

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY – PRELIMINARY RISK ASSESSMENT

(Trustees) Mr S & Mrs B Sutton

**Land adjacent to 79 Chapelgate
Sutton St James**



Our Ref: SES/MBS/79C/1#1

Date: 6th November 2018

Client:

(Trustees) Mr S and Mrs B Sutton
39 Wisbech Road
Long Sutton
Spalding
Lincs
PE12 9AG

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Land adjacent to 79 Chapelgate Sutton St James

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EXECUTIVE SUMMARY

Current site conditions	A grassed area of land with an outbuilding occupies the site.
Proposal	The proposal is for the erection of one dwelling and parking garage. See Drawing 2 for proposal. Planning Application H20-0378-18.
Adjacent site conditions	A road bounds the site to the north and west, with residential dwellings to the east and west, and a grassed field to the south.
Site history	No significant development had occurred on the site until the development of the current outbuilding (mapped by 2000).
Geology	Tidal Flat Deposits - Clay and Silt over Ampthill Clay Formation – Mudstone.
Hydrogeology	The site is on a negligibly permeable Unproductive Superficial and Unproductive Bedrock aquifer and is not in a groundwater source protection zone.
Hydrology	Surface water flow could possibly find a route to surface water drains and channels to the south and west leading to the drain mapped 145 m south-west of the site.
Potential sources and contaminants	No significant sources are considered to exist on or within a significant distance of the site with the exception of asbestos possibly present on the outbuilding on site.
Conclusions	No significant plausible pollutant linkages or significant uncertainties are considered to exist other than that related to asbestos therefore no further investigation is considered to be needed. An asbestos survey should be undertaken if asbestos is present and any identified asbestos should be removed and disposed of in accordance with regulations.

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:

Land adjacent to 79 Chapel Gate
Sutton St James
Spalding
Lincs
PE12 0EF

OS Grid Ref: 539290, 318210

The proposal is for the erection of one dwelling and parking garage. See Drawing 2 for proposal. Planning Application H20-0378-18.

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 comprises 0.08 ha of land located off Chapel Gate, Spalding. A road bounds the site to the north and west, with residential dwellings to the east and west, and a grassed field to the south (Photo 1). A grassed area of land with an outbuilding occupies the site (Photos 1 & 2). The site and surrounding land slopes down to the south-west.

