
Soil Environment Services Ltd

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY– PRELIMINARY RISK ASSESSMENT

Studio Tashkeel Architecture Ltd

**Land at Herbert Street
Manchester**



**Soil Environment Services Ltd
July 2020**

Our Ref: SES/STA/LHS/1#1

Date: 6th July 2020

Client:

Studio Tashkeel Architecture Ltd
89 Princess Street
Manchester
M1 4HT

CONTAMINATED LAND RISK ASSESSMENT

PHASE 1 DESK TOP STUDY– PRELIMINARY RISK ASSESSMENT

Land at Herbert Street Manchester

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



Louise Tavasso BSc (Hons)
Environmental Consultant

Approved by:



Dr Robin S Davies BSc PhD MISoilSci PGC *Contaminated Land Management*
Managing Director

This report has been prepared by Soil Environment Services with all reasonable skill, care and diligence, within the terms of The Contract with The Client. The report is the property of The Client who can assign this report to any third party who will then be afforded the same assurances as detailed within the terms of the original Contract with The Client.

Soil Environment Services

Agricultural Land Classification, Contaminated Land
Risk Assessment, Mineral Extraction Soil Planning
Unit 8, Stocksfield Hall, Northumberland, NE43 7TN
Telephone 01661 844827
1210 Parkview, Arlington Business Park, Reading, RG7 4TY
Telephone 0118 9657523
www.soilenvironmental-services.co.uk

CONTENTS

	Page
EXECUTIVE SUMMARY	
1. INTRODUCTION AND OBJECTIVES	6
1.1 Introduction	6
1.2 Objectives	6
2. SITE CHARACTERISATION	7
2.1 Current settings and conditions	7
2.2 Former investigations and consultations	8
2.3 Planning history	8
2.4 Site history	9
2.5 Soil, geology and hydrology	9
2.6 Environmental data search	10
3. INITIAL CONCEPTUAL SITE MODEL	12
3.1 Significant sources	12
3.2 Receptors	12
3.3 Pathways and plausible pollutant linkages	13
4. RISK ASSESSMENT SUMMARY	15
4.1 Human health	15
4.2 Controlled waters	15
4.3 Ecology	15
4.4 Buildings and services	15
5. UNCERTAINTIES AND RECOMMENDATIONS	16
DRAWING 1	Current site setting
DRAWING 2	Site proposal plan
APPENDIX A	Historical maps
APPENDIX B	Environmental data
APPENDIX C	Risk consequence
REFERENCES	

LIST OF TABLES

TABLE 1 Significant features on the historical maps

TABLE 2 Possible source locations and potential contaminants

TABLE 3 Initial Conceptual Site Model

EXECUTIVE SUMMARY

Current site conditions	The site comprises a building most recently used for service garages activities, with grassed areas to the north and south.
Proposal	The proposal is for residential development (see Drawing 2 for proposal). No planning application was available for viewing at the time of report completion.
Adjacent site conditions	Roads bound the site to the north, east and south, with a government office building to the west.
Site history	Residential dwellings occupied the site, with the development of a building c.1952 used for public baths/wash house/ public laundry and depot.
Geology	Till, Devensian – Diamicton over Chester Formation – Sandstone.
Hydrogeology	The site is on a low vulnerability Secondary Undifferentiated Superficial and Principal Bedrock aquifer and is not in a groundwater source protection zone.
Hydrology	Surface water flow could find a possible route via surface water drains and channels surrounding the site. No surface water is mapped within 785 m of the site.
Potential sources and contaminants	Potential sources of contamination, primarily in the form of metals and hydrocarbons are considered to possibly exist from on-site sources.
Conclusions	Plausible pollutant linkages and significant uncertainties are considered to exist from on-site sources. A moderate risk is evident and therefore some remedial measures or further investigation is considered to be needed.

