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CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY – PRELIMINARY RISK ASSESSMENT

Ms Elaine Saunders

**Wood Cottage,
Greenfield Road**



**Soil Environment Services Ltd
June 2017**

Client:

Ms Elaine Saunders
Wood Cottage
Greenfield Road
Holmfirth
HD9 3XF

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**Wood Cottage,
Greenfield Road**

A report prepared on behalf of ***Soil Environment Services*** by:

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EXECUTIVE SUMMARY

Current site conditions	Currently occupied by a boarding kennels and cattery adjacent to Wood Cottage.
Proposal	Residential development.
Adjacent site conditions	The site is bound by woodland to the north and west, Greenfield Road to the south and Wood Cottage and associated gardens to the north east and east.
Site history	A building is mapped on the site from 1893. A cattery has been on the site since the 1960s.
Geology	Huddersfield White Rock – Sandstone Bedrock. No superficial mapped.
Hydrogeology	The site is on a Secondary A Bedrock Aquifer and is not within a groundwater source protection zone.
Hydrology	The nearest surface water is 50 m to the northeast of the site.
Potential sources and contaminants	No potential sources are considered to have been generated on or within a significant distance of the site.
Conclusions	No Phase 2 investigation is considered to be needed. Basic radon protective measures are required within new developments.

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:

Wood Cottage
Greenfield Road
Holmfirth
HD9 3XF

OS Grid Ref: 410500, 408143.

The proposal is for residential development. A planning application was not available for viewing at the time of report completion.

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 0.2 ha of land located off Greenfield, Holmfirth. The site is bound by woodland to the north and west, Greenfield Road to the south and Wood Cottage and associated gardens to the north east and east (Photo 1). The site is currently occupied by a commercial boarding kennels and cattery (Photos 1 and 2). The topography of the site and surrounding area slopes towards the north north west.

PHOTO 1 Aerial view



PHOTO 2 View S to N from Greenfield Road.



2.2 Former investigations and consultations

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

2.3 Planning history

A planning application for the site was not available for viewing at the time of writing this report.

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, as noted on historical maps, 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			
Building mapped	On-site	0	1893 onwards
Cattery	On-site	0	c.1960s
Off site			
Wood Cottage	NE	28	Built Circa 1854
Infilled Sandstone Quarry	SW	88	Mapped as 1982; Unknown infill

2.5 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: *Huddersfield White Rock - Sandstone.*

Sedimentary Bedrock formed approximately 314 to 315 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.

One BGS listed borehole log is mapped within 500 m of the site, identifying hard blue stone with alternative beds of coal shale and shale to 22.9 m bgl.

Hydrology

Flow to groundwater may be restricted due to the low leaching potential soils, however, the permeable bedrock geology may allow the flow of groundwater at depth.

The site and surrounding area slopes towards the north north west hence surface water is expected to flow to controlled waters, located 50 m north west of the site.

The site is on a Secondary A Bedrock Aquifer and is not within a groundwater source protection zone.

2.6 Environmental data search

Environmental data (Appendix B) indicates the following:

- The site is on a Secondary A Bedrock Aquifer.
- The site is not within a groundwater source protection zone.
- No pollution incidents to controlled waters within 700 m radius.
- No substantiated pollution incidents within 1000 m.
- No contaminated land register entries and notices within 1000 m.
- No licensed, current or historical landfill sites within 1000 m.
- No waste treatment, management or disposal sites within 1000 m.
- One area of infilled ground is mapped within 250 m; an opencast sandstone pit located 86 m southwest, infilled circa 1982 with unknown fill.
- 3-5% of homes are estimated to be at or above the Action Level. Basic radon protective measures are considered necessary in the construction of new properties.
- No contemporary trade directory entries are listed within 1000 m of the site.
- No fuel station/garages are listed within 1000 m of the site.
- The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations.
- The site is not within an area which may be affected by coal mining activity.

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 south of the site is located on soils of low leaching potential overlying a Secondary A Bedrock Aquifer. No significant potential sources of contamination are considered to have been generated on the site. The current workers and future residents will be the main receptors on site. No significant potential pollutant pathways from off-site sources have been identified. Plausible pollutant linkages with regards to future residents are not considered to be evident.

