

Report on a **PHASE 3 REMEDIATION STRATEGY**

Ref: 23/37713-1 | Date: November 2023

**8 Westbourne Park Road
London
W2 5PH**

Prepared for:
Mr Edoardo Zegna



DOCUMENT CONTROL

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1.0 INTRODUCTION

At the request of Mr Edoardo Zegna, a proposed remediation strategy and remedial action plan at 8 Westbourne Park Road, London, W2 5PH was prepared in connection with a proposed redevelopment at the above site.

1.1 Report Objectives

This report comprises a Phase 3 - Remediation Strategy Report to assess the remediation required for the protection of the end-user from the presence of potential contamination within the soils encountered.

Planning permission granted by councils for development of Brownfield land often have conditions attached which require the following site investigation to be undertaken and submitted to the local authority for approval:

1. Phase 1 - Preliminary Risk Assessment
2. Phase 2 - Intrusive Investigation
3. Phase 3 - Remediation Strategy
4. Phase 4 - Validation Report

This Phase 3 report should be read in conjunction with the Phase 1 - Preliminary Risk Assessment has previously been undertaken at the site by Site Analytical Services Limited in July 2023, reference 23/37125 and Phase 2 Site Investigation (SAS Limited Report Ref: 23/37713, dated November 2023).

This document summarises the results, discussion and conclusions of the previous investigation works and comprises and remediation strategy for the development of the site.

A Phase 4 - Validation Report should be compiled and submitted to the council when the development has been completed.

1.2 Objectives and Scope of Works

The objectives and scope of this document are as follows:

- The identification of a suitable approach to remediation in order to reduce contamination risks to acceptable levels for residential use.
- Producing a remediation strategy that addresses all relevant contaminant linkages, where appropriate by combining remediation options.

- To satisfy any Condition attached to council planning application stating that a remediation strategy be submitted and agreed with interested parties.
- To define any controls required (legislative, regulatory or otherwise) during the implementation of the Remediation Strategy.
- To provide a validation plan outlining the verification procedures that will be adopted to ensure remediation measures are implemented to a suitable standard.

The work was carried out in accordance with the methodologies detailed in the LCRM: Land Contamination Risk Management Document.

1.3 Report Limitations

The recommendations and comments given in this report are based on the ground conditions encountered in the exploratory holes made during the investigation and the results of the tests made in the field and the laboratory, within the time constraints applied by the project. It must be noted that there may be special conditions prevailing at the site remote from the exploratory hole locations which have not been disclosed by the investigation and which have not been taken into account in the report. No liability can be accepted for any such conditions.

The remediation action plan sets out a combination of investigation and remedial measures which, when considered in the context of the development, will ensure that the final development is suitable for the proposed use.

1.4 Confidentiality, Copyright and Reproduction

This document has been prepared by Site Analytical Services Limited in connection with a contract to supply goods and/or services and is submitted only on the basis of strict confidentiality. The contents must not be disclosed to third parties other than in accordance with the terms of the contract.

Site Analytical Services Limited accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

2.0 SITE SETTING AND SUMMARY OF RISK ASSESSMENT

Much of the information summarised in this section are based on the Phase 1 - Preliminary Risk Assessment has previously been undertaken at the site by Site Analytical Services Limited in July 2023, reference 23/37125 and Phase 2 Site Investigation (SAS Limited Report Ref: 23/37713, dated November 2023). Reference should be made to these reports for a detailed account of the information in this section.

2.1 Site Location, Current Site and Surrounding Land Uses

The site is located on the northern side of Westbourne Park Road – 30m to the west of the junction connecting Westbourne Park Road, the B411 Porchester Road and Celbridge Mews. The site is located in the north-east of Westminster, London, at approximate postcode W2 5PH. The site is bound by residential terraced properties to the east (10 Westbourne Park Road) and west (6 Westbourne Park Road) and part bound by a residential terraced property (4 Westbourne Park Villas) and institutional property (Paddington Children’s Library) to the north.

The site is trapezoidal in shape and covers an approximate area of 0.03 Hectares with the general area being under the authority of the City of Westminster.

