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Soil Environment Services Ltd

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***CONTAMINATED LAND RISK ASSESSMENT***

***PHASE 1 DESK TOP STUDY – PRELIMINARY RISK ASSESSMENT***

**Buildrow Property Services Ltd**

**Summer House  
Hamlet Hill**



**Soil Environment Services Ltd  
July 2019**

Our Ref: SES/BPSL/SH/1#1

Date: 26<sup>th</sup> July 2019

**Client:**  
Buildrow Property Services Ltd  
Summer House  
Hamlet Hill  
Royson Hamlet  
Essex  
CM19 5LA

## ***CONTAMINATED LAND RISK ASSESSMENT***

### ***PHASE 1 DESK TOP STUDY – PRELIMINARY RISK ASSESSMENT***

#### **Summer House Hamlet Hill**

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## EXECUTIVE SUMMARY

|                                    |   |
|------------------------------------|---|
| Current site conditions            | The site comprises a Summer House and an outbuilding.   |
| Proposal                           | The proposal is for the 'Erection of 2 no. chalet bungalow dwellings with associated parking, amenity spaces and with refuse & cycle store'.  |
| Adjacent site conditions           | The site is bound by Hamlet Hill road to the north, Havana residential house to the east, agricultural land to the south and a residential building to the west.  |
| Site history                       | The site was undeveloped from 1873/84 to c.1939 when a nursery was mapped on the site. The nursery was mapped on site until pre-1993. Additional buildings were removed c.2003.   |
| Geology                            | London Clay (clay, silt and sand) bedrock geology is mapped on the site. No superficial geology is recorded on the site.  |
| Hydrogeology                       | The site is mapped as having low leaching potential soils overlying an Unproductive Bedrock Strata. The site is not within a groundwater protection zone.   |
| Hydrology                          | Surface water flow is expected to flow down gradient towards the south west. The nearest surface water is mapped 196 m north east of the site.  |
| Potential sources and contaminants | No potential sources of contaminants are considered to exist on the site. Potential contaminants within a significant distance of the site have been identified, however pathways are restricted by distance, geology and low leaching potential soils. |
| Conclusions                        | No plausible pollutant linkages or significant uncertainties are considered to exist with regards to the proposed development on the site. No further investigation is considered to be required.   |

## **1. INTRODUCTION AND OBJECTIVES**

### **1.1 Introduction**

The purpose of this assessment is to examine specifically the current and potential risks to human, ecological and ground and surface water receptors associated with possible contamination of the ground at the site located at:

Summer House  
Hamlet Hill  
Roydon Hamlet  
Essex  
CM19 5LA

OS Grid Ref: 540916, 207591

The proposal is for the 'Erection of 2 no. chalet bungalow dwellings with associated parking, amenity spaces and a refuse and cycle store'. Planning Application EPF/1524/19 was available for viewing at the time of writing this report.

### **1.2 Objectives**

The primary objective of this risk assessment is to assess potential contamination sources, the pathways which these could possibly take through the environment and then the effects on likely receptors. A preliminary Conceptual Site Model (CSM) has been developed and evaluation of the risks is given. Subsequently, if needed, recommendations are made with regard to further (Phase 2) investigation and/or remediation.