3.1 Potential sources

A review of the historical maps (Appendix A) has identified that no significant sources of contamination are considered to have been generated on the site (Table 2) other than Radon. No potential sources and pathways are considered to be present within a significant distance of the site as the time since infill of the nearby quarry is likely to have lead to the peak and decline of ground gas generation.

TABLE 2 Possible source locations and potential contaminants

Land use	Direction	Distance (m)	Potential Contaminants
On-site Geology	On-site	0	<i>Radon</i>
Off site Infilled Opencast Sandstone Quarry	SW	88	<i>Carbon dioxide and methane</i>

3.2 Receptors

Humans

- Current workers on the site
- Future residents on the site.
- Residents in adjacent properties.
- Development workers.

Controlled waters

- The site is on a Secondary A Bedrock Aquifer.
- The site is not in a groundwater source protection zone.
- Nearest surface water feature is 50 m northeast 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
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 may be restricted due to the low leaching potential soils, however, the permeable bedrock geology may allow the flow of groundwater at depth.

The site and surrounding area slopes towards the north north west hence surface water is expected to flow to controlled waters, located 50 m north west of the site.

The site is on a Secondary A Bedrock Aquifer and is not within a groundwater source protection zone.

TABLE 3. Initial source/receptor matrix											Y = yes, N = no, Blank = not possible											CSM	Ref	No.	1	Version	a
SOURCE	Chemicals		RECEPTORS																								
		Possible present on site	On site									Off site															
	Type		Current workers	Future workers	Dev,ment workers	Current residents	Future residents	Ground water	Surface water	Ecology	Current workers	Future workers	Dev,ment workers	Current residents	Future residents	Ground water	Surface water	Ecology									
ON SITE																											
Geology	Radon	Y	Y	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N									
OFF SITE																											
Infilled Sandstone Quarry	Carbon Dioxide	N	N	N	N	N	N	N	N	N	N/A																
	Methane	N	N	N	N	N	N	N	N	N																	
Notes	For sources and contaminants see Section 3.1 of the report.																										
	For receptors and plausible linkages see Sections 3.2 and 3.3 of the report.																										
	For risks from sources on-site and sources off-site see Section 4 of the report.																										

The identified potential contaminants (sources) and receptors have been considered in relation to pathways that may link them (Table 4 and Appendix C):

TABLE 4 – Initial Conceptual Site Model (see Appendix C)

Initial Source	Potential contaminants of concern	Plausible pathway	Potential receptor	Probability	Severity	Risk	Justification	Risk classification
ON-SITE								
Geology	Radon	Indoor inhalation following any movement through the strata	Humans (site users)	Likely	Medium	Moderate	No significant risk is considered to exist as no significant sources have been generated on the site	Moderate
OFF-SITE								
Infilled Sandstone Quarry	Methane, carbon dioxide	Indoor inhalation following any movement of any ground gases through the strata	Humans (site users)	Unlikely	Medium	Low	Gas generated during decomposition is likely to have peaked and be in decline* due to time since infill circa 1982.	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 potential on site radon risks. A *low* potential risk exists from potential off-site sources as no significant sources are considered to have been generated.

4.2 Controlled waters

A *low* potential risk exists from potential off site sources as no significant sources are considered to have been generated.

4.3 Ecology

No significant 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* potential risk is considered to exist as aggressive substances (e.g. acids, organic solvents, PAH's) which may affect the foundations or plastic/metal pipes are not considered to exist within a significant distance of the site.

5. UNCERTAINTIES AND RECOMMENDATIONS

No uncertainties are considered to exist with regards to the concentration of potential contaminants from on-site or off-site sources other than with regard to Radon. The site has been identified within an 'intermediate probability' radon area, therefore basic radon protective measures are necessary in the construction of new dwellings.

No Phase 2 investigation is considered to be needed.

Appropriate PPE should be worn by development workers and a watching brief should be conducted during development works. Should any significant made ground be encountered during development works or should any areas of odorous, abnormally coloured or suspected contaminated ground be encountered, an amended risk assessment of the development should be undertaken to determine whether further investigation or remedial works are necessary.

The Phase 1 Preliminary Risk Assessment will need to be submitted to the relevant authorities for their comments prior to any development works on site.

