PROPOSED SCOPE OF WORKS

for a site at

LAND TO REAR OF EAST HOUSE, HIGH ROAD, GREAT FINBOROUGH

for

MACNAMARA DEVELOPMENTS LTD

Contaminated Land Solutions

[redacted]

4 De Frene Road, London, SE26 4AB

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CONTENTS

1 INTRODUCTION

The phase 1 report by Castledine indicates potential for contamination to be present from vegetated mounds which are located over areas of proposed soft landscaping.

The proposed site usage is residential with private gardens.

The proposed development involves the construction of 4no. dwellings with an access road and private gardens.

In order to determine the extent and nature of any contamination present an intrusive Phase 2 intrusive environmental investigation is proposed. The strategy for the investigation has been informed by the conceptual model and risk assessment from the Phase 1 report and the recommendations and requirements of BS 10175.

2 REFERENCE SOURCES

Castledine Phase 1 Land Contamination Risk Assessment ref. 3044D P1 Ruffell – Suffolk dated September 2020
BS 10175 Investigation of Potentially contaminated Sites - Code of Practice
Environmental Protection Act 1990 - Part IIA
Contaminated Land (England) Regulations 2000
BS 5930 The Code of Practice for Site Investigation
BS 1377 The Code of Practice for methods of tests for soils for Civil Engineering Purposes
CIRIA C665 Assessing risks posed by hazardous gases to buildings

3 SITE LOCATION

The site is located just south of the village of Great Finborough, with access gained from High Road. The National Grid Reference of the site is 601358,257120 and it is approximately 0.52ha in area. Refer to figure 1 below.

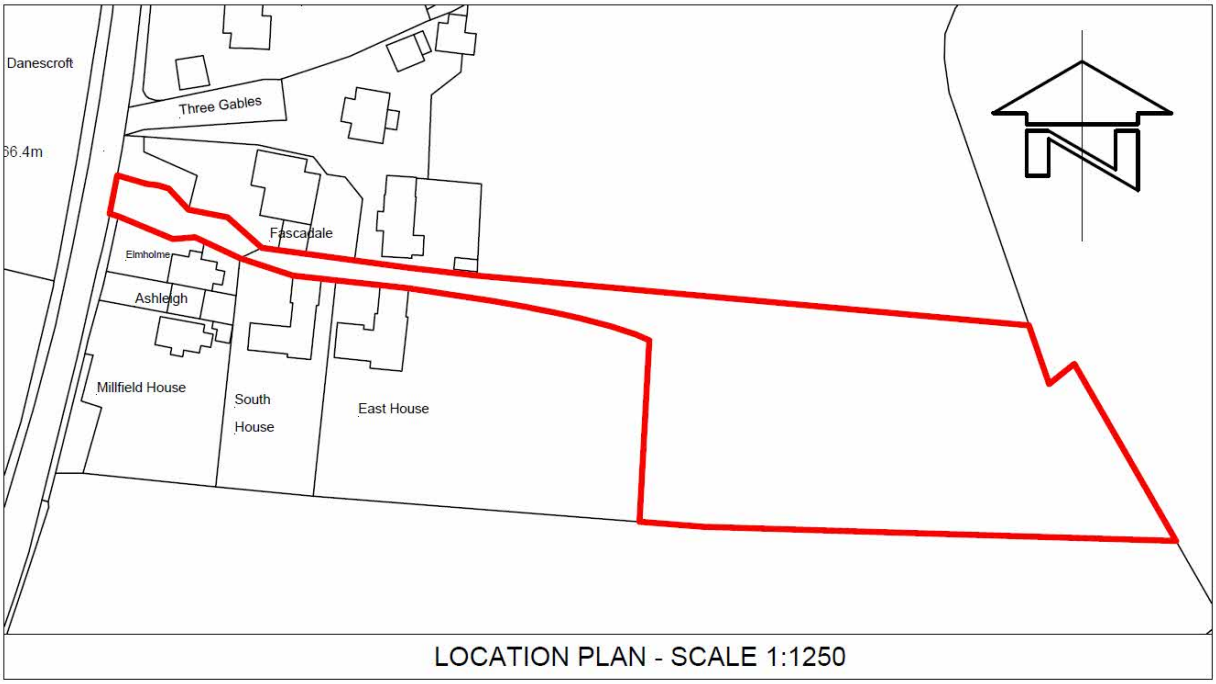

Figure 1 – Site Location Plan

4 SITE DESCRIPTION

Site description as of September 2020 as described in Castledine Phase 1 Report:

The site is an irregular rectangle in shape orientated east to west and connected to the nearby High Road via an access spur. The site is directly bounded by field to the north, east and south with dwellings located to the west. The surrounding areas are predominantly agricultural with the village of Great Finborough located approximately 280m north of site.