PHOTO 1 Aerial view

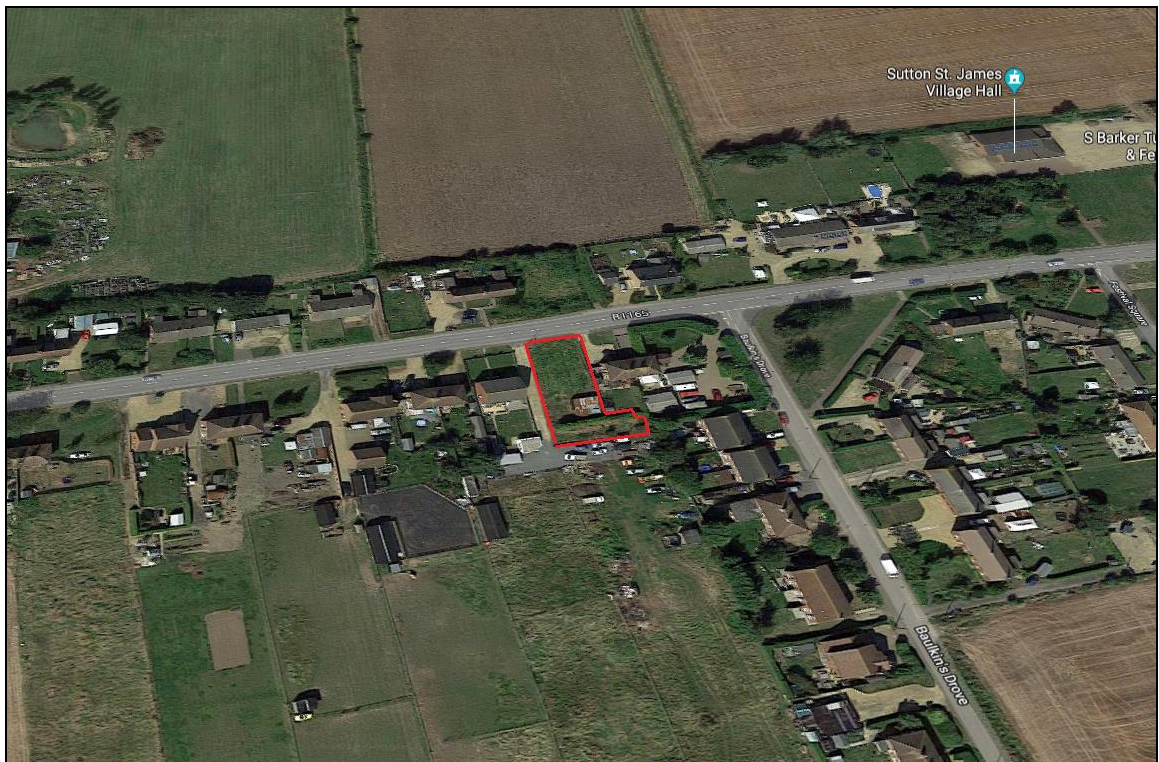


PHOTO 2 Google Streeview 2015 View N to S



2.2 Former investigations and consultations

No known former investigations with regards to contamination appear to have been undertaken for the site.

2.3 Relevant planning history

No planning history is evident for the site.

2.4 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
On-site			
Undeveloped land (pre-1888)	On-site	0	
Current building mapped by 2000	On-site	0	
Off site			
Allotment gardens (1904-1975)	NW	12	<i>dwelling constructed by 1975</i>
Residential development mapped (1952)	E,W	2	
Sewage works (1975-current)	E	109	
Sewage works (1975-1991)	S	124	
Garage (1975-current)	E	190	
Farm (1975-current)	W	183	

2.5 Soils, geology and hydrology

BGS maps indicate that the site is located on:

Superficial geology

1:50 000 scale superficial deposits description: Tidal Flat Deposits - Clay and Silt. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by shorelines (U)

Bedrock geology

1:50 000 scale bedrock geology description: Ampthill Clay Formation - Mudstone. Sedimentary Bedrock formed approximately 157 to 164 million years ago in the Jurassic Period. Local environment previously dominated by shallow seas.

No BGS listed borehole logs are mapped within a 250 m radius and within the same strata as mapped for the site.

Hydrology

Flow to groundwater may occur slowly through the soils to the aquifer at depth.

Surface water flow could possibly find a route to surface water drains and channels to the south and west leading to the drain mapped 145 m south-west of the site.

The site is on a negligibly permeable Unproductive Superficial and Unproductive Bedrock aquifer and is not in a groundwater source protection zone.

2.6 Environmental data search

Environmental data (Appendix B) indicates the following:

- The site is located on a negligibly permeable Unproductive Superficial and Unproductive Bedrock aquifer and is not in a groundwater source protection zone.
- No substantiated pollution incidents within 325 m.
- No landfill sites within 600 m.
- No waste management, treatment or disposal sites within 1000 m.
- No areas of potentially infilled land within 285 m.
- No contemporary trade directory entries are listed for the site or within a 200 m radius.
- The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations in relation to the proposed development.
- Two pollution incidents 91 m east of the site (1997). Pollutant: petrol. Classed as Category 3 incidents (minor).
- The property is in a lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). No radon protective measures are considered necessary in the construction of new properties.
- One fuel station 207 m east of the site.

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 located on negligibly permeable aquifer. No significant potential sources of contamination are considered to exist from on or off-site sources. The residents will be the main receptors on site. No significant plausible pollutant linkages with regards to on-site residents or controlled waters are considered to exist other than that related to asbestos.

3.1 Potential sources

A review of the historical maps (Appendix A) and other information has identified that no significant sources of contamination are considered to be present on the site other than that related to asbestos (Table 2).

