CONTAMINATED LAND RISK ASSESSMENT

Phase 1 Desk Study Report

Site Address
Unit 4 Hawthorn Road
Littlehampton
BN17 7LT

Client:
Envision Contracting Ltd

Report Reference
PH1-2018-001033

Prepared by
STM Environmental Consultants Ltd

Date:
07/09/2018

ARUN DISTRICT COUNCIL LU/7/19/PD

1 CONTENTS

1 Contents 2
2 Document Control 5
3 Disclaimer 6
4 Executive Summary 7
5 Introduction 8
6 Context and Objectives for the Risk Assessment 8
6.1 Legislative Context 8
6.1.1 Part IIA 8
6.1.2 National Planning Policy Framework 8
6.1.3 Environmental Damage Regulations 9
6.2 Objectives 9
6.3 Summary of Research Undertaken 9
7 Site Description 10
7.1 Site Location and Size 10
7.2 Site Current Use 11
7.3 Surrounding Land Uses 11
7.4 Proposed Development 11
8 Site History 11
8.1 Analysis of Historical Ordnance Survey Mapping 11
9 Environmental Characteristics 13
9.1 Geology 13
9.2 Hydrogeology 13
9.3 Hydrology 13
9.4 Topography 13
9.5 Designated Ecological Protection Zones 14
9.6 Designated Protected Buildings and Monuments 14
9.7 IPC Processes 14
9.8 Dangerous Substance and Radioactive Substance Registrations 14
9.9 Pollution Incidents 14
9.10 Waste Disposal Activities (Landfills) 14
9.11 Coal Mining 14
9.12 Radon 14
9.13 Flood Risk 14
9.14 Asbestos within Buildings 14
10 Relevant Planning History 14
11 Site Walkover 15
12 Preliminary Conceptual Risk Model (CRM) 15

12.1 Potential Sources 15
12.2 Potential Receptors 16
12.2.1 Potential Human Health receptors 16
12.2.2 Potential Groundwater Receptors 16
12.2.3 Potential Surface Water Receptors 16
12.2.4 Potential Ecological Receptors 16
12.2.5 Potential Property Receptors 16
12.3 Potential Pathways 16
12.3.1 Potential Pathways for Human Receptors 16
12.3.2 Potential Pathways for Groundwater Receptors 16
12.3.3 Potential Pathways for Surface Water Receptors 16
12.3.4 Potential Pathways for Ecological Receptors 16
12.3.5 Potential Pathways for Property Receptors 17
12.4 Potential Pollutant Linkages 17
13 Qualitative Risk Assessment 17
13.1 Assessment of Potential Significance of Potential Pollutant Linkages 19
13.1.1 Potential Risks to On-Site Human Health 19
13.1.2 Potential Risks to Off-Site Human Health 19
13.1.3 Potential Risks to Groundwater Receptors 19
13.1.4 Potential Risks to Surface Water Receptors 19
13.1.5 Potential Risks to Property Receptors 19
14 Conclusions 19
15 Recommendations 20
15.1 Watching Brief and Discovery Strategy 20
15.2 Health and Safety 20
15.3 Services 21
16 Information Gaps and Uncertainties 21
17 Appendix 1 – Proposed Development Plans 22
18 Appendix 2 – Environmental Screening Report 24
18.1 Summary Datasheet 24
18.2 Historical Industrial and Waste Uses 26
18.2.1 Search Information for Potential Contaminated Land 27
18.3 Hydrogeology 28
18.3.1 Search Information for Aquifer (Superficial) 28
18.3.2 Search Information for Aquifer (Bedrock) 28
18.4 Geology 29
18.4.1 Search Information for Superficial Geology 29
18.4.2 Search Information for Bedrock Geology 29

18.5 Radon Gas 30
18.5.1 Search Information for Areas Potentially Affected by Radon 30
19 Appendix 3 – Site Photography 31
20 Appendix 4 - Risk Assessment Methodology 33
21 Abbreviations 35

List of Tables

Table 1: Summary of surrounding land uses 11
Table 2: Summary of historical land use identified from historical maps 11
Table 3: Summary of potential contamination sources, period of operation and distance from site. 15
Table 4: Conceptual Site Risk Model - Potential Sources, Pathways and Receptors identified on the site. 18
Table 5: Summary of qualitative risk assessment 20
Table 6: Contamination Risk Matrix 33
Table 7: Assessment description for risk scores 33
Table 8: Risk Classification System 33