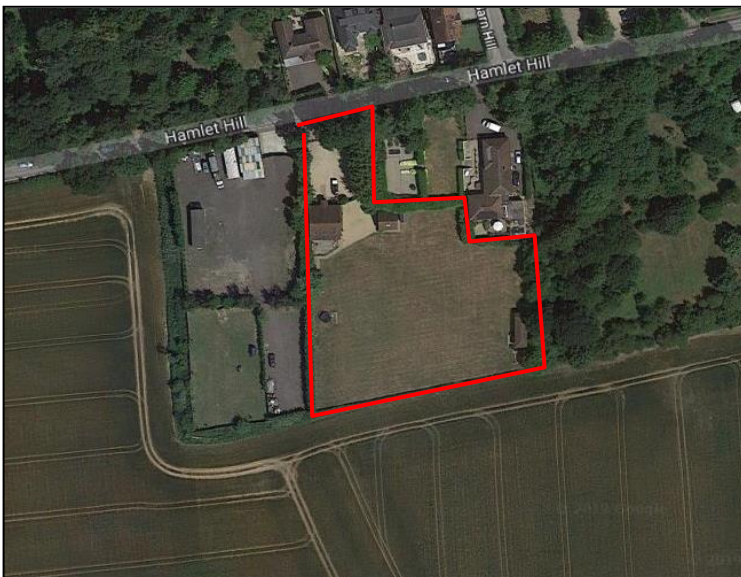
## 2. SITE CHARACTERISATION

### 2.1 Current setting and condition (Drawing 1)

The site assessed for this investigation currently comprises approximately 0.49 ha at Summer House, Hamlet Hill, Roydon Hamlet. The site was undeveloped from pre-1873/84 to c.1939 when a building and nursery were mapped on site. The nursery onsite was removed from site c.1993, with other outbuildings removed c.2003 with the land used as a garden area associated with Summer House to present.

The topography of the land on and surrounding the site slopes towards the southwest.

#### PHOTO 1 Aerial view



#### PHOTO 2 Streetview N to S (2019)



## **2.2 Former investigations and consultations**

No former investigations in relation to contamination have been undertaken for the site.

## **2.3 Relevant planning history for the site.**

A number of planning applications have previously been submitted for the site on the Epping Forest District Council website. Two applications for a two storey extension were submitted in 2012 (EPF/2266/12; Refused) and 2016 (EPF/1650/16; Granted with conditions).

A number of planning applications were available for Ash View located the west of the site. EPF/1965/12 was granted with conditions after an appeal in 2015; *'Change of use to mixed use consisting of stationing of caravans for occupation by a gypsy traveller family & the use of yard for general storage of materials including scrap metal & old cars with paddock for keeping horses'*, with the three most recent applications relating to the conditions for the development of the site.



## Site history (see Historical maps – Appendix A)

A chronological list of potential sources of contamination and significant features on and surrounding the site considered relevant to the proposed development are outlined below (Table 1).

**TABLE 1 Significant features on the historical maps**

| Land use                                      | Direction | Distance (m) | Notes                                   |
|---|-----------|--------------|---|
| <b>On-site</b>                                |           |              |   |
| Undeveloped land (pre-1873/84 to c.1939)      | On-site   | 0            |   |
| Nursery (c.1939 to pre-1993)                  | On-site   | 0            |   |
| Residential building (c.1939 to present)      | On-site   | 0            |   |
| <b>Off site</b>                               |           |              |   |
| Nursery (pre-1939 to pre-2019)                | W         | 183          |   |
| Tank, within filter beds (pre-1939 to c.1993) | W         | 100          |   |
| Nursery (1973/75 to pre-1993)                 | E         | 83           |   |
| Electric Substation (c.1993 to present)       | NW        | 71           |   |
| Ash View (scrap metal and car storage)        | W         | 3            | <i>Planning Application EPF/1965/12</i> |

## 2.4 Soils, geology and hydrology

BGS maps indicate that the site is located on:

### Superficial geology

*None recorded*

### Bedrock geology

***1:50 000 scale bedrock geology description:*** *London Clay Formation - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas.*

BGS listed borehole logs located within a 250 m radius of the site and within the same strata as mapped for the site, identify topsoil over clay to a maximum proven depth of 15.84 m bgl (TL40NW32, TL40 NW34, TL40NW30, TL40NW37).

### *Hydrology*

Flow to groundwater is considered to be restricted due to the low leaching potential soils mapped on the site. Surface water flow is expected to flow down gradient towards the south west.

The site mapped as having low leaching potential soils overlying an Unproductive Bedrock Strata. The site is not within a groundwater source protection zone.

## 2.5 Environmental data search

Environmental data (Appendix B) indicates the following:

- The site is situated on unproductive bedrock strata.
- The site is not within a groundwater source protection zone.
- No substantiated pollution incidents within 250 m.
- No pollution incidents to controlled waters within 250 m.
- No water abstractions within 250 m.
- No Contaminated Land Register Entries and Notices within 1000 m.
- No landfill/waste management site within 950 m
- No waste transfer sites within 950 m
- No areas of potentially infilled land mapped within 650 m.
- The Urban Soil Chemistry maps (Appendix B) indicates no significant elevated soil metals concentrations in relation to the proposed development.
- The property is in a lower probability radon area, <1% of homes are estimated to be at or above the Action Level. No radon protective measures are necessary in the construction of new dwellings or extensions.
- No fuel station entries within 1000 m of the site
- Two contemporary trade directory entry is listed on or within a 250 m radius of the site:
  - 211 m NE      Electrical component distributors      (Inactive)
  - 245 m NE      Fuel distributor      (Inactive)

### 3. INITIAL CONCEPTUAL SITE MODEL

The initial conceptual site model detailed here is by a written and tabular description of the sources, pathways and receptors. A cross section or diagram is only added if this will aid in understanding the conceptual site model.