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 at Herbert Street
Manchester
M8 0DG

OS Grid Ref: 383972, 400494

The proposal is for residential development (see Drawing 2 for proposal). No planning application was 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 currently comprises 0.26 ha of land located on Herbert Street, Manchester. Roads bound the site to the north, east and south, with a government office building to the west (Photo 1). The site comprises a building most recently used for service garages activities, with grassed areas to the north and south (Photos 1-4). The site and surrounding land are relatively level.

PHOTO 1 Aerial view



PHOTO 2 -Google Streetview 2012- View S to N



PHOTO 3 -Google Streetview View from N



PHOTO 3 -Google Streetview View from E



2.2 Former investigations and consultations

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

2.3 Relevant planning history

[Reference 038295](#)

CITY COUNCIL DEVELOPMENT Change of use of vacant laundry and baths to a storage depot and the creation of a new loading bay
Decision: Approved

[Reference 062593/FU/NORTH1/01](#)

Change of use from former depot to motor vehicle repairs.
Decision: Approved

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-1848)	On-site	0	
Dwellings (1890-c.1973)	On-site	0	NE & S boundaries
Additional building mapped by 1952	On-site	0	Mapped as 'Public baths & wash house'
Mapped as a Public Laundry by 1975	On-site	0	
Mapped as a Depot by 1996	On-site	0	Most recently used for garage activities
Off site			
Brick works/clay pits (1891-c.1923)	SW	17	
Brick works/clay pits (1891-c.1923)	SE	95	
Works/warehouses/garages (1968-current)	SW	102	

2.5 Soils, geology and hydrology

BGS maps indicate that the site is located on:

Superficial geology

1:50 000 scale superficial deposits description: Till, Devensian - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions.

Bedrock geology

1:50 000 scale bedrock geology description: Chester Formation - Sandstone. Sedimentary Bedrock formed approximately 247 to 250 million years ago in the Triassic Period. Local environment previously dominated by rivers.

A BGS listed borehole log (BGS ID 29019) mapped 15 m east and within the same strata as mapped for the site informs of made ground over soft black silty clay to 2.92 m bgl over firm to stiff red/brown boulder clay to 6.27 m bgl. No water was encountered.

Hydrology

Flow to groundwater may occur slowly through the soils to the aquifer at depth. Surface water flow could find a possible route via surface water drains and channels surrounding the site. No surface water is mapped within 785 m of the site

The site is on a low vulnerability Secondary Undifferentiated Superficial and Principal 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 Secondary Undifferentiated Superficial and Principal Bedrock aquifer and is not in a groundwater source protection zone.
- No Contaminated Land Register Entries and Notices within 1000 m.
- No pollution incidents within 400 m.
- 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.
- No fuel stations within 560 m.
- The Urban Soil Chemistry maps (Appendix B) indicate no significant elevated soil metal concentrations in relation to the proposed development.
- Three contemporary trade directories are listed for the site (garage services).
- Four area of potentially infilled land (non-water) 10 m SW, 97 m SE, 123 m W and 245 m SW (date of mapping: 1986). One area of potentially infilled land (water) is mapped 179 m east (date of mapping: 1848). See Figure 1 for location.
- One waste site 125 m NW of the site (1987).
- Two historical landfill sites within 250 m (See Figure 1 for location):
 1. 145 m west. No input dates provided. Waste and commercial waste accepted.
 2. 234 m south-east. No input dates or types of waste specified.

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 high vulnerability groundwater area. Potential sources of contamination are considered to exist from previous on-site activities. The future residents will be the main receptors on site. Plausible pollutant linkages with regards to on-site residents and development workers 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 from on-site sources (Table 2).