2 DOCUMENT CONTROL

CONTAMINATED LAND RISK ASSESSMENT
Phase 1 Desk Study Report

Site Address:	Unit 4 Hawthorn Road Littlehampton BN17 7LT
Site Coordinates:	502477, 103525
STM Reference:	PH1-2018-001033
Version No:	1.0
Prepared for:	Envision Contracting Ltd
Date:	07/09/2018
Report Author:	Lara Griffin (BSc) **Graduate Environmental Consultant**
Draft Report Authorised by:	Kelley Swana (BSc, MSc) **Graduate Environmental Consultant**
Final Report Authorised by:	Simon Makoni (BSc, MSc) **Director**

3 DISCLAIMER

This report and any information or advice which it contains, is provided by STM Environmental Consultants Ltd and is solely for use by Envision Contracting Ltd (Client). Any other party using or placing reliance upon any information contained in this report does so at their own risk.

STM Environmental Consultants Ltd has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. However, STM Environmental Consultants Ltd gives no warranty, representation or assurance as to the accuracy or completeness of any information, assessments or evaluations presented within this report. Furthermore, STM Environmental accepts no liability whatsoever for any loss or damage arising from the interpretation or use of the information contained within this report.

It is noted that some of the findings presented in this report are based on information obtained from third parties (i.e. Environmental Search Report). Whilst we assume that all information is representative of the site and of present conditions we can offer no guarantee as to its validity regarding the short term or long-term history of the Site.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

It should be noted that this report has been produced for environmental purposes only. It should not in any way be construed to be or used to replace a geotechnical survey, structural survey, asbestos survey, buried services survey, unexploded ordnance survey or Invasive Plant Survey.

4 EXECUTIVE SUMMARY

SECTION	SUMMARY
Site Location And Size	The site is located at Unit 4 Hawthorn Road, Littlehampton, BN17 7LT and is centred at national grid reference 502477, 103525. The site has an area of approximately 0.459 ha.
Current Use	The site is currently an office building with associated Car Park.
Proposed Development	The development proposal is for the change of use from B1a Office to C3 residential, comprising 30 one-bedroom apartments (16 one bedroom and 14 studio flats).
Site History	Examination of Ordnance Survey historic maps revealed that the site was open undeveloped land until c. 1993 when a small rectangular office building appears onsite. The site remains the same until the present day.
Geology	The site is located on bedrock of New Pit Chalk Formation and Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated). The superficial deposits are Brickearth consisting of silt.
Topography	The site is at an elevation of approximately 4.0 mAOD (above Ordnance Datum).
Hydrogeology	The site is underlain by a Principal Aquifer.
Hydrology	There are no surface water bodies located within 250m of the site
Radon	The site has been identified as being at between a 1 – 3% chance of being affected by naturally occurring radon gas. However, no radon protective measures are considered necessary for the site in accordance with publication BR211 by the Building Research Establishment.
Contamination Assessment	No onsite PCLUs have been identified, however, offsite PCLUs include Warehouses, Morrison's Car Park, Agricultural Supplies Works, Martello Enterprise Centre, Tank and Electrical Substation. A conceptual site risk model was developed and a qualitative risk assessment carried out. Potentially significant potential pollutant linkages were identified in respect of - Human Health – i.e. future occupiers and construction workers
Recommendations	Given that potentially significant potential pollutant linkages were identified, it is recommended that a limited intrusive site investigation, including ground gas and vapour monitoring, is undertaken with the objective of determining the presence and extent of any soil contamination at the site. The scope of the investigation should be agreed with the Local Planning Authority prior to commencement of the works.
This table is intended as a summary of the desk study findings and should be read in conjunction with the main report.	

5 INTRODUCTION

STM Environmental Consultants Ltd (STM) were commissioned by Envision Contracting Ltd (Client) to undertake a Phase 1 Contaminated Land Risk Assessment (CLRA) at a site located at Unit 4 Hawthorn Road, Littlehampton, BN17 7LT.

The study is required to support planning permission for the change of use from B1a Office to C3 residential, comprising 30 one-bedroom apartments (16 one bedroom and 14 studio flats).

6 CONTEXT AND OBJECTIVES FOR THE RISK ASSESSMENT

6.1 Legislative Context

6.1.1 Part IIA

Part IIA of the Environmental Protection Act 1990, which came into force in England in April 2000, introduced a new statutory regime for the identification and remediation of contaminated land in the United Kingdom.

The legislation considers risks from contaminated land to human beings, controlled waters (surface and ground water), protected ecological systems and property. Under the legislation “contaminated land” is defined as:

"Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land that: -

(a) Significant harm is being caused or there is significant possibility of such harm being caused: or

(b) Pollution of controlled waters is being caused, or is likely to be, caused."

