

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY– PRELIMINARY RISK ASSESSMENT

William Heslop

**St Simons Community Hall, Wenlock Road
South Shields**



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Client:

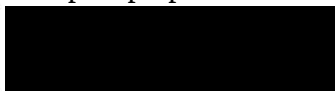
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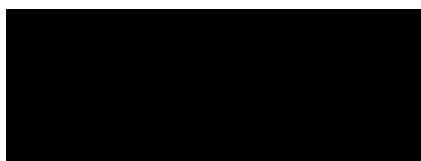
St Simons Community Hall, Wenlock Road South Shields

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



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EXECUTIVE SUMMARY

Current site conditions	A church hall occupies the site.
Proposal	The proposal is demolition of the existing church hall and construction of a dwelling.
Adjacent site conditions	Residential dwellings bound the site to the north, with a road to the east and a church and graveyard to the south and west.
Site history	The site was undeveloped until a scout hut was partly mapped on the north of the site in 1956. The current church hall building has been mapped since c.1973.
Geology	Pelaw Clay Member – Clay over Pennine Upper Coal Measures Formation - Mudstone, Siltstone and Sandstone.
Hydrogeology	The site is on a Low Vulnerability Unproductive Superficial and Secondary A 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 north and east leading to the pond mapped 76 m north-east of the site.
Potential sources and contaminants	No significant sources are considered to exist on or within a significant distance of the site other than that related to asbestos which may be present.
Conclusions	No significant plausible pollutant linkages or significant uncertainties are considered to exist other than that potentially from asbestos therefore no further investigation is considered to be needed. Prior to demolition of the building, an asbestos survey should be undertaken and any identified asbestos should be removed and disposed of by a licenced contractor.

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:

St Simons Community Hall
Wenlock Road
South Shields
NE34 9AL

OS Grid Ref: 434939, 564342

The proposal is demolition of the existing church hall and construction of a dwelling.

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 on Wenlock Road. Residential dwellings bound the site to the north, with a road to the east and a church and graveyard to the south and west (Photo 1). A church hall occupies the site (Photos 1 & 2). The site and surrounding land slopes down to the north and east.

PHOTO 1 Aerial view



PHOTO 2 Google Streetview from West (2010)



2.2 Former investigations and consultations

No former investigations with regards to contamination appear to have been undertaken.

2.3 Relevant planning history for the site

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-1859)	On-site	0	<i>northern boundary</i>
Part of a scout hut building (1956-c.1970)	On-site	0	
Hall building mapped by 1973	On-site	0	
Off site			
Graveyard (1897-current)	S	1	
Rail (1897-current)	S	57	
Warehouse/works/rail (1897-c.1993)	NW	87	
Pond (1897-current)	NE	76	
Allotments (1941-1956)	SE	68	
Depot (1961-current)	W	173	

2.5 Soils, geology and hydrology

BGS maps indicate that the site is located on:

Superficial geology

1:50 000 scale superficial deposits description: *Pelaw Clay Member - Clay. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions*

Bedrock:

1:50 000 scale bedrock geology description: *Pennine Upper Coal Measures Formation - Mudstone, Siltstone and Sandstone. Sedimentary Bedrock formed approximately 308 to 315 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries and deltas.seas.*

BGS borehole logs mapped for the development of the road 50 m north-west (and within the same strata as mapped for the site) in general inform of silty sandy Clay with medium fine gravel to 3 m bgl over stiff silty sandy CLAY with fine to medium gravel to 10 m bgl.

Hydrology

Flow to groundwater may be restricted due to the low permeability nature of the superficial geology mapped on the site

Surface water flow could possibly find a route to surface water drains and channels to the north and east leading to the pond mapped 76 m north-east of the site.

