

# 76 Fitzjohn's Avenue London NW3 5LS

Remediation Method Statement

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April 2022

J16214A Rev 0



Ground investigation | Geotechnical consultancy | Contaminated land assessment

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| Rev No | Status | Revision Details | Date         | Approved for Issue |
|--------|--------|------------------|--------------|--------------------|
| 0      | Final  |                  | 8 April 2022 | 81                 |

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# 1.0 Introduction

Consideration is being given to the redevelopment of this site through the construction of a new single-storey basement beneath the footprint of the existing house.

A desk study and ground investigation has previously been carried out by GEA (Report Ref J16214 Issue 3, dated July 2018). The ground investigation identified elevated concentrations of lead in the made ground and preliminary recommendations of how to deal with the contamination were included in the report.

This report sets out a formalised Remedial Method Statement and should be read in conjunction with the previous report. The proposed development has been granted planning permission by Camden Council (application ref. 2017/1047/P) and this report has been prepared to satisfy Condition 4, relating to a contaminated land remediation scheme. The wording of the condition is as follows;

"Prior to commencement of any works on site, a written programme of ground investigation for the presence of soil and groundwater contamination shall be submitted to and approved by the local planning authority in writing

Site investigation shall be carried out in accordance with the approved programme and the results and a written scheme of remediation measures [if necessary] shall be submitted to and approved by the local planning authority in writing

The remediation measured shall be implemented strictly in accordance with the approved scheme and a written report detailing the remediation shall be submitted to and approved by the local planning authority in writing prior to occupation.; Reason: To protect future occupiers of the development from the possible presence of ground contamination in accordance with policies G1, D1, A1 and DM1 of the London Borough of Camden Local Plan 2017 and policy DH1 of the Hampstead Neighbourhood Plan 2018."

The previous GEA report concerns the first paragraph of the condition, while this report addresses the second paragraph and provides details of the validation measures required to confirm that the remedial work has been carried out in accordance with the requirements detailed in the third paragraph.

# 1.1 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigations carried out. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.







# 2.0 The Site

#### 2.1 Site Description

The site is located in the northwest of the London Borough of Camden, approximately 550 m northeast of Finchley Road and Frognal London Underground and Railway Station and 750 m southwest of Hampstead Heath Railway station. It is accessed via a gate from Fitzjohn's Avenue and is bounded by No 74 Fitzjohn's Avenue to the north and 78 Fitzjohn's Avenue to the south. Spring Path, a narrow pathway, bounds the site to the east. The site may be additionally located by National Grid Reference 526591, 185294.

A walkover of the site was carried out by a geotechnical engineer from GEA at the time of the previous investigation. The site covers a broadly rectangular area measuring approximately 9 m north-south by 35 m east-west, and is currently occupied by a twostorey house with front and rear gardens and a driveway. The site is essentially level and both the front driveway and rear garden are free of vegetation. The front garden comprises a central lawn with hardstanding around the boundaries and planted beds along the northern and southern boundaries. A single mature London Plane tree that measures about 20 m in height is present in the front garden.

#### 2.2 Background Information

The site history was previously researched by reference to internet sources and historical Ordnance Survey (OS) maps obtained from the Envirocheck database.

The earliest map studied, dated 1879, shows the site to be undeveloped in an area of fields with a track running along the eastern boundary of the site and two springs to be present nearby, located approximately 90 m to the south and 150 m to the west of the site. By the time of the next map studied, dated 1896, much of the existing road network and existing buildings in the surrounding area had been constructed, although the site itself remained undeveloped.

The site was developed with the existing house at some time between 1915 and 1934, at which time the existing adjacent buildings to the north and south were also constructed. The site and surrounding area have since remained essentially unchanged.

The site is not located within a nitrate vulnerable zone or any other sensitive land use.

The British Geological Survey (BGS) map of the area (Sheet 256) indicates that the site is underlain by the Claygate Member, over the London Clay.

The Claygate Member is classified as a Secondary 'A' Aquifer, which refers to strata that contain permeable layers capable of supporting water supply at a local level and in some cases may form an important source of base flow for local rivers, as defined by the Environment Agency (EA). The underlying London Clay is classified as a Non-Aquifer and Unproductive Stratum, which refers to a soil or rock with low permeability that has a negligible effect on local water supply or river base flow.