In order for land to be considered contaminated, there must be a contaminant, a receptor and a pathway (via which the contaminant can reach the receptor) present at the site. When these three components are identified at a site, a *pollutant linkage* is said to exist.

Pollutant Linkage = Contaminant –> Pathway –> Receptor

In order for a local authority to make a determination that a site is contaminated land, it must be satisfied that the pollutant linkage is a *significant pollutant linkage* and that the land in question is causing, or that there is a significant possibility that it will cause significant harm (SPOSH) to humans, habitats, buildings or livestock and crops if remedial work is not carried out.

6.1.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) sets out the government's policy on dealing with land contamination through the planning process. It states that planning policies and decisions should ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including

land remediation or impacts on the natural environment arising from that remediation;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- adequate site investigation information, prepared by a competent person, is presented.

6.1.3 Environmental Damage Regulations

The Environmental Damage (Protections and Remediation) Regulations 2015 transpose the provisions of the EU Environmental Liability Directive into law in England and Wales.

The Regulations require action in response to the most significant cases of environmental damage. They cover specific types of:

- damage to species and habitats;
- damage to water; or
- risks to human health from contamination of land.

The Regulations apply to both imminent threats and actual cases of damage. Where these arise, those responsible must take immediate action to prevent damage occurring or remediate damage where it does occur.

The Regulations are based on the polluter pays principle ‘requiring those responsible to meet the cost of preventive and remedial measures.

6.2 Objectives

This Desk Study has been written so as to provide an initial overview of the nature and extent of contamination hazards that may exist at the site. It has been undertaken in accordance with the specifications outlined in the British Standard BS 10175:2011+A2:2017 Code of Practice for the Investigation of potentially contaminated sites and the Environment Agency Document, CLR11 Model Procedures for the Management of Land Contamination.

The main objectives of the study were to:

- Enable a conceptual site risk model to be constructed;
- Provide sufficient information for a preliminary qualitative risk assessment to be undertaken;
- Inform the need for and scope of any intrusive investigations that may be required.

6.3 Summary of Research Undertaken

Details of information sources researched in order to compile this desk study are given below.

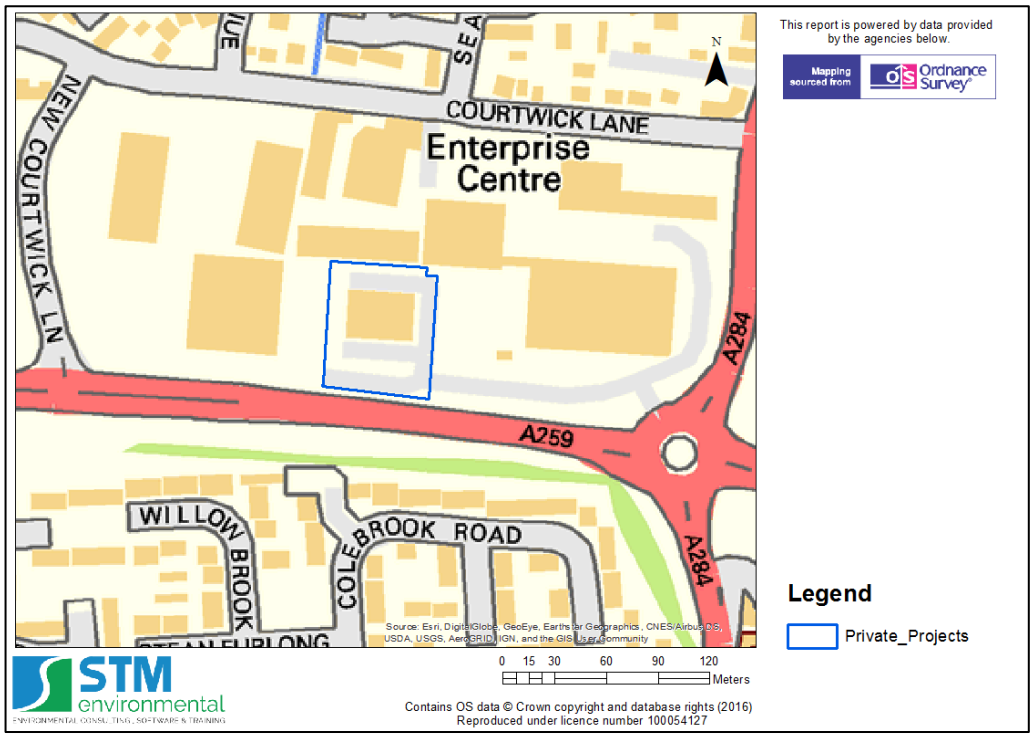
- Environment Agency Open Data (GIS)
- English Nature Open Data (GIS)
- English Heritage Open Data (GIS)
- British Geological Survey GeoIndex Web Map Service
- Coal Authority Open Data and Web Map Service.
- Historical Ordnance Survey Maps
- Local Authority Planning Application Portal

7 SITE DESCRIPTION

7.1 Site Location and Size

The site is located at Unit 4 Hawthorn Road, Littlehampton, BN17 7LT at grid reference is 502477, 103525. The site has an area of approximately 0.459 ha.