TABLE 2 Possible source locations and potential contaminants

Land use	Direction	Distance (m)	Potential Contaminants
On-site			
Laundry/depot/garage activities	On-site	0	Metals, hydrocarbons, solvents
Buildings	On-site	0	Asbestos
Off site			
Brick works/clay pits (1891-c.1923)	SW	17	Methane, carbon dioxide
Brick works/clay pits (1891-c.1923)	SE	95	Methane, carbon dioxide
Works/warehouses/garages (1968-current)	SW	102	Metals, hydrocarbons
Historic landfill	W	145	Methane, carbon dioxide, leachates
Historic landfill	SE	234	Methane, carbon dioxide, leachates

3.2 Receptors

Humans

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

Controlled Waters

- The site is on a low vulnerability Secondary Undifferentiated Superficial and Principal Bedrock aquifer and is not in a groundwater source protection zone.

- Underlying aquifer.

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.

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 occur slowly through the soils to the aquifer at depth.

Surface water flow could find a possible route via surface water drains and channels surrounding the site. No surface water is mapped within 785 m of the site

The site is on a low vulnerability Secondary Undifferentiated Superficial and Principal 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)

TABLE 5: 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								
Former laundry and gargage activities	Metals, hydrocarbons, solvents	Direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users), development workers	Likely	Medium	Moderate	Pollutant linkages to future on site residents are evident	Moderate
		Leaching via vertical or lateral migration following any movement through the strata	Perched water, groundwater	Low likelihood	Medium	Moderate /low	Geology helping to restrict pathways to depth	Moderate/low
		Direct contact	Buildings and service pipes	Low likelihood	Medium	Moderate /low	Aggressive substances (PAH's) which may affect the foundations or plastic/metal pipes of any buildings are considered to possibly be present on the site	Moderate/low
OFF-SITE								
Former clay pits/infilled land/historic landfill sites	Methane, carbon dioxide, leachates	Indoor inhalation, direct soil and dust ingestion and/or inhalation following any movement through the strata	Humans (site users)	Unlikely	Medium	Low	Natural attenuation and dispersion of ground gases* given the time since infill, distance and geology restricting pathways	Low
Works/warehouses/garages	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
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*** risk to future residents exists from on-site sources (Table 3). The major risk is from dermal contact or ingestion of soil and dust in proposed landscaped/garden areas and indoor inhalation of hydrocarbon vapours.

4.2 Controlled Waters

A ***moderate/low*** risk to groundwater is considered to exist due to the geology restricting pathways.

4.3 Ecology

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

4.4 Buildings and services

A ***moderate/low*** risk is considered to exist as aggressive substances which may affect the foundations or plastic/metal pipes of any buildings are considered to be possibly present on the site.

5. UNCERTAINTIES AND RECOMMENDATIONS

Some risks are considered to be evident in relation to the possible presence of metals, hydrocarbons and solvents from on-site sources. The major risk to human health could be from indoor inhalation via hydrocarbon vapours and direct soil and dust ingestion in landscaped/garden areas and to development workers. In addition, a risk to controlled waters is evident via direct leaching to the aquifer. A Phase 2 investigation would therefore be needed or in lieu of this, the council may accept the implementation of some remedial measures.

A Phase 2 investigation could be undertaken with sampling of the soil in order to substantiate the possible risks from contamination. The investigation should consist of soil samples from targeted boreholes with samples analysed in a UKAS and MCERTS accredited laboratory for metals and dioxins, such that a site-specific quantitative risk assessment can be undertaken and appropriate risk reduction measures recommended. Any site investigation should be targeted with regard to sampling locations and all works be undertaken in accordance with BS 10175 - Investigation of Potentially Contaminated Sites: Code of Practice and CLR11 - Model Procedures for the Management of Land Contamination, using LQM/CIEH S4ULs guideline values.

An asbestos survey should be undertaken prior to demolition/removal of the current 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.

The above proposed remediation measures or a Phase 2 scope of works will need to be agreed with the council prior to intrusive or development works.

DRAWING 1

Current site setting

NOTES:



Site boundary

Soil Environment Services

Drawing number

1

Drawing title

Current site setting

Scale

1:2680

Date

06/07/2020

N



NOTES:

 Site boundary

Soil Environment Services

Drawing number	2
Drawing title	Proposed site plan
Scale	1:427
Date	06/07/2020



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.