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2 INCHFIELD CLOSE, NORDEN, ROCHDALE, OL11 5SB

REMEDIATION STRATEGY

INTRODUCTION

It is proposed to build a detached house. Following an intrusive report 11/2/19, instructions were to prepare a remediation strategy.

SITE DESCRIPTION

The site is a vacant, truncated rectangle, about 27 by 12 metres, located to the east of Inchfield Close in Norden and at OS Grid Reference 386203, 413908. The site, previously occupied by a bungalow destroyed by fire in 2016.

This is a residential area which slopes down to the southwest at about 1 in 25.

PROPOSED DEVELOPMENT

It is proposed to build a replacement detached house, on the foundations of a former burnt-out bungalow. There will be associated gardens.

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An intrusive report is dated 11/2/19, the salient points are:

INTRUSIVE REPORT

Ground Conditions

A series of three trial holes (THA, THC and THD) was excavated to about 1.0 metre to collect shallow samples for testing.

Trial hole B was not carried out due to a concrete slab in that location.

The trial holes showed topsoil to 0.25 metres (THA & B), over made ground to about 0.7 metres (THA & B). There was clay in the base of the trial holes.

Contamination

Tests show low levels in THA and THD. However, arsenic and lead exceed their residential threshold in THC at 0.2 metres. THC represents the front (west) garden and the findings suggest a risk to householders in that area. Remedial works are required in the garden around THC.

The low results in THA and THD suggests the risk are confined to the front (west) garden.

The risks associated with arsenic and lead arise from direct contact with the surface soils. Where the contaminated soils are below permanent hard surfacing (e.g. the house and a hard surface drive) there will be no risk to householders and no remedial works will be required there.

Water Soluble Sulphate levels are low and sulphate resistant concrete is not required.

The tests results suggest, subject to approval, the site is suitable for normal PE water pipes.

There is no risk from hydrocarbon vapours.

Controlled Waters

Regarding risks to controlled waters:

- The site is underlain by a Secondary A aquifer.
- There are no nearby water courses.
- The levels of contaminants in THA and THB are low and not excessive.
- Arsenic and lead exceed the residential threshold in THC and contaminated soils will either be taken away or covered, removing or considerably reducing the opportunity for leaching.
- Clay underlying the site will be an aquitard.
- There are no nearby abstraction points.
- There are no nearby source protection zones.

Bearing in mind all of the above factors, it is considered that risks to groundwater are very low and that no significant pathway will arise.

Landfill Gas/Ground Gas/Coal Gas

Bearing in mind the proposals is for a single house it is considered that the anticipated gas risk can be adequately dealt with by installing precautionary gas protection measures, in-lieu of testing.

Conceptual Model

Contamination issues should be considered using the source-path-receptor concept assisted by the conceptual model diagram included at the end of the report.

Source	Receptors	Pathway	Complete Pollutant Linkage
Asbestos (none detected)	Construction workers	Inhalation	No
	End-users	Inhalation	No
	Off-site	Migration off-site	No
Inorganic contaminants (raised arsenic and lead in THC)	Construction workers	Short-term direct contact, inhalation of dust, ingestion	Yes
	Householders	Direct contact, ingestion, from home grown vegetables, ingestion and inhalation of dust	Yes (around THC)
	Groundwater	Leaching towards	No
	River/stream	Leaching towards	No
Hydrocarbons (low)	Construction workers	Short-term direct contact, inhalation of dust, ingestion	No
	Householders	Direct contact, ingestion, from home grown vegetables, ingestion and inhalation of dust	No
	Service pipes	Seeping into drinking water pipes	No
	Groundwater	Migrating towards	No
	River/stream	Migrating/leaching towards	No
Hydrocarbon vapours (low)	Construction workers	Short-term inhalation	No
	Householders	Inhalation of vapours indoors and outdoors	No
Coal gas/ground gas	End-users - in buildings	Seeping into buildings, explosion, asphyxiation	Possible
Radon	End-users - in buildings	Seeping into buildings	No

REMEDIATION STRATEGY

Construction Workers

Normal precautions for an urban renewal type project are required. These would include the use of gloves and the provision of washing facilities to avoid ingestion of contaminants.