The site lies within the jurisdiction of Arun District Council in terms of the planning process.



7.2 Site Current Use

The site is currently an office building with associated Car Park.

7.3 Surrounding Land Uses

A description of current land uses surrounding the boundaries of the site is given below in Table 1 below.

Table 1: Summary of surrounding land uses

Boundary	Land Use Description
Northern	Commercial/ Industrial area
Eastern	Morrisons
Southern	Hawthorn Rd/ A259/ Residential area
Western	Advanced Energy - Warehouse

7.4 Proposed Development

The development proposal is for the change of use from B1a Office to C3 residential, comprising 30 one-bedroom apartments (16 one bedroom and 14 studio flats).

The proposed development plans are contained in Appendix 1.

8 SITE HISTORY

8.1 Analysis of Historical Ordnance Survey Mapping

Historical maps published by the Ordnance Survey dating back to the late 1800's were reviewed in order to ascertain any previous industrial use at the site. A summary of the historic map analysis is provided in Table 2.

Table 2: Summary of historical land use identified from historical maps

Map Year & Scale	POTENTIALLY CONTAMINATIVE LAND USES	
	On Site	Off Site
1876 1:2,500	The site is open undeveloped land, potentially agricultural.	The surrounding area is partially developed E with open undeveloped land to the N, W and S.
1879 1:10,560	No significant changes.	No significant changes.
1897-98 1:2,500	No significant changes.	Millfield Barn adjacent N.
1899 1:10,560	No significant changes.	No significant changes.

Table 2: Summary of historical land use identified from historical maps

Map Year & Scale	POTENTIALLY CONTAMINATIVE LAND USES	
	On Site	Off Site
1911-12 1:2,500	No significant changes.	No significant changes.
1913-14 1:10,560	No significant changes.	No significant changes.
1932 1:2,500	No significant changes.	Further development NE.
1938-52 1:10,560	No significant changes.	No significant changes.
1958 1:1,250	No significant changes.	Further residential development in all directions.
1959-73 1:2,500	No significant changes.	No significant changes.
1962 1:10,560	No significant changes.	No significant changes.
1965-73 1:1,250	No significant changes.	Millfield Barn adjacent N now labelled as Agricultural Supplies Works.
1970-73 1:1,250	Partial mapping only.	Electrical Substation 121m S.
1972 1:2,500	No significant changes.	No significant changes.
1973 1:10,560	No significant changes.	Further residential development S.
1974 1:1,250	Partial mapping only.	Partial mapping only.
1977 1:10,000	No significant changes.	No significant changes.

Table 2: Summary of historical land use identified from historical maps

Map Year & Scale	POTENTIALLY CONTAMINATIVE LAND USES	
	On Site	Off Site
1979 1:1,250	Partial mapping only.	Partial mapping only.
1982 1:10,000	No significant changes.	Further residential development S.
1993 1:10,000	A small rectangular office building appears onsite.	Agricultural Supplies Works adjacent N no longer labelled now potentially an industrial/ commercial area labelled Enterprise Centre.
Current Use	The site is currently an office building with associated Car Park.	The surrounding area is mixed commercial and industrial use. Warehouse adjacent W, Martello Enterprise Centre adjacent N, Morrisons Car Park adjacent E, Tank 19m E, Electrical Substation 37m E, Morrisons Petrol Station 108m E and Electrical Substation 85m N.

9 ENVIRONMENTAL CHARACTERISTICS

A variety of Environmental datasets provided by the Environment Agency, British Geological Society, English Heritage and English Nature and others were screened in order to assess the environmental sensitivity of the site. The LandCheck Environmental Screen report is presented in Appendix 2. The results are summarised below.

9.1 Geology

The site is located on bedrock of New Pit Chalk Formation and Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (Undifferentiated). The superficial deposits are Brickearth consisting of silt.

9.2 Hydrogeology

The Environment Agency classifies the superficial deposits as a Secondary A aquifer. The bedrock is classified as a Principal aquifer. There are no groundwater Source Protection Zones within 250 m of the site.