The Claygate Member is predominantly cohesive in nature and therefore groundwater flow is likely to be relatively slow, although horizons of more sandier soils are present, resulting in the permeability ranging from "very low" to "high". Published data for the permeability of the London Clay indicates the horizontal permeability to generally range between  $1 \times 10^{-10}$  m/s and  $1 \times 10^{-8}$  m/s, with an even lower vertical permeability.

Groundwater flow is considered to be in a southerly direction, towards the River Thames and with the local topography.

The site is not at risk of flooding from rivers or sea, as defined by the Environment Agency and is shown as being within an area at low risk of surface water flooding.

The previous report included a preliminary contamination risk assessment for the development which concluded that there was a LOW risk of there being a significant contaminant linkage at this site which would result in a requirement for major remediation work. Furthermore, the site was not considered to be at risk of hazardous soil gas.





Oddicroft Lane, Sutton in Ashfield, Nottinghamshire, NG17 5FS Remediation Validation Statement for Romo Group Ltd

# 3.0 Ground Model

The desk study revealed that the site does not have a potentially contaminative historical use as it has been occupied by the existing residential property for its entire known developed history, and on the basis of the fieldwork, the ground conditions at this site can be characterised as follows:

- below a nominal to moderate thickness of made ground, the Claygate Member was encountered and extends to the full depth of investigation, of 18.00 m;
- the made ground generally comprises dark grey silty clayey sand with variable amounts of gravel, brick, ash and concrete fragments and extends to depths of between 0.27 m and 1.75 m;
- C the Claygate Member generally comprises interbedded horizons of stiff orangebrown mottled grey and pale brown silty sandy clay and clayey silty sand extending to a depth of 18.00 m;
- **G** groundwater is apparently present at a depth of approximately 4.50 m; and,
- C contamination testing revealed two of the samples tested to contain elevated concentrations of lead.

# 4.0 Risk Assessment

The table below sets out the risk pathways that could potentially be present following the redevelopment of the site, which will have a residential with plant uptake end use. This conceptual model is based upon the findings of the ground model developed in the light of the investigation findings and highlights areas where remedial work should be considered.

| SOURCE  | RECEPTOR  | ΡΑΤΗΨΑΥ  | COMMENT   |  |
|---|---|--|---|--|
| Elevated concentrations of lead within made ground. | End users   | Direct soil and dust ingestion, consumption of homegrown<br>produce, consumption of soil adhering to homegrown produce,<br>skin contact with soils and dust and inhalation of dust | End users may be exposed to contaminated soils within private gardens. The contaminated made ground will need to be isolated from end users and from migration off site, using clean cover or bardstanding, or excavated and disposed of off-site to remove the potential contaminant source  |  |
| Vegetation Uptake via gardens                       | Uptake via soil through roots in landscaped areas and private gardens | and thus eliminate the potential risk.   |   |  |
|   | Adjacent sites  | Migration through made ground  | A clean cover system and separation layer will be needed to prevent contaminant uptake by vegetation in landscaped areas and private gardens.   |  |
|   | Ground workers<br>and future site<br>workers                          | Accidental ingestion of soil and inhalation and ingestion of soil derived dust, direct contact with contaminated soils   | Skin contact with soil will be minimized through the use of correct PPE and washing facilities will be provided. Soil will be kept damp to prevent fugitive dust emissions. The presence of contamination should be noted on the construction file.   |  |
|   | Groundwater   | Percolation and leaching of surface run-off in areas of soft<br>landscaping and permeable paving   | None of the contaminants identified are likely to be in a soluble form so it is unlikely that there will be leaching of contaminants from the made ground into the limited shallow groundwater aquifer within the Claygate Member and to adjacent sites. The Claygate Member is underlain by the London Clay, which has extremely low vertical permeability, thus the risk posed to the groundwater within the deep aquifer is considered to be minimal. The risk of groundwater contamination will be reduced where the shallow soils are not exposed to rainwater percolation, for example in areas to remain under hardstanding. |  |
| Ground Gas  | End users   | Inhalation or explosion  | The risk of ground gas is negligible given the age of the made ground and the lack of organic content in the made ground.   |  |
|   | Site Workers  | Inhalation   | The site will be open to the atmosphere during excavation and ground works so any soil gases can dissipate.   |  |



# 5.0 Remedial Objectives

Based on the above risk assessment the following remedial objectives have been established for this development;

- minimise the potential chronic human exposure pathways in soft landscaping areas and private gardens, and protection of residential end users and ecological receptors on site;
- protection of ground workers and future site workers who will be exposed to the soil; and,
- S protection of end users and ecology on adjacent sites.