The site is on a Low Vulnerability Unproductive Superficial and Secondary A 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 Low Vulnerability Unproductive Superficial and Secondary A Bedrock aquifer and is not in a groundwater source protection zone.
- No Contaminated Land Register Entries and Notices within 1000 m.
- No landfill sites within 550 m.
- No waste treatment, management or disposal sites within 465 m.
- The site 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.
- No contemporary trade directory entries are listed for the site or within a 79 m radius of the site.
- No fuel stations within 430 m.
- The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations in relation to the proposed development.
- One pollution incident 69 m north-east of the site (dated 1994 – pollutant not given). Classed as a Category 3 incident (minor incident).
- Five areas of potentially infilled land mapped within 250 m:

Potentially Infilled Land (Water)			
Use:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc)	A13NW (W)	50
Date of Mapping:	1862		
Potentially Infilled Land (Water)			
Use:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc)	A13NW (W)	77
Date of Mapping:	1952		
Potentially Infilled Land (Water)			
Use:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc)	A13NE (NE)	84
Date of Mapping:	1951		
Potentially Infilled Land (Water)			
Use:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc)	A13NW (W)	212
Date of Mapping:	1862		
Potentially Infilled Land (Water)			
Use:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc)	A13NW (W)	221
Date of Mapping:	1862		

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 a low vulnerability groundwater area. 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. With the exception of asbestos possibly present on the building, no significant plausible pollutant linkages with regards to on-residents or controlled waters are considered to exist.

3.1 Potential sources

A review of the historical maps (Appendix A) and other information has identified that no potential sources of contamination are considered to exist on the site from on and off-site sources other than that possibly from asbestos (Table 2).

TABLE 2 Possible source locations and potential contaminants

Land use	Direction	Distance (m)	Potential Contaminants
On-site			
Current building	On-site	0	Asbestos
Off site			
Graveyard (1897-current)	S	1	Methane, carbon dioxide
Rail (1897-current)	S	57	Metals, hydrocarbons
Warehouse/works/rail (1897-c.1993)	NW	87	Metals, hydrocarbons
Allotments (1941-1956)	SE	68	Hydrocarbons, pesticides, herbicides
Depot (1961-current)	W	173	Metals, hydrocarbons
Infilled land (1862-1952)	NE, W	50-221	Methane, carbon dioxide

3.2 Receptors

Humans

- Residents in the proposed development
- Residents and workers in nearby properties

Controlled Waters

- The site is on an Unproductive Superficial and Secondary A Bedrock aquifer

- Pond 76 m north-east.

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/fruit
4. Ingestion of soil attached to vegetables/fruit
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
12. Ingress and accumulation of methane and carbon dioxide

Controlled Waters

Flow to groundwater may be restricted due to the low permeability nature of the superficial geology mapped on the site

Surface water flow could possibly find a route to surface water drains and channels to the north and east leading to the pond mapped 76 m north-east of the site.

The site is on a Low Vulnerability Unproductive Superficial and Secondary A 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								
Building due for demolition	Asbestos	Inhalation	Humans (site users)	Likely	Medium	Moderate	Given the age of the building, asbestos may be present on the building on site and present a risk when disturbed	Moderate
OFF-SITE								
Graveyard	Methane, carbon dioxide	Indoor inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Given the age of the cemetery, the risk from ground gases is considered to be low	Low
Current metro/rail line	Metals, hydrocarbons	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
Former works/warehouse/rail	Metals, hydrocarbons	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
Former allotments	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. Natural attenuation given the time since allotment activities	Low
Depot	Metals, hydrocarbons	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
Infilled land	PCB's, mineral oils	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Natural attenuation given the time since infill *(pre 1952). 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 **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 or surrounding the site is considered to be *low*.

A **moderate** potential risk exists from asbestos possibly present on the uilding on site.

4.2 Controlled Waters

A **low** risk to groundwater is considered to exist given that no significant sources are considered to originate from the site.

4.3 Ecology

A **low risk** is considered to exist as no significant sources or 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 **low** risk is considered to exist as no significant quantities of aggressive substances which may affect the foundations or plastic/metal pipes of any buildings are considered to be present on the site.

5. UNCERTAINTIES AND RECOMMENDATIONS

With the exception of asbestos possibly present on the building on site, no significant plausible pollutant linkages or significant uncertainties are considered to exist with regards to ground contamination on the basis of this information.

An asbestos survey should be undertaken prior to demolition/removal of the building and any 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

Current site setting

NOTES:

 Site boundary

Soil Environment Services

Drawing number

1

Drawing title

Current site setting

Scale

1:2745

Date

26/08/2020

N



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	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.

APPENDIX D

Coal Authority report

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.