The site location plan is presented below in Figure 1:

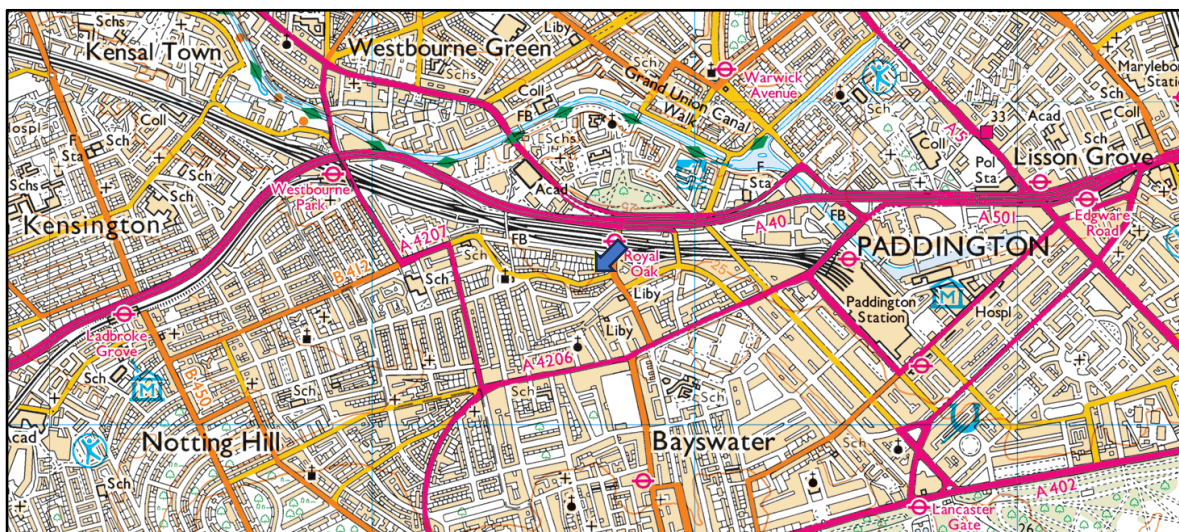


Figure 1 – Site Location Plan

Ordnance Survey © Crown copyright 2023. All rights reserved. Licence number LAN1001889

The site was most recently in use as a residential dwelling.

An existing site plan is presented below in Figure 2:

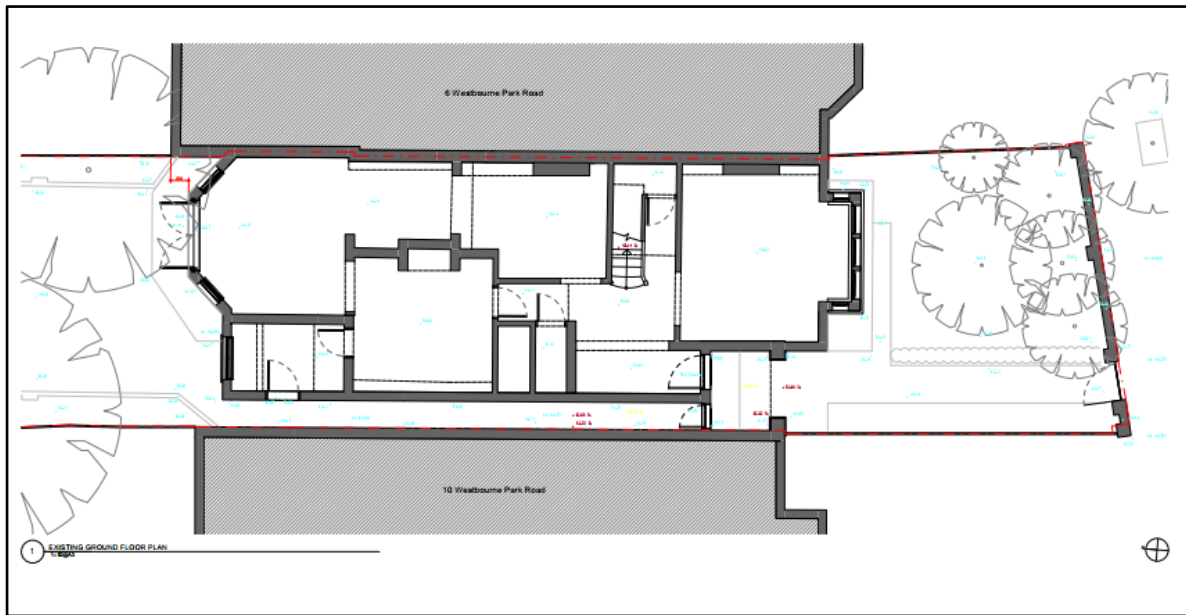


Figure 2 - Existing Site Plan

2.2 References of Planning Applications

There are several recent planning applications for the site registered on the City of Westminster planning portal. One application is relevant to this report and is detailed below.

Reference	22/04023/FULL
Alternative Reference	PP-11336706
Application Received	Monday 20 th June 2022
Application Validated	Monday 20 th June 2022
Address	8 Westbourne Park Road, London W2 5PH
Proposal	Excavation of basement extension beneath existing dwelling house, with associated front and rear lightwells and plant in basement.
Status	Decided
Decision	Application Permitted
Decision Issued Date	Thursday 15 th December 2022
Appeal Status	Unknown
Appeal Decision	Not Available

2.3 Proposed Development

The proposal is to a basement extension beneath the existing property. The proposed basement development will involve the excavation of the underlying soils at the site. The proposed development plan has been provided below in Figure 3:

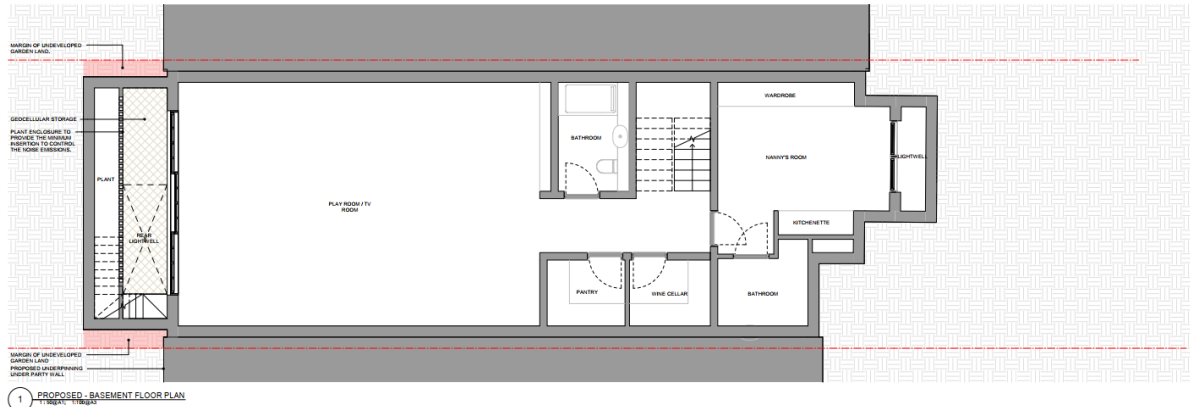


Figure 3 - Proposed Site Plan

2.4 Site Geology and Hydrogeology

The Geological Survey of Great Britain (England and Wales) covering the area indicates the site to be underlain by the London Clay Formation.

The exploratory holes revealed ground conditions that were generally consistent with the geological records and known history of the area and comprised Made Ground up to 1.20m in thickness underlain by the London Clay Formation.

The Bedrock geology underlying the site has been classified as London Clay Formation (Unproductive Stratum).

2.5 Contamination Assessment

A Contaminated Land Phase 1 report (Ref: 23/37125, dated July 2023) was completed for the site by Site Analytical Services Limited.

From historical map evidence it would appear that the site was first built on prior to 1869, with moderate changes taking place to the property since its construction. Ruins and several industrial premises including railway lines, garages, depots, a timber yard, engineering works and a printing works have been present within 250m.

The findings of the Phase 2 site investigation demonstrated that in the context of a proposed commercial use of the site, the contaminants of concern with respect to end-user protection was Lead.