The site interior comprises a large, open field in part use as a garden for the associated dwelling, which is located west of the main site area.

A gravelled site access track leads east off High road and bypasses the associated dwelling. The gravelled access track then terminates at the side of the dwelling, giving way to the main grassed site area. The grassed area was seen to contain scattered, miscellaneous garden furniture and toys and a vegetated spoil mound and pile. The pile is small and located adjacent to the eastern boundary of site. The vegetated mound is located on the southern boundary of site and extends west from the south eastern corner of site to approximately two-thirds of the site length.

Topographically the site is level with a small ditch noted forming or just outside of the eastern boundary of site. The vegetated rubble located along the southern boundary of site is a potential source of contamination.

With reference to Google Earth Satellite imagery from 2023, the site appears to be unchanged from the description outlined above.

5 GROUND CONDITIONS

5.1 Geology

Reference to the geological survey of Great Britain indicates that beneath made ground, the area generally is underlain by superficial deposits comprising the Lowestoft Group which is described as Diamicton.

The Lowestoft Group Diamicton is described by the BGS as an extensive sheet of chalky till, together with outwash sands and gravels, silts and clays

The superficial deposits are underlain by bedrock comprising Crag Group described as Sands, gravels, silts and clays.

5.2 Hydrogeology

The Environment Agency maps show the site to be located over an Undifferentiated Aquifer in the superficial or drift deposits, in the bedrock they show the site to be over a Principal Aquifer .

Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Principal Aquifers comprise layers of rock or drift deposits that have either high intergranular or fracture permeability, meaning they usually provide a high level of water storage. They may support either water supply or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary Undifferentiated Aquifer has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

The site is located in a Type 3 Total Catchment Source Protection Zone (SPZ).

The Environment Agency define a zone according to how the groundwater behaves in that area. From this a model of the groundwater environment is developed on which to define the zones.

Groundwater source catchments are divided into three zones:

SPZ1 – Inner protection zone

Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.

SPZ2 – Outer protection zone

Defined by a 400 day travel time from a point below the water table. This zone has a minimum radius of 250 or 500 metres around the source, depending on the size of the abstraction.

SPZ3 – Source catchment protection zone

Defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the

ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75.

5.3 Hydrology

An unnamed, surface level watercourse is located 158m north of site in the Groundsure mapping.

It is not considered that there is potential for the watercourse to be impacted by the site.

6 RISK ASSESSMENT – SUMMARY OF POLLUTANT LINKAGES (CASTLEDINE ENVIRONMENTAL REPORT)

A qualitative risk assessment has been undertaken as part of the Phase 1 report in order to identify the severity, likelihood of occurrence and significance of the risk presented by potential pollutants identified in the preliminary conceptual model and the conclusions of this assessment have determined whether any further investigation is necessary and what form this should take. The items requiring further investigation are tabulated below.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Consequence	Risk	Possible Mitigation
Contaminated Soils	Direct Ingestion & Direct Contact	Site Workers	Li	Md	M	Site workers to wear appropriate PPE for health and safety reasons
Contaminated Soils	Inhalation of Dust	Site Workers	Li	Md	M	
Contaminated Soils	Direct Ingestion & Direct Contact	End Users	Li	Md	M	No significant sources of potential contamination have been identified. It is recommended that the vegetated mound on site be tested and/or removed following testing, depending on the laboratory results.
Contaminated Soils	Inhalation of Dust	End Users	Li	Md	M	
Contaminated Soils	Direct Ingestion	Flora and Fauna	Li	Md	M	
Contaminated Soils	Vertical and lateral migration	Controlled Waters	Li	Md	M	
Contaminated Soils	Direct contact	Services	Ul	Md	L	
Ground Gases (Methane and CO_2)	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	No significant sources of ground gas or vapour generation have been identified.
Volatile and Semi-volatile Organic Compounds	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	
Radon	Vertical and lateral migration	End Users & Building Envelope	Ul	Md	L	Site is not in a Radon Affected Area.

KEY: Probability of pollutant linkage Hi = Highly likely, Li = Likely, Lw = Low Likelihood, Ul = Unlikely
Consequence Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor,
Overall Risk VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low

Any visual or olfactory evidence of contamination noted during works should be investigated by a suitably qualified person and their recommendations implemented.