TABLE 2 Possible source locations and potential contaminants

Land use	Direction	Distance (m)	Potential Contaminants
On-site Outbuilding	On-site	0	Asbestos
Off site Allotment gardens (1904-1975)	NW	12	Hydrocarbons, pesticides, herbicides
Sewage works (1975-current)	E	109	Pathogens, inorganic ions
Sewage works (1975-1991)	S	124	Pathogens, inorganic ions
Garage/fuel station (1975-current)	E	190	Metals, hydrocarbons, solvents
Farm (1975-current)	W	183	Metals, hydrocarbons, pesticides, herbicides

3.2 Receptors

Humans

- Residents in the proposed dwelling.
- Residents in adjacent properties.

Controlled Waters

- The site is on a negligibly permeable Unproductive Superficial and Unproductive Bedrock aquifer and is not in a groundwater source protection zone.

- Surface water 145 m south-west 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 and from the site could exist via service channels.

Human health

The main pathways considered possible are:

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

Controlled Waters

Flow to groundwater may occur slowly through the soils to the aquifer at depth.

Surface water flow could possibly find a route to surface water drains and channels to the south and west leading to the drain mapped 145 m south-west of the site.

The site is on a negligibly permeable Unproductive Superficial and Unproductive Bedrock aquifer and is not in a groundwater source 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)

Potential source	Potential contaminants of concern	Plausible pathway	Potential receptor	Probability	Severity	Risk	Justification	Risk classification
ON-SITE								
Buildings	Asbestos	Inhalation	Humans (site users)	Likely	Medium	Moderate	Asbestos may be present on the buildings and will present a risk during demolition/renovation	Moderate
OFF-SITE								
Former allotment gardens (to 1975)	Hydrocarbons, pesticides, herbicides	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Significant natural attenuation and/or dispersion, geology and topography restricting pathways	Low
Former and current sewage works	Pathogens, inorganic ions	Direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Distance and geology restricting pathways	Low
Garage/fuel station	Metals, hydrocarbons, solvents	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Distance and geology restricting pathways	Low
Farm	Metals, hydrocarbons, pesticides, herbicides	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Distance and geology restricting pathways	Low
Notes to table: * Given the length of time since in-fill, any potential gas generated during decomposition is likely to have peaked and be in decline. This information is based on the document prepared by CIRIA titled 'CIRIA C665 -Assessing risks posed by hazardous gases to buildings'. Section 7.2.5 (Figure 7.1), details that the landfill gas generation rate significantly reduces with the age of the waste. By 30 years, the rate of gas generation is insignificant, and by 50 years, the rate is minimal. 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 **moderate** potential risk exists from any asbestos possibly present on the building on the site and likely to be disturbed as part of the re-development.

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

4.2 Controlled Waters

A **low** risk to groundwater is considered to exist due to no significant sources being present on the site.

4.3 Ecology

A **very low risk** is considered to exist as no significant sources are considered to exist on the site or receptors 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.

5. UNCERTAINTIES AND RECOMMENDATIONS

No significant plausible pollutant linkages or significant uncertainties are considered to exist on the basis of this information other than that related to asbestos.

If asbestos is present on the building, an asbestos survey should be undertaken and all identified asbestos should be disposed of according to regulations prior to demolition works. Documentation should be retained and provided to the relevant authorities on completion of the works.

No Phase 2 investigation is considered to be needed.