The locations of the exploratory holes are shown on the site investigation plan below:

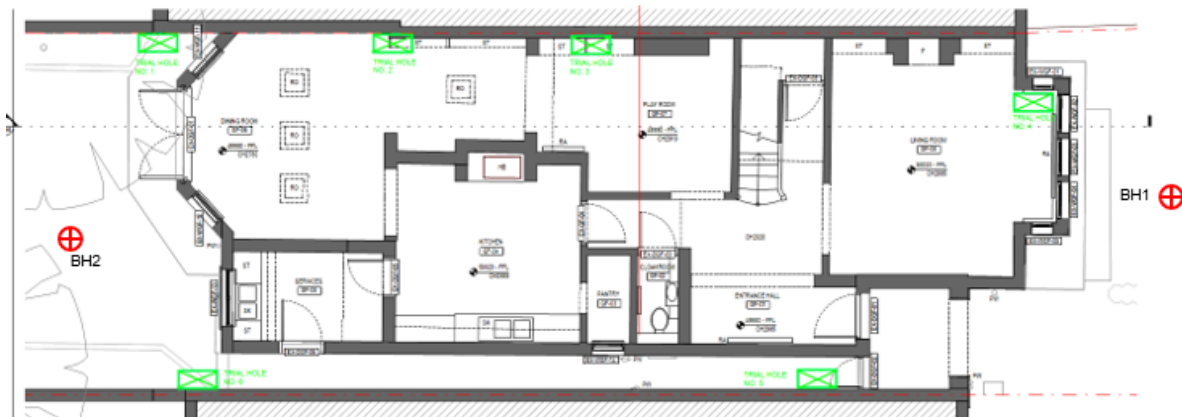


Figure 4 - Site Investigation Plan

Conceptual Site Model

In accordance with current UK guidance on contaminated land risk assessment (LCRM and BS10175), the following Conceptual Site Model has been generated to summarise the primary sources, receptors and migration and exposure pathways present on the site and to aid in the decision-making process.

For an environmental risk to exist there has to be a source of contamination, receptor or receptors at risk from the contamination and one or more pathway which links the two. Such contaminant – pathway – receptor relationships are termed pollutant linkages.

The subject site has been assessed within the source – pathway – receptor methodology as described above in the framework of a conceptual site model. A conceptual site model can be defined as a testable representation of environmental processes on a site and its vicinity. Its purpose is to identify potential contaminants, pathways and receptors with a view to, initially identifying potential and eventually, quantifying significant contaminant linkages. It should highlight any limitation and uncertainties present in the risk assessment and be able to communicate the results of the risk assessment to all stakeholders.

Table A presents the revised site conceptual model showing residual pollutant linkages.

Potential Contaminants / Source	Pathway	Receptor	Site specific settings	Risk Classification: (Phase 2)	Action Required
LEAD	Inhalation, ingestion and dermal contact.	Human Health Residents	Residential with home grown produce	Low/Medium	Further action required
LEAD	Inhalation, ingestion and dermal contact	Human Health Groundworkers	Workers should follow regulation on health and safety during development (HSE, 1991).	Low	Further action required – Good standard of site hygiene required

Table A – Phase 2 Conceptual Site Model

The Phase 2 Site Investigation has revealed that plausible contaminant linkages remain after the risk assessment and further actions are warranted. Assuming the future use of the site is residential, Lead encountered on-site indicated an unacceptable risk to the end-users and remediation should be undertaken.

3.0 REMEDIATION OBJECTIVES AND STRATEGY

3.1 Viable Risks Requiring Action

The risk assessment summarised above identified a number of contaminant linkages that are present at the site. The viable risks associated with the current site condition in the context of the proposed development can be summarised as follows:

- There is a risk to end-users of the site from Lead encountered in the Made Ground on-site. Mitigation should be undertaken on-site to negate this risk.
- There is a risk to the workforce on-site from Lead encountered in the Made Ground on-site. Normal PPE and following health and safety regulations would negate this risk.

Plausible pollutant linkages remain at site and further actions are necessary to ensure the protection of sensitive receptors. This can be achieved by either:

- Removal or treatment the source of pollutants;
- Removal or modification of the pathways;
- Removal of or modification of the behaviour of receptors.