7 INVESTIGATION STRATEGY

The qualitative risk assessment has determined that further investigation of potential on-site contamination identified by the conceptual model is necessary. It is unlikely that significant contamination would have migrated to the site from off-site sources, and due to a similar nature of use, determine the likely source. As contamination testing has been recommended, any potential risk from these sources will be remediated if required.

The objectives of the investigation will be to obtain further information in relation to the potential sources of contamination, likely pathways and other features of concern and to obtain data on the nature and extent of contamination, the geology, geochemistry, soil hydrogeology and hydrology of the site. This information and data will be used to inform the conceptual model and allow the risk assessment to be updated if necessary. In addition the data obtained will be sufficient for the design of any remedial works that may be required.

Given the size of the site, the lack of significant constraints and the fact that the visual inspection has indicated that the contamination present appears to be limited it is not intended that a separate exploratory investigation will be require and therefore the works proposed will form the main site investigation.

8 INVESTIGATION TECHNIQUES

8.1 Soil Sampling

It is intended to carry out soil sampling using post hole spades and hand augers.

9 SAMPLING STRATEGY

It is estimated that the mounds are in the region of 300mm thick, and the sampling will be undertaken in a way that is representative of this material.

The following sets out the envisaged sampling, however as stated in R&D 66 "the decision of what soil material should be sampled will be determined by the sampling and analysis plan including consideration of the likely source and likely behaviour of the substances being sampled, as well as site observations regarding the geology and any evidence of contamination." Therefore, locations and numbers of samples may be varied to take account of site observations.

Incoming services could form a localised constraint to the investigation and the position of service runs, etc will be established either by reference to plans obtained from the service providers or by the use of Cable Avoidance Tools or by hand excavated service pits.

The sampling strategy will be sufficiently flexible in order to allow for samples to be collected from all strata and materials encountered during the investigation.

The samples will be collected by suitably qualified person in accordance with methodology set out in clause 8.3 and 8.6 of BS 10175.

The number of sampling locations for the targeted sampling will be reviewed using empirical judgement when on site, based on visual or olfactory evidence.

All samples will be placed immediately in cool boxes with ice packs and collected by courier for transport to the laboratory.

The results will be compared to the Atkins 2017 ATRISKsoil SSVs for residential with homegrown produce, where available. These guideline values have been derived using the updated CLEA v1.071 model, previously published Category 4 Screening Levels (C4SLs) by DEFRA and information in the Environment Agency guidance SR2. Where ATRISKsoil SSVs have not been derived, the Category 4 Screening Levels will be used, and for determinands which do not have either of the above, the LQM/CIEH Suitable 4 Use Levels (S4ULs) assessment criteria will be used for residential with homegrown produce.

To assess the genotoxic poly-aromatic hydrocarbons (PAHs), the benzo-a-pyrene (BaP) surrogate marker approach will be adopted. The results for genotoxic PAHs will be compared to the soil PAH coal tar mixtures used in the Culp et al 1998 study, to determine if they are sufficiently similar and establish if Benzo-a-pyrene is a suitable surrogate marker for PAHs.

The LQM PAH profiling tool will be used to confirm the validity of the surrogate marker approach.

The reworking of the ground appears to be limited to the mounds, therefore sampling depths will be within the fill material of the vegetated mounds. Based on the site photographs provided in the phase 1 report, a maximum thickness of 300mm fill is anticipated. Therefore the initial sampling depths will be between 0.1 and 0.3mbgl.

The initial sampling and testing regime for soil is shown in the table below:

Location	Sampling Depth	Testing Suite
S1 – S5	Within vegetated mound fill material Approx 0.1 – 0.3mbgl	Asbestos, heavy metals, PH, banded hydrocarbons and speciated PAHs

A plan showing the proposed Site Investigation Layout is contained in Appendix C.

Should any further visual or olfactory evidence of contamination be noted during the investigation additional samples will be taken and tested.

10 LABORATORY ANALYSIS

Soil samples collected during the investigation will be analysed at a specialist testing house generally using accredited methods in accordance with ISO 17025 /MCERTS Performance Standards for Laboratories Undertaking the Chemical Testing of Soil, or if no MCERTS test is available, a United Kingdom Accreditation Service (UKAS) method of testing.

The list in Appendix D confirms the determinands contained in the GO Contaminated Land Solutions Ltd standard suite. For the full range of contamination testing required refer to the body of this scope.

11 REPORTING

On completion of the intrusive investigation and the laboratory analysis of soil samples, an interpretive report will be prepared which will provide the following information:

A summary of the fieldwork undertaken

An assessment of the results of the field investigation

An updated conceptual model

Recommendations for supplementary investigation or monitoring and proposal for any remedial works that may be required.