#### *Model summary*

The site is situated on low leaching potential soils overlying an unproductive bedrock strata. No potential sources of contamination are considered to exist from on site activities. Potential sources of contamination are considered to be present from off-site sources, however, pathways to the site are restricted,. The future residents will be the main receptors on site. No significant plausible pollutant linkages are considered to potentially exist.

#### 3.1 Potential sources

A review of the historical maps (Appendix A) and other information has identified that potential sources of contamination are considered to exist on the site from off-site sources (Table 2).

**TABLE 2 Possible source locations and potential contaminants**

| <b>Land use</b>                     | <b>Direction</b> | <b>Distance (m)</b> | <b>Potential Contaminants</b>  |
|-------------------------------------|------------------|---------------------|--------------------------------|
| <b>On-site</b><br>Nursery           | On-site          | 0                   | <i>Pesticides, Herbicides</i>  |
| <b>Off site</b><br>Nurseries        | W, E             | 183, 83             | Pesticides, Herbicides         |
| Tank                                | W                | 100                 | Metals and Hydrocarbons        |
| Electric Substation                 | NW               | 71                  | <i>PCBs, mineral oils</i>      |
| Ash View (scrap metals/car storage) | W                | 3                   | <i>Metals and Hydrocarbons</i> |

## 3.2 Receptors

### *Humans*

- Residents in the proposed dwellings.
- Residents adjacent to the site.
- Development workers.

### *Controlled Waters*

- The site is on an unproductive bedrock strata.
- The site is mapped as having low leaching potential soils.
- Nearest surface water is located 196 m north east of the site.

### *Ecology*

- Animals and plants are considered to be possible receptors.

### *Buildings and services*

- Underground pipes and foundations.

## 3.3 Pathways and plausible pollutant linkages (See Table 3)

Pathways to the site are considered to be restricted by the low leaching potential soils, and unproductive bedrock strata. Any surface water flow from the site is expected to flow down gradient towards the south west.

### *Human health*

The main pathways considered possible are:

1. Ingestion of soil
2. Ingestion of dust
3. Ingestion of contaminated vegetables
4. Ingestion of soil attached to vegetables
5. Dermal contact with soil
6. Dermal contact with dust
7. Inhalation of fugitive soil dust
8. Inhalation of fugitive dust
9. Inhalation of vapours outside
10. Inhalation of vapours inside
11. Ingress to water supplies is also considered

## **Controlled Waters**

Flow to groundwater is considered to be restricted due to the low leaching potential soils mapped on the site. Surface water flow is expected to flow down gradient towards the south west.

The site mapped as having low leaching potential soils overlying Unproductive Bedrock Strata. The site is not within a groundwater protection zone.

The identified potential contaminants(sources) and receptors have been considered in relation to pathways that may link them (Table 3 and Appendix C):