The remediation strategy is to render ground conditions at the site 'suitable for use' from an environmental risk perspective taking into account the proposed redevelopment of the site.

The purpose of the strategy is to describe a framework for the treatment of contamination that can be developed by the designers of the development to give the most practical and cost-effective treatment for the proposed scheme and render ground conditions at the site 'suitable for use' from an environmental risk perspective. It should be considered in conjunction with an overall development plan of the site and is specific to the area set by the brief for the investigation.

Potential Remediation Methods and Options

Contaminated soils treatments on-site or off-site are presented in the table below:

Technology Type	Examples	Medium	Linkage	Suitability	Comments	Relevance
Biological	Bioventing	Soil	Source removal	Hydrocarbons	Reduce contaminants levels by increasing ventilation. Offsite gas monitoring needed	Not relevant
	Microbial or Phytoremediation	Soil	Source removal	Hydrocarbons and metals	Biodegradation by microorganism. Effectiveness can reduce soils condition (e.g. pH)	Not relevant
	Biodegradation	Soil	Source removal	Hydrocarbons	Excavation and piling of contaminated soils to increase the activity of aerobic microorganisms. Treatability testing is useful to determine the biodegradability of contaminants and appropriate oxygen and nutrient loading	Not relevant
Chemical	In-situ oxidation	Soil	Pathway interruption	Organic chemicals	Handling of large quantities of hazardous substance and may not be appropriate for small quantities of soils	Not relevant
	In-situ reduction	Soil	Pathway interruption	Hazardous chemicals	Handling of large quantities of hazardous substance and may not be appropriate for small quantities of soils	Not relevant
Civil Engineering	Capping	Soil	Pathway interruption	Various	This is not a treatment, but fixes the contaminant therefore breaking the pathways to the receptors	Suitable
	Vertical barriers	Free product, water, vapour	Pathway interruption	Various	Involve large amount of heavy constructions. Also contains the contaminants	Un-Suitable due to size of site
	Excavation and offsite disposal	Soil, Free product, water, vapour	Source removal	Various	The cost of disposal and treatment are a significant factor to consider	Suitable

Technology Type	Examples	Medium	Linkage	Suitability	Comments	Relevance
Physical	Soil washing	Soil, Free product	Source removal	Hydrocarbons and metals	Contaminated soils are excavated, then washed free of contaminants. Not suitable for a mixture of contaminants or for small volumes of soils	Not relevant
	Membrane	Vapour	Pathway interruption	Vapour	Breaks pathways of contaminants, and/or vapour	Not relevant
	Soil vapour extraction	Vapour	Source removal	Chlorinated solvents and hydrocarbons	Exhaust air from in-situ soil vapour extraction system may require treatment to eliminate possible harm to the environment as a whole	Not relevant
Thermal	Thermal desorption	Soil, Free product	Source removal	Organics	Not suitable for metals. Air emission need regulating therefore cost for permitting	Not relevant
	In situ vitrification	Soil, Free product	Source removal	Organics	Limited application for metals	Not relevant
	Incineration	Soil, Free product	Source removal	Waste	Not a treatment as such. More an alternative to landfill	Not relevant

Table B - Contaminated soils treatments

Remediation Strategy – Options Considered (Soils)

The proposed development plan is for the extension of the basement at the residential property.

The requirement is to break the source – pathway – receptor linkage on site via one of several scenarios as presented below;

Remediation Option A - Excavation of Contaminated Soils (Civil Engineering - Excavation and offsite disposal)

The proposal is that all contaminated material be removed for treatment and/or transported to permit offsite disposal facilities. Some pre-treatment of the contaminated material may be needed in order to meet land disposal restrictions.

Remediation Option B - Engineering Capping system (Civil Engineering - Capping option)

An engineering capping system could be introduced on-site which should comprise geotextile and/or mesh underlying a 200mm thick layer of gap graded crushed concrete (5-75mm) or the like with geotextile underlying 400mm thickness of clean certified fill / Topsoil.

Whilst there are a number of possible remediation methods that would be suitable for the site it is noted that the proposed redevelopment of the site includes the extension of the basement.