# 6.0 Remedial Recommendations

To address the remedial objectives the remedial measures will include;

- installation of an imported layer of 'clean' certified topsoil and subsoil placed over and within an anti-dig separation layer;
- removal of all encountered contaminants from the made ground and incorporation into the construction methodology that, so far as possible, made ground is not left exposed during construction; and,
- C the adoption of appropriate working practices to minimise dust generation and minimise site workers' contact with the soil to protect adjacent end users and site workers.

The details of these remedial measures are set out below in the Verification Plan.

# 7.0 Verification Plan

This section sets out how the remedial measures will be achieved and validated.

# 7.1 Garden and Soft Landscaped Areas

### Importation of soil

Prior to the importation of any topsoil for use within the garden, certification will be provided by the supplier and approved by GEA. The suitability of the material to be free of contaminants will be assessed against the GEA Screening Values, which are based on C4SL or LQM/CIEH S4UL for a residential with plant uptake end use, a copy of which is enclosed. The suitability of the soil with regard to nutrient levels specific to the planting scheme will be assessed by the landscape architect.

It is understood that the existing areas of soft landscaping cover approximately 109 m<sup>2</sup> of the site area, and this will be reduced to approximately 60 m<sup>2</sup> following the development.

#### Installation of clean cover layer

The clean cover layer will extend to depths of 600 mm for garden areas and in accordance with BRE recommendations<sup>1</sup>, the upper 150 mm of which should be classified as topsoil, in accordance with BS3882:2007. Where the made ground is covered by buildings or hardstanding, no additional protection measures are deemed necessary.

#### Insitu validation of clean cover layer

Photographs of the installation will be taken by the contractor along with records of the levels before and after installation, and these will be included in the validation report.

In addition to the above, confirmation of the correct installation of the clean cover layer will be validated by a series of trial holes and / or hand auger boreholes undertaken by GEA. In support of the visual examination, further samples of the material will be taken by GEA for laboratory testing and assessment against the adopted screening values for residential end use with plant uptake.



<sup>1</sup> BRE (2004) Cover systems for land regeneration. Thickness of cover systems for contaminated land. BRE pub 465

#### **Frequency of Analysis**

Confirmatory soil samples will be taken at a rate of one sample per  $50m^3$  to  $100m^3$  of certified material and a minimum of three samples per source.

#### Documentation

The validation report will include waste transfer documents for all exported and imported material, photographs of the capping layer, details of the certified imported soil and the results of the validation testing together with the thickness of the imported clean cover layer.

### 7.2 Site Workers

Site workers will be made aware of the potential for contamination in the soils and a programme of working will be identified to protect workers handling any soil. The method of site working will be in accordance with guidelines set out by HSE and CIRIA. Washing facilities will be provided and site workers will be encouraged to wash prior to eating and to use appropriate PPE when on site to minimise skin contact with the soil.

There will be no stockpiling of soil on the site. If any areas of made ground are left exposed for long periods measures will be required to prevent dust generation.

# 7.3 Unknown Contamination

Prior to the commencement of ground works a site induction meeting will be held, attended by the developer and site workers, where the appointed geoenvironmental engineer will brief the workers on the history of the site and the nature of any contaminated soils they may encounter. This information will be included in the Discovery Strategy which will also be displayed in the site office, along with the contact names and numbers of the geoenvironmental engineers, so that contact can easily be made if any suspicious substances are encountered. If, during development, contamination not previously identified is found to be present at the site, the Council will be informed immediately and no further development (unless otherwise agreed in writing by the Council) will be carried out until a report indicating the nature of the contamination and how it is to be dealt with is submitted to, and agreed in writing by, the Council. A copy of the discovery strategy is included in the attached appendix.

In the event that contamination is not encountered, a statement to this effect by a suitably qualified and experienced individual will be provided.

# 7.4 Reporting

On completion of the remedial works, a report will be prepared documenting the satisfactory undertaking of the remediation proposals and of any duty of care under the waste management legislation, together with an assessment of the suitability of the soils remaining beneath the site in respect of the proposed residential development. The report will include written and photographic records of the site inspections carried out, together with the results of the validation analyses and will present an assessment of the condition of the remediated site with respect to the end use.





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