**TABLE 3 – Initial Conceptual Site Model (see Appendix C)**

| Initial Source                         | Potential contaminants of concern | Plausible pathway  | Potential receptor          | Probability | Severity | Risk     | Justification  | Risk classification |
|--|-----------------------------------|--|-----------------------------|-------------|----------|----------|--|---------------------|
| <b>ON-SITE</b>                         |                                   |  |                             |             |          |          |  |                     |
| Nursery                                | Pesticides, Herbicides            | Direct soil and dust ingestion and/or inhalation following contact with the strata         | Humans (site users)         | Unlikely    | Medium   | Low      | Time since use as a nursery (over 20 years), natural attenuation, low leaching potential soils and unproductive bedrock strata restricting pathways.   | Low                 |
|  |                                   | Leaching via vertical or lateral migration following any movement through the strata       | Perched water, groundwater  | Unlikely    | Medium   | Low      |  | Low                 |
|  |                                   | Direct contact following any movement through the strata                                   | Buildings and service pipes | Unlikely    | Mild     | Very Low |  | Very Low            |
| <b>OFF-SITE</b>                        |                                   |  |                             |             |          |          |  |                     |
| Nurseries                              | Pesticides, Herbicides            | Direct soil and dust ingestion and/or inhalation following contact with the strata         | Humans (site users)         | Unlikely    | Medium   | Low      | Nursery 83 m E restricted by time since use as a nursery (over 20 years).<br>Natural attenuation, low leaching potential soils, unproductive bedrock strata and distance restricting pathways. | Low                 |
|  |                                   | Leaching via vertical or lateral migration following any movement through the strata       | Perched water, groundwater  | Unlikely    | Medium   | Low      |  | Low                 |
|  |                                   | Direct contact following any movement through the strata                                   | Buildings and service pipes | Unlikely    | Mild     | Very Low |  | Very Low            |
| Tank                                   | Metals, Hydrocarbons              | Direct soil and dust ingestion and/or inhalation following any movement through the strata | Humans (site users)         | Unlikely    | Medium   | Low      | Distance, topography, low leaching soil and unproductive bedrock strata restricting pathways.  | Low                 |
|  | Hydrocarbons                      | Leaching via vertical or lateral migration following any movement through the strata       | Perched water, groundwater  | Unlikely    | Medium   | Low      |  | Low                 |
|  |                                   | Direct contact following any movement through the strata                                   | Buildings and service pipes | Unlikely    | Mild     | Very Low |  | Very Low            |
| Ash View (scrap metal and car storage) | Metals, Hydrocarbons              | Direct soil and dust ingestion and/or inhalation following any movement through the strata | Humans (site users)         | Unlikely    | Medium   | Low      | Hardstanding, topography, low leaching potential soils and unproductive bedrock strata restricting pathways.   | Low                 |
|  | Hydrocarbons                      | Leaching via vertical or lateral migration following any movement through the strata       | Perched water, groundwater  | Unlikely    | Medium   | Low      |  | Low                 |
|  |                                   | Direct contact following any movement through the strata                                   | Buildings and service pipes | Unlikely    | Mild     | Very Low |  | Very Low            |
| Electric Substation                    | PCBs and Mineral Oils             | Direct soil and dust ingestion and/or inhalation following any movement through the strata | Humans (site users)         | Unlikely    | Medium   | Low      | Distance, topography, low leaching soils and unproductive bedrock strata restricting pathways.   | Low                 |
|  |                                   | Leaching via vertical or lateral migration following any movement through the strata       | Perched water, groundwater  | Unlikely    | Medium   | Low      |  | Low                 |
|  |                                   | Direct contact following any movement through the strata                                   | Buildings and service pipes | Unlikely    | Mild     | Very Low |  | Very Low            |

**Pathway:** Classification of human exposure pathways (routes) from The CLEA model, Research and Development Publication CLR10. **Probability and severity:** Classification of Probability and Consequence from CIRIA C552 Contaminated land risk assessment, a guide to good practice 2001. **Risk Classification** from DETR Guidelines for Environmental Risk Assessment and Management, 2000

## **4. RISK ASSESSMENT SUMMARY**

### **4.1 Human health**

A *low* potential risk exists from on and off site sources. The likelihood of occurrence of significant risks associated with any significant contamination associated with activities on the site is considered to be *low*.

### **4.2 Controlled Waters**

A *low* risk to groundwater and surface water is considered to exist as no sources are considered to be present on the site.

### **4.3 Ecology**

A *low risk* is considered to exist as no significant receptors are considered to exist on or within a significant distance of the site. Hence no plausible pollutant linkages are present.

### **4.4 Buildings and services**

A *very low* risk is considered to exist as aggressive substances which may affect the foundations or plastic/metal pipes of any buildings are considered not to be present on the site as no sources are considered to be present on site.



## **5. UNCERTAINTIES AND RECOMMENDATIONS**

No significant plausible pollutant linkages or significant uncertainties are considered to exist on the basis of this information.

No Phase 2 investigation is considered to be needed at present.

Development workers should wear PPE equipment if any ground works are to be undertaken. Should any significant made ground or odorous, abnormally coloured or suspected contaminated ground be encountered on the site during any development works, an amended risk assessment of the development should be undertaken to determine whether further investigation or remedial works are necessary.

To ensure minimal dust production, excavation works should not be undertaken when the ground is dry. If water is to be used as a dust suppressant during soil removal, on-site ponding or off-site run off must be appropriately controlled.

The Phase 1 Preliminary Risk Assessment should be submitted for review by the relevant authorities for their comments prior to any development works.