Remediation Strategy – Radon Gas

The Site is not in a Radon Affected Area (as defined by the Health Protection Agency), as less than 1% of properties are above the action level set by the Health Protection Agency. According to BR211 (by the Building Research Establishment), Radon Protection Measures are not required for new properties in these areas.

However, all basements are at increased risk of elevated levels of Radon gas (BR211 Section 6.12) and the UK National Radon Action Plan published in 2018 states: 'Radon measurements should be made in regularly occupied basements of properties irrespective of their geographical location.

As it is unlikely that conditions exist that will enable valid monitoring for Radon to be undertaken in low-risk locations such as London, it may be possible to mitigate the potential minimal risk and the need for monitoring through the incorporation of a suitably designed waterproofing system for a basement. This should be prepared by an appropriate specialist qualified in both waterproofing and radon management (BR211 Section 6.12), as part of the design of the basement.

An example of a suitable protective membrane complying to these requirements, is the Delta AT800 produced by Delta Membranes. It will be necessary to provide independent certification for the system to prove it has been installed correctly.

4.0 PROPOSED REMEDIATION MEASURES

4.1 Groundworks

4.1.1 Remediation Action (Option A)

The construction of the basement extension will result in the removal of some of the Made Ground at the site. The removal of the excavated material during the basement works will thereby remove all the residual contamination encountered within the Made Ground at the site.

4.1.2 Remediation Action (Radon Gas)

A suitably designed waterproofing system for a basement capable of providing a barrier against Radon gas should be included in the design of the basement.

4.2 Discovery Strategy

The discovery strategy sets out the actions that must be taken if unanticipated contamination is encountered during the course of a development.

A significant observation includes any observation of contamination. Examples of the types of observations that would be considered significant are set out in the following table.

Evidence	Description
Visual	<ul style="list-style-type: none"> Fuel or oil like substances mixed in with or smeared on the soil or floating on perched, groundwater or surface waters. Waste materials (refuse, barrels, industrial wastes, ash, tar, etc.) buried at specific location or across the site. Marked variation in colour. For example red, orange, yellow, green, light or dark blue, etc. may indicate contamination from a variety of contaminants. Soils including large amounts of ash and clinker where such contamination of soils wasn't expected.
Odours	<ul style="list-style-type: none"> Fuel, oil and chemical type odours Unusual odours such as sweet odours or fishy odours
Wellbeing	<ul style="list-style-type: none"> Light headedness and/or nausea when in excavations, at the working face of an excavation, when visual or olfactory evidence of contamination exists, etc. Burning of nasal passages, throat, lungs or skin Blistering or reddening of skin due to contact with soil

Table C - Discovery Strategy 1

Note: The examples provided in this table are not exhaustive.

The following table sets out the actions that must be taken if significant or suspected land, water or air contamination is observed by site staff, contractors or visitors.

Person observing contamination	To be reported to:	Action to be taken
Site visitor	Must report observations to the site manager	None
Contractor	Must report observations to the site manager	Stop work and where possible and safe make area safe and secure area before reporting to site manager
On-site manager	Must report observations to their direct manager, the appointed Environmental Consultant, the Planning Authority and Contaminated Land Officer	Stop work and where possible and safe make area safe and secure area before reporting to others
Environmental Consultant	Must report observations to the site manager, the Planning Authority and Contaminated Land Officer	Advise that work stops and where possible that the area is made safe before reporting to others

Table D - Discovery Strategy 2

The following table identifies other organisations that may need to be contacted in an emergency or where pollution of controlled waters or nuisance is occurring.

Occurrence	Description	Contact
Risk to the public	If at any point residents, the public or others may be at risk as a result of contamination found during the course of investigation, remediation or development works	<ul style="list-style-type: none"> Contact the emergency services if there is a risk to life Contaminated Land Officer/Planning Authority Health & Safety Executive
Nuisance to residents/the public	If a nuisance has been or is likely to be caused to nearby residents, the public and others – for example odours, dust, noise, vibration, etc.	<ul style="list-style-type: none"> Pollution Control Team at the Local Council (and other Councils where necessary)
Pollution of controlled waters	If any surface, culverted or groundwater has been polluted – for example slurry, contaminated soil/water or a chemical spillage entering a river or canal.	<ul style="list-style-type: none"> Environment Agency Planning Authority and Contaminated Land Officer at the Local Council
Pollution of adjoining land	If land outside the boundary of the development site is polluted from site activities – for example slurry, contaminated soil/water or a chemical spillage	<ul style="list-style-type: none"> The owner of the land Planning Authority and Contaminated Land Officer at the Local Council