Development workers should wear PPE equipment during all development works. Should any significant made ground or odorous, abnormally coloured or suspected contaminated ground be encountered on the site during 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 & DRAWING 2

Current site setting & Site proposal plan

NOTES:

 Site boundary

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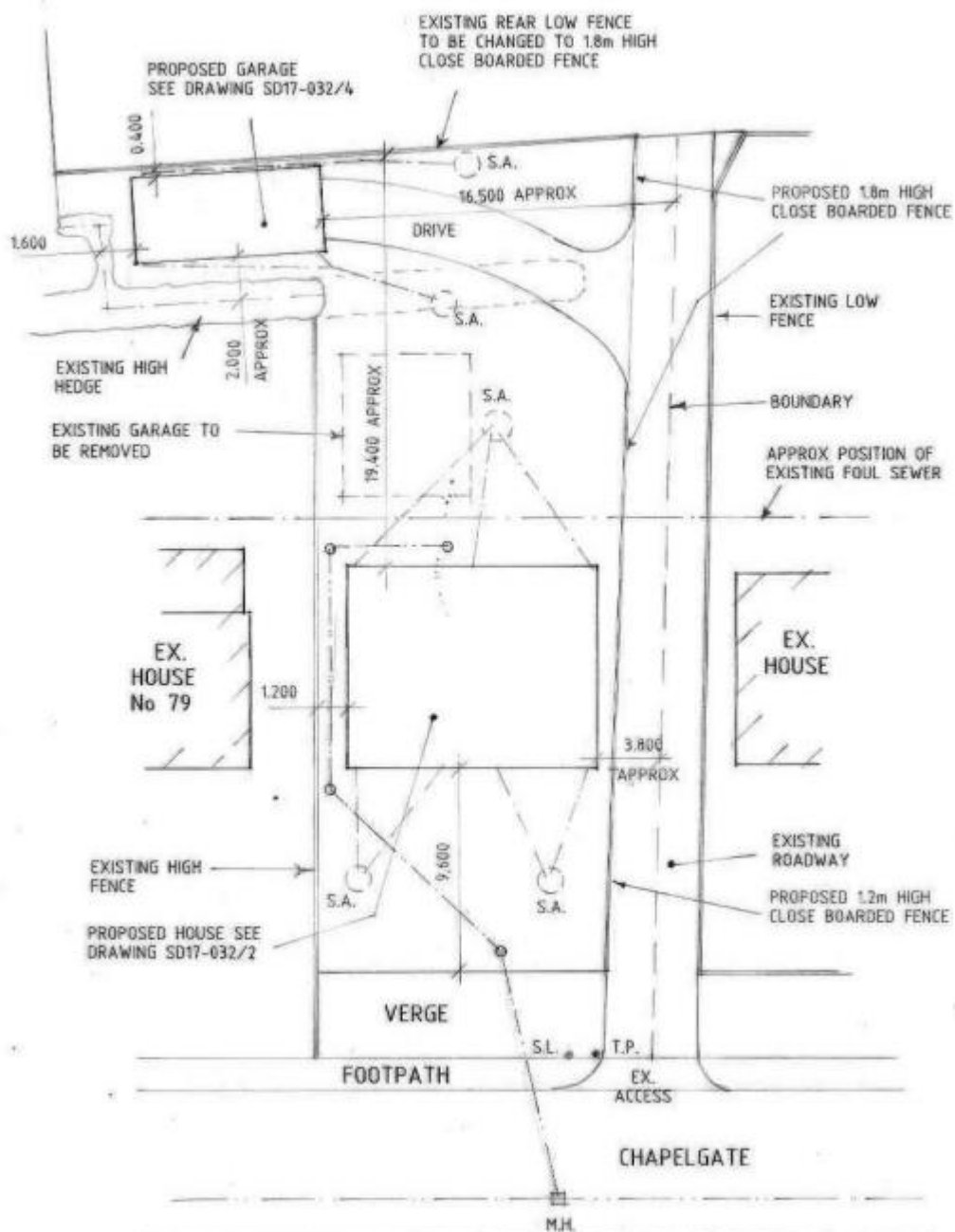
Drawing number	1
Drawing title	Current site setting
Scale	1:2745
Date	06/11/2018



NOTES:

Soil Environment Services

Drawing number	2
Drawing title	Site proposal plan – ground floor
Scale	1:250
Date	06/11/2018



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)

Consequence of risk being realised			
Classification	Category	Definition	Examples
Severe 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.	
Medium 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.
Mild 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). 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.	
Minor 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. 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.