# **DRAWING 1**

**Current site setting**



# **APPENDIX A**

## **Historical maps**

# **APPENDIX B**

## **Environmental data**

# **APPENDIX C**

## **Risk consequence**

Risk is regarded as being a combination of the likelihood of an ‘event’ occurring and its severity. Both elements must be considered when assessing risk. As defined in CIRIA C552:2001, the magnitude of the potential severity of risk occurring may be assessed against:

**Consequence of Risk Being Realised (based on C552 CIRIA, 2001)**

| <b>Consequence of risk being realised</b>                          |                     |  |  |
|--|---------------------|--|--|
| <b>Classification</b>  | <b>Category</b>     | <b>Definition</b>  | <b>Examples</b>  |
| <b>Severe</b><br>short-term (acute) risks only                     | Humans              | Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part 2A.   | High concentrations of cyanide on the surface of an informal recreation area.                                      |
|  | Controlled Waters   | Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.  | Major spillage of contaminants from site into controlled water.  |
|  | Property            | Catastrophic damage to buildings/property.   | Explosion causing building collapse (can also equate to a short-term human health risk if buildings are occupied). |
|  | Ecological System   | A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.   |  |
| <b>Medium</b><br>chronic (long-term) risks; "significant harm"     | Humans              | Chronic damage to Human Health ("significant harm" as defined in Defra 2006).  | Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria                 |
|  | Controlled Waters   | Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).  | Leaching of contaminants from a site into a major or minor aquifer.  |
|  | Ecological System   | A significant change in a particular ecosystem   | Death of a species within a designated nature reserve.   |
| <b>Mild</b><br>chronic (long-term) risks; less sensitive receptors | Controlled Waters   | Pollution of non-sensitive water resources.  | Pollution of non-classified groundwater.   |
|  | Property            | Significant damage to buildings, structures and services ("significant harm" as defined in Circular on Contaminated Land, Defra, 2006).<br>Damage to sensitive buildings/structures/services | Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability)                |
|  | Ecological System   | Significant damage to crops. Damage to the environment.  |  |
| <b>Minor</b><br>chronic (long-term) risks; mild                    | Financial / project | Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.  |  |
|  | Humans              | Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).  | The presence of contaminants at such concentrations that protective equipment is required during site works.       |
|  | Property            | Easily repairable effects of damage to buildings, structures and services  | The loss of plants in a landscaping scheme.<br>Discolouration of concrete.   |

Similarly, the classification of the magnitude of the probability of the risk occurring may be assessed against:

**Probability of Risk Being Realised (C552 CIRIA, 2001)**

| Probability of risk being realised |   |
|------------------------------------|---|
| Classification                     | Definition  |
| High Likelihood                    | There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.  |
| Likely                             | There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. |
| Low Likelihood                     | There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.                                  |
| Unlikely                           | There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.   |

The risk categories are summarised in the following table:

**Risk Classification Matrix (C552 CIRIA, 2001)**

| Risk classification matrix  |                 |               |               |               |               |
|-----------------------------|-----------------|---------------|---------------|---------------|---------------|
| (CIRIA C552, 2001, page 82) |                 | Consequence   |               |               |               |
|                             |                 | Severe        | Medium        | Mild          | Minor         |
| Probability                 | High Likelihood | Very High     | High          | Moderate      | Moderate/ Low |
|                             | Likely          | High          | Moderate      | Moderate/ Low | Low           |
|                             | Low Likelihood  | Moderate      | Moderate/ Low | Low           | Very Low      |
|                             | Unlikely        | Moderate/ Low | Low           | Very Low      | Very Low      |

**Risk Classification Definitions (C552 CIRIA, 2001)**

| Risk classification definitions |  |
|---------------------------------|--|
| Very High                       | There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.   |
| High                            | Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.  |
| Moderate                        | It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. |
| Moderate / Low                  |  |
| Low                             | It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.  |
| Very Low                        | There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.  |



# REFERENCES

## *General guidance used:*

**BS 10175:2011** Investigation of potentially contaminated sites. British Standards Institution, London.

**CLR 11:** Model procedures for the management of land contamination. Environment Agency.

**CIRIA C665** Assessing the risks posed by hazardous ground gases 2013.

**CIRIA C682 The VOCs Handbook 2009** Investigation, assessing and managing risks from inhalation of Volatile Organic Compounds at land affected by contamination.

**Chartered Institute for Environment and Health** Indoor air quality in the home.

**Environment Agency Guiding Principles for Land Contamination (GPLC).**  
(2010) Environment Agency.