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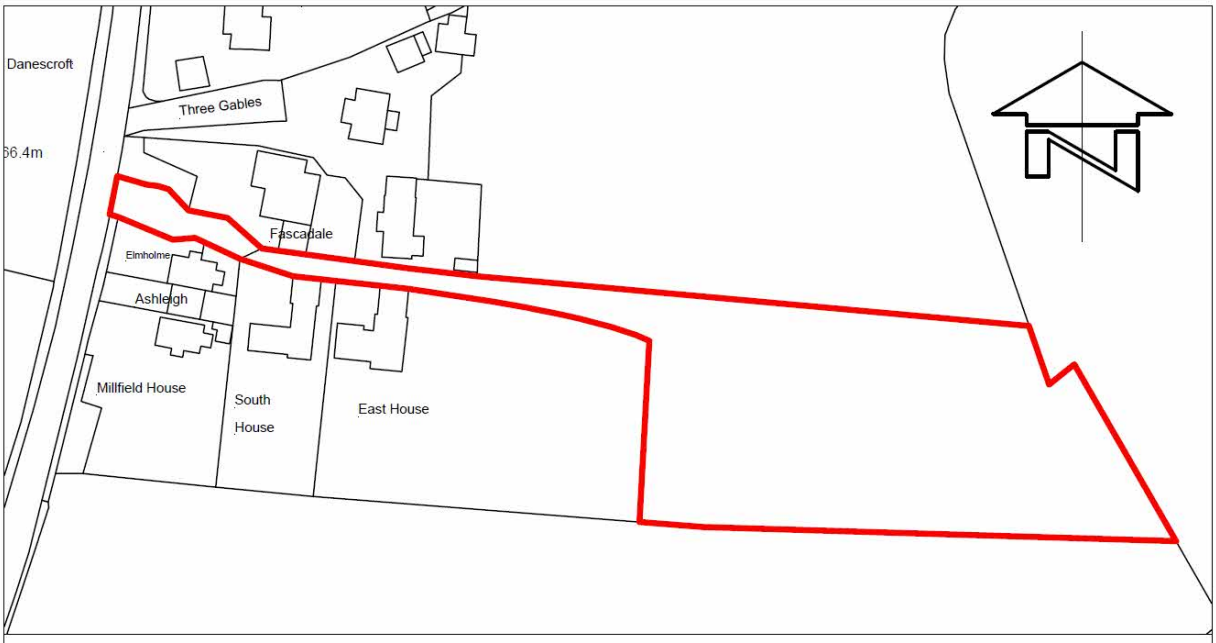
Appendix A – Site Location Plan



LOCATION PLAN - SCALE 1:1250

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Appendix B – Proposed Site Plan

