UL (2014)

Values in brackets indicate SGVs for SOM (1%, 2.5%, 6%).

Potentially Toxic Elements [PTE]	Maximum permissible levels of toxic elements in soil mg/kg (Grassland figures in brackets)			
	pH 5.0<5.5	pH 5.5<6.0	pH 6.0-7.0	pH >7.0
Zinc	200	250	300	450
Copper	80 (130)	100 (70)	135 (225)	200
Nickel	50 (80)	60 (100)	75 (125)	100

Based upon levels of PTE in soil following application of sewage sludge to agricultural soil (DEFRA, 2005)

The above GAC are presented above for reference only and should be considered with their respective technical notes. The technical notes are commercially in confidence and are not repeated here.

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