Table E - Discovery Strategy 3

5.0 OTHER CONSIDERATIONS

5.1 Watching Brief

During the course of the development, it will be the responsibility of the on-site manger to ensure watching briefs are kept. A watching brief consists of a record of:

- Any observations of contamination made during the course of development by any member of site staff, contractor or visitor.
- A photographic record of the key stages of development and key occurrences, including any contamination found during the course of the development, the formation levels of excavations, any reduced level dig/mass excavation, formation of landscaped or garden areas, etc.

In areas of the site where there is a greater chance of finding contaminated soil and/or water an area specific watching brief will need to be kept. Such a brief will need to be completed by an appropriately qualified site manager and/or an environmental consultant. The following table specifies works in specific parts of the site that require an area specific watching brief, identifying who must complete the watching brief.

Examples of observations that should be recorded as part of a watching brief are included within Section 4.2 (Discovery Strategy).

Area of site	Works to be observed	Person to observe works
Basement Excavation	<ul style="list-style-type: none"> • Removal of Made Ground and natural ground. 	Site Manager
Building foundations	<ul style="list-style-type: none"> • Removal of Made Ground and natural ground. • Piling Works. 	Site Manager

Table F – Watching Brief

Upon completion of associated works, a written and signed statement will be obtained by the following parties:

- Groundworks contractor(s) upon completion of foundations and ground works
- On-site manager upon completion of groundworks and landscaping work
- Environmental Consultant upon completion of groundworks and landscaping works

The written statement must clearly state whether or not evidence of contamination was identified during the course of the development and the action that was taken.

5.2 Staff Training/Brief

All site staff, site contractors and, where significant contamination is expected site visitors, will be briefed on the potential presence of land, water or airborne contamination before commencing work on the site. Apart from any standard Health & Safety practices this will include the following information:

- Health & Safety considerations.
- The type of land, water or airborne contamination expected at the development site based on previous use and available site investigation information.
- Any particular areas of the site which are likely to be affected.
- Staff responsibilities under the discovery strategy (see Section 4.2)

Examples of observations that should be recorded as part of a watching brief are included within Section 4.2 (Discovery Strategy).

The on-site manager will need to provide written confirmation that site staff were briefed about contaminated land in line with these recommendations.

5.3 Waste Management Information

Soil will be required to be removed from the site as part of the remediation/development strategy. Under such circumstances the material will be defined as waste and all the necessary regulatory steps must be adhered to under this scenario.

An assessment of potential waste soils comprising of Made Ground were carried out as part of this study showed soils from site were hazardous in nature in a number of locations.

Excavated material must be classified in accordance with Environment Agency protocols for disposal at an appropriately licenced disposal facility.

Both Producers and Waste Management companies must ensure compliance with the Waste Acceptance Criteria (WAC) prior to landfill in hazardous, stable non-reactive cells and inert sites. These regulations govern the operation of landfill in England and Wales. Basic characterisation is the responsibility of the waste producer and compliance checking is generally the responsibility of the landfill operator. Therefore, landfill operators will be unlikely to accept waste that does not meet the Waste Acceptance Criteria for their class of site.

5.4 Workforce Duty of Care

Site worker exposure is acute in nature, i.e. high level exposure over a short time span. Appropriate Health and Safety procedures and provision of appropriate PPE should mitigate such risks.

The site should be secured at all times to prevent unauthorised access. Washing facilities should be provided and eating restricted to mess huts.