DRAWING 1

Current site location

NOTES:

 Site boundary

Soil Environment Services

Drawing number

1

Drawing title

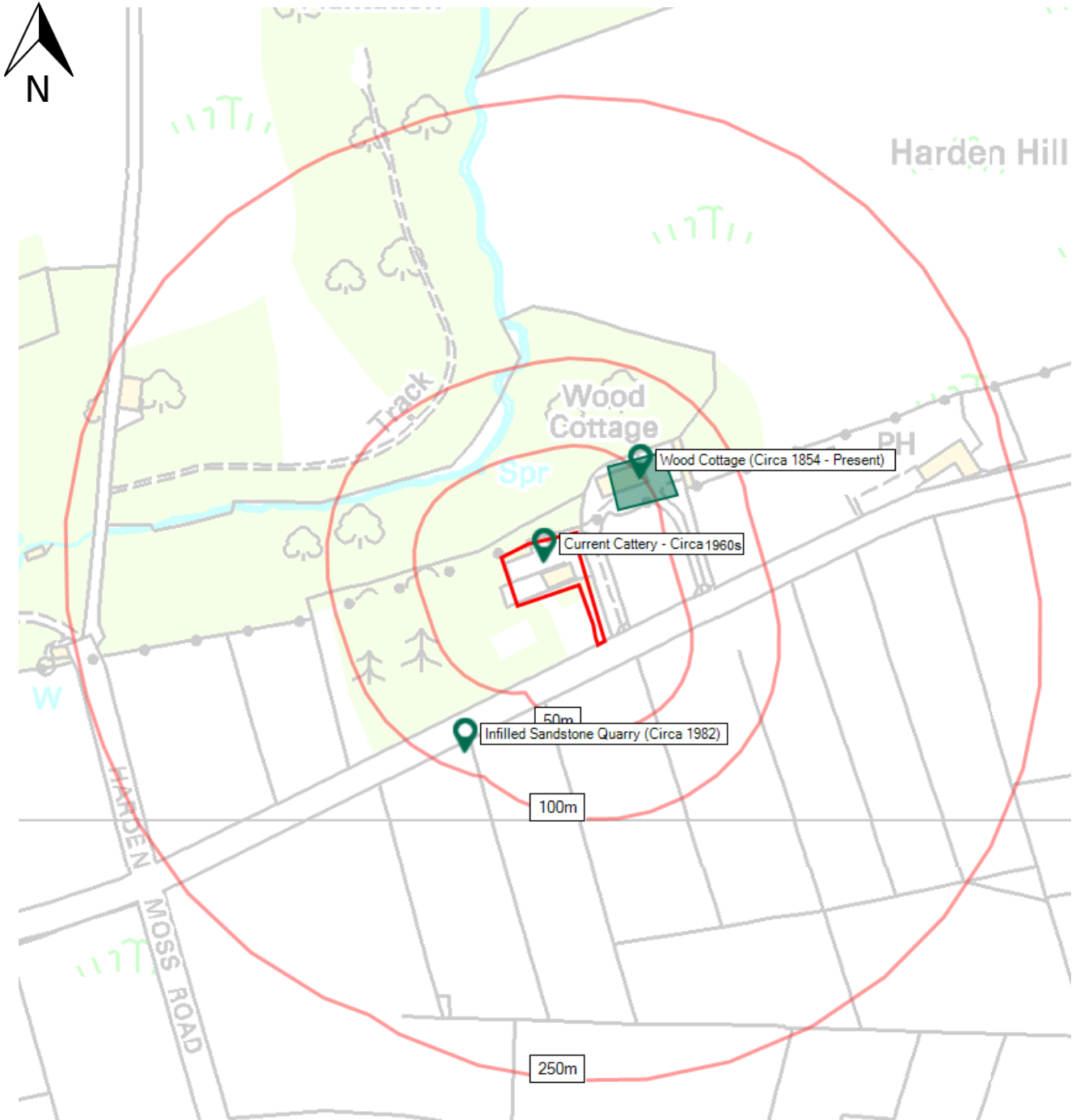
Current site location

Scale

1: 3333

Date

16/06/2017



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)

		Consequence			
		Severe	Medium	Mild	Minor
Probability (CIRIA C552, 2001, page 82)	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.