2407-P2E-1-Scope: Land to Rear of East House, High Road, Great Finborough
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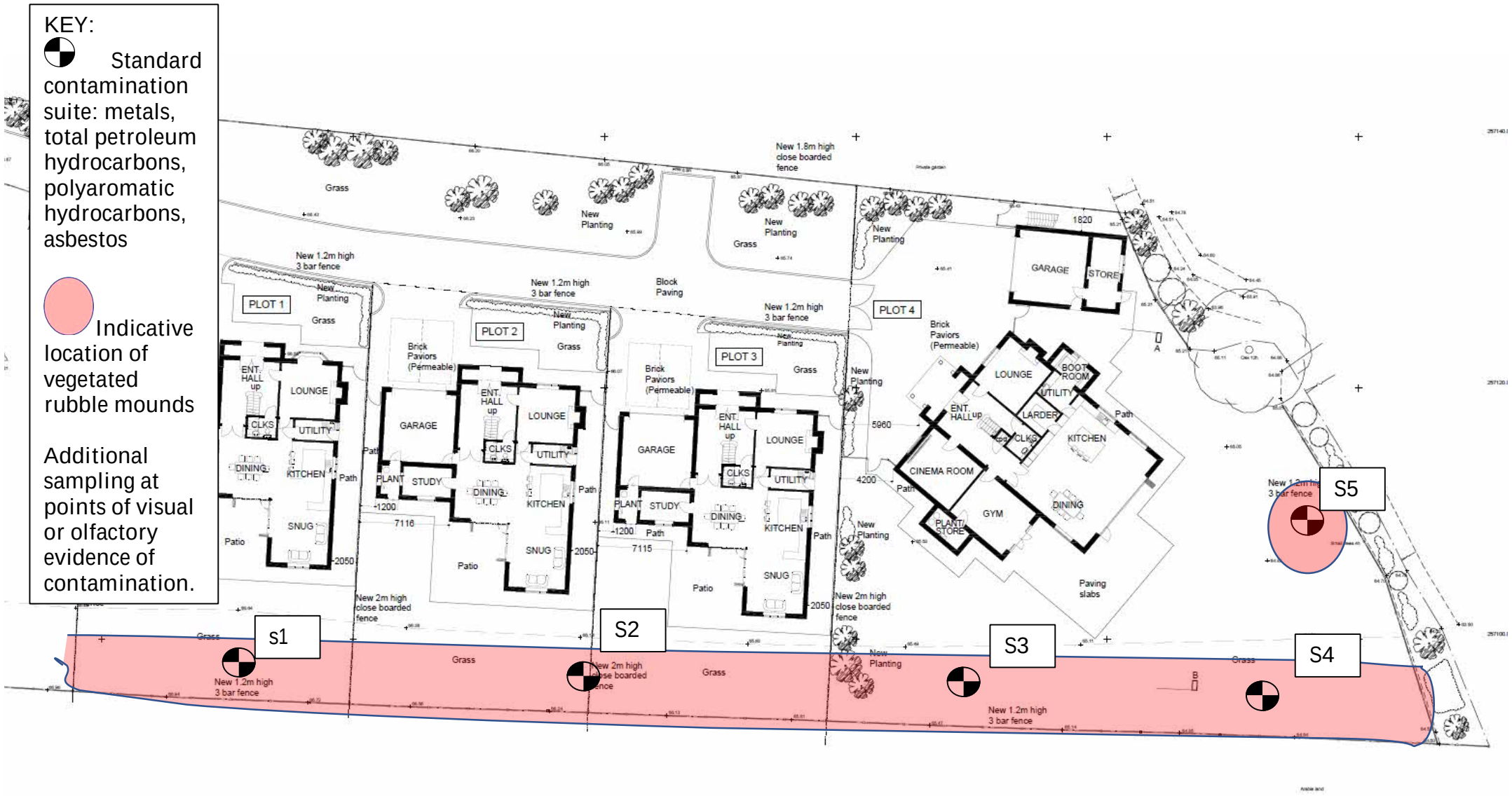
Appendix C – Site Investigation Layout



2407-P2E-1-Scope: Land to Rear of East House, High Road, Great Finborough
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Appendix D – Contamination Suite

Note: The following list confirms the determinands contained within the test suites referred to the body of this scope.

	Determinand		Unit
Metals	Arsenic		mg/kg
	Cadmium		mg/kg
	Chromium		mg/kg
	Lead		mg/kg
	Mercury		mg/kg
	Nickel		mg/kg
	Copper		mg/kg
	Zinc		mg/kg
	Selenium		mg/kg
	Hexavalent Chromium		mg/kg
	pH Value		units
	Free Cyanide		mg/kg
Polycyclic Aromatic Hydrocarbons	Naphthalene		mg/kg
	Acenaphthylene		mg/kg
	Acenaphthene		mg/kg
	Fluorene		mg/kg
	Phenanthrene		mg/kg
	Anthracene		mg/kg
	Fluoranthene		mg/kg
	Pyrene		mg/kg
	Benzo(a)anthracene		mg/kg
	Chrysene		mg/kg
	Benzo(b)fluoranthene		mg/kg
	Benzo(k)fluoranthene		mg/kg
	Benzo(a)pyrene		mg/kg
	Indeno(123-cd)pyrene		mg/kg
	Dibenzo(ah)anthracene		mg/kg
	Benzo(ghi)perylene		mg/kg
	TOTAL PAH		mg/kg
Hydrocarbons	Aromatic Hydrocarbons	$>C_5$-C_7	mg/kg
		$>C_7$-C_8	mg/kg
		$>C_8$-C_{10}	mg/kg
		$>C_{10}$-C_{12}	mg/kg
		$>C_{12}$-C_{16}	mg/kg
		$>C_{16}$-C_{21}	mg/kg
		$>C_{21}$-C_{35}	mg/kg
	Aliphatic Hydrocarbons	$>C_5$-C_6	mg/kg
		$>C_6$-C_8	mg/kg
		$>C_8$-C_{10}	mg/kg
		$>C_{10}$-C_{12}	mg/kg
		$>C_{12}$-C_{16}	mg/kg
		$>C_{16}$-C_{35}	mg/kg
	TOTAL TPH		mg/kg
	Asbestos		