Garden/Landscaped Areas

Contamination by arsenic and lead was found to be present in THC at 0.2 metres, with results in THA and THD being well below screening thresholds. This suggesting a localised problem on the west of the site, or around THC.

The following is suggested:

- Excavate to 0.6 metres at THC for 2 metres to the east and south and up to the site boundary west and driveway (north).
- Dispose excavated soils off-site.
- Test garden sides of excavation for arsenic and lead, levels to be below residential thresholds.
- If levels still exceed residential threshold, widen excavation and re-test.
- Backfill excavation with imported soils, tested to confirm their suitability for use on-site.

Landfill/Ground Gases/Coal Gas

The following are considered to be appropriate measures for the anticipated level of risk.

- Ventilation of confined spaces within building
- A well-constructed ground slab/suspended floor with sub-floor venting.
- A low-permeability gas membrane (see membranes below).
- Minimum penetration of ground slab by services.
- Also gas precautions should continue across the cavity.

Membranes

The following membrane (or equivalent) is suggested:

- Suspended floor, with underfloor venting, Visqueen Low Permeability Gas Membrane (yellow).
- Ground bearing slab, Visqueen Gas Barrier (blue).

Each membrane should be used with the appropriate matching cavity tray (or cavity membrane), DPC and service duct 'top hat'. Joints to be lapped and sealed.

The following might also be considered:

- Contractor to be sufficiently experienced and/or qualified in installing gas protection measures.
- Gas protection measures to be installed as per the manufacturer's specification.
- The area of the membrane to be cleared of any debris or materials prior to laying.
- To ensure damage to the membrane will be prevented prior to the floor being install, post installation, **ALL** site personnel (including all trades) to be made aware of the presence of the membrane and that damage to the membrane must be prevented.
- To prevent damage, post installation, no materials or tools to be stored on the membrane, scaffolding not erected on the membrane, service penetrations to be cast into the slab, membrane to be left exposed for the minimum time possible, no work to be carried out on the exposed membrane (e.g. cutting, welding etc.)
- All joints to be sealed before any follow on work commences.
- The use of preformed 'top hats' and corners is beneficial.

Imported Soils

All soils (e.g. topsoil, bulk fill hardcore) and similar materials imported on-site to be proved to be uncontaminated. Imported material will require testing as follows:

- Greenfield soils – minimum of 3 tests or 1 test per 100m³ (whichever is greater). Testing to include arsenic, cadmium, chromium (total), chromium VI, copper, mercury, nickel, lead, selenium, zinc, PAH (16 USEPA speciation), asbestos, TPHs (speciated), boron, cyanide, thiocyanate, sulphide, sulphur, sulphate, pH, Som.
- Brownfield/screened/manufactured soils – minimum of 3 tests or 1 test per 50m³ (whichever is greater). Testing to include arsenic, cadmium, chromium (total), chromium VI, copper, mercury, nickel, lead, selenium, zinc, PAH (16 USEPA speciation) asbestos, TPHs (speciated), boron, cyanide, thiocyanate, sulphide, sulphur, sulphate, pH, Som.

Soil Screen Values

Tests carried out on the imported material, either by the supplier or the consultant, to be screed against appropriate residential thresholds, based on 1% SOM. If these are exceeded, site specific value may be derived, subject to them being appropriate.

Validation

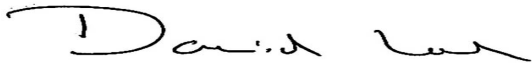
A validation report will be required on completion, this will require:

- Tickets from waste removal contractor and receiving landfill.
- Test results for sides of excavation.
- Photographs of excavation to confirm depth.
- Contamination test results for imported soils.
- Trial pits, with photographs, to show depth and thickness of individual layers.
- Document (receipt, delivery notes) to show soil types and sources.
- Independent inspection of gas membrane and report.
- Documented site inspection, including photographs.

This report is usually a collaboration between the contractor, who will collect the above documentation and Worms Eye, who can assist in preparing the Validation Report

Yours faithfully

on behalf of Worms Eye Ltd

A handwritten signature in black ink, appearing to read 'David Lord', with a stylized flourish at the end.

David Lord
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