6.0 VALIDATION PLAN

6.1 Excavation Works

It is likely that a Solid Waste Management Plan (SWMP) will be produced for the site. These plans will document the waste arisings associated with the development and the proposed management/reuse on site. The Principal Contractor will forward the relevant portions of the SWMP to the Environmental Consultant. In addition to the above, the following information will be required from the site activities:

- A summary of the waste arisings from the site stripping and excavation activities.
- Information on the Waste Carriers and final destination of wastes.
- Copies of the consignment tickets.
- A copy of As-built drawings of the excavated areas.
- Photographic evidence the excavated areas.
- Estimated quantities of site won material to be reused on site.
- Areas of proposed backfilling
- Demonstration of material suitability
- Waste Characterisation and Classification Testing results.

6.2 Chemical Quality of Imported/Site Sourced Soils and Fills

Full technical information from the source provider will be provided, including details of source, whether it is virgin or manufactured and any batch chemical analyses completed.

- Soils will be verified at a rate of 1 sample per 100m³ of material with a minimum of 4 samples being obtained for each source of material. Soils will be verified for pH, SOM, an asbestos screen, a standard metals suite, PAHs and TPH. Screening criteria will be in accordance with C4SL's for public open space, and CIEH S4ULS Generic Screening Criteria for public open space.
- Non virgin fills will be checked visually for asbestos and screened using UKAS accredited method for asbestos to achieve a level of detection of 0.001% by weight asbestos.
- Non virgin fills that may be associated with heavy metals, PAHs and other hydrocarbons will be analysed for an appropriate suite of determinants. Screening criteria will be in accordance with C4SL's for public open space and CIEH S4ULS Generic Screening Criteria for public open space.
- Screening criteria will be in accordance with C4SL's for public open space, and CIEH S4ULS Generic Screening Criteria for public open space.

Where soils are to be imported to the site for the construction/remediation of soft landscaped areas on-site, imported soils will require suitable validation certificates to demonstrate that they are suitable for use within the development. The information required includes chemical testing information that confirm suitability of the material to be used on site, (i.e. topsoil test results should be compared with the GAC) and confirmation of the source of the site of origin.

Validation testing of the site should be undertaken and any imported sub-soil / topsoil and material for backfilling should be sampled (preferably at source) at a rate of 1 test per 100m³ of soil.

All soil testing must be conducted by a UKAS and MCERTS accredited laboratory and subject to appropriate sampling protocols.

The results must be supplied to / collated by a suitably qualified environmental consultant for compilation within a site completion report, which is to be submitted to the Local Authority upon completion of the development.

6.3 Validation Reporting

Verification is based on an assessment of remediation performance to demonstrate that the risk associated with contamination has been reduced to meet remediation objectives and that the site is rendered suitable for use after development has been completed. This is a regular requirement under the planning process.

A verification report will be provided as soon as all groundworks at the site are completed and foundations / surface coverings are down.

Verification details of the completed development, any agreed remedial measures completed, materials imported onto or off the site with waste management and/or appropriate analysis to demonstrate chemical suitability/absence of asbestos, written statements clearly identifying whether or not any contamination was identified at the site during works will be provided.

Information for the validation report relating to work undertaken is to be supplied during the course of the works, including the following:

- Details of disposal of hazardous materials during demolition and site preparation
- Details of total disposal quantities and final disposal fates for waste soil
- Copies of relevant waste management/disposal licences or PC Permits, as applicable;
- Copies of registered waste carrier certificates
- Records of any consents, permits authorisation and/or licences held or obtained by the Contractor (and subcontractors) relevant to the Works
- Validation sample records.

Import and backfill records, including the following, as applicable:

- Chemical and geotechnical data for site derived fill materials and topsoil.
- Chemical and geotechnical data for imported fill materials and topsoil.
- Imported fill summary records.
- Waste disposal records, including the following, as applicable.
- Soils disposal summary and daily disposal records.
- Liquid waste disposal summary.
- Hazardous waste disposal summary.
- Waste consignment notes.
- Tip tickets for each waste disposal facility use.
- Liquid waste transfer notes.

As built drawings showing placement of imported fill and topsoil and thicknesses.

Clear conclusions regarding the suitability for use of the site, the likelihood of residual contamination being present beneath the site, the likelihood of residual contamination impacting upon site and off-site uses/environment (including groundwater), the likelihood of off-site contamination impacting significantly upon the site in the future and any other relevant information shall be provided.

7.0 LIST OF FIGURES AND TABLES

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