9.3 Hydrology

No surface water bodies were identified within 250m of the site.

9.4 Topography

According to Elevation Finder, the general site level is at 4.0 mAOD.

9.5 Designated Ecological Protection Zones

No ecological protection zones (e.g. SSSI, Ramsar, SPA or SAC) were identified onsite or within 250m of the proposed development.

9.6 Designated Protected Buildings and Monuments

No listed buildings or scheduled ancient monuments were identified onsite or within 50m of the proposed development.

9.7 IPC Processes

No IPC processes were identified onsite or within 50m of the site.

9.8 Dangerous Substance and Radioactive Substance Registrations

No List 1 or List 2 Dangerous Substance Registrations were identified onsite or within 50m of the site. No Radioactive Substance Registrations were identified onsite or within 50m of the site.

9.9 Pollution Incidents

No pollution incidents were identified onsite or within 50m of the site.

9.10 Waste Disposal Activities (Landfills)

A search of Environment Agency Historic and Authorised landfill datasets did not identify any evidence of historic authorised or non-authorised landfills on or within 250m of the site.

9.11 Coal Mining

A search of the BGS Areas potentially affected by coal mining dataset indicates that the site is not located in an area potentially affected by coal mining.

9.12 Radon

A search of the BGS Radon dataset indicates that the property lies in an area with between a 1 – 3% chance of being affected by naturally occurring radon gas. However, no radon protective measures are considered necessary for the site in accordance with publication BR211 by the Building Research Establishment.

9.13 Flood Risk

The site is not located within a flood zone.

9.14 Asbestos within Buildings

It is possible that Asbestos may exist within the office buildings on the site and that an Asbestos survey may be required in line with The Control of Asbestos Regulations 2012. This is outside the scope of this assessment.

10 RELEVANT PLANNING HISTORY

Arun District Council's online planning portal was searched in an effort to identify any relevant planning applications. No relevant records were identified.

11 SITE WALKOVER

A site walkover was not undertaken as part of the initial scope of works. Photographs of the site taken from Google Maps are presented in Appendix 3.

12 PRELIMINARY CONCEPTUAL RISK MODEL (CRM)

A conceptual site risk model (CRM) aims to summarise all the potential pollutant linkages or risk that may be associated with a site. It considers the potential pollution sources, receptors and pathways by which receptors can be impacted.

12.1 Potential Sources

Potentially contaminative land uses (PCLUs) of concern were identified based on their proximity to the site and whether they had the potential to generate significant quantities of ground gases, vapours and/or mobile volatile contamination (i.e. high pollution migration potential).

Any PCLs within a 50m radius of the site as well as any PCLs with high pollution migration potential within 250m of the site were considered to be of concern and were included within the assessment.

A summary is provided in Table 3 below.

Table 3: Summary of potential contamination sources, period of operation and distance from site.

Site Name	Industrial Profile	Approx. Year Use Established	Approx. Year Use Ended	Direction	Approx. Distance from Site (m)
Warehouses	Warehouses	c. 1993	Current (2018)	Adjacent W	0
Morrison's Car Park	Car Park	Unknown	Current (2018)	Adjacent E	0
Agricultural Supplies Works	Factory or Works	c. 1965	c. 1993	Adjacent N	0
Martello Enterprise Centre	Factory or Works: Use Unspecified	c. 1993	Current (2018)	Adjacent N	0
Tank	Tank	Unknown	Current (2018)	N	18
Electrical Substation	Electrical Substation	Unknown	Current (2018)	E	38

Typical contaminants associated with the above PCLUs are:

- Heavy Metals
- Fuels & Fuel Oils
- Acids & Alkalis
- Chlorinated & Non-Chlorinated Solvents
- Organic & Inorganic Compounds
- PCBs
- PAHs

Please note, this list is not exhaustive of all contaminants that may be present on or off site.

12.2 Potential Receptors

The potential receptors include human, water, ecological and infrastructure receptors.

12.2.1 Potential Human Health receptors

Potential human health receptors include construction workers and future occupants or users of the site and the proposed development.

12.2.2 Potential Groundwater Receptors

Potential groundwater receptors include the Principal Aquifer.

12.2.3 Potential Surface Water Receptors

There are no potential surface water receptors in the vicinity of the site.

12.2.4 Potential Ecological Receptors

There are no potential ecological receptors in the vicinity of the site.

12.2.5 Potential Property Receptors

Potential property receptors include the proposed development as well as neighbouring properties and associated services.

12.3 Potential Pathways

12.3.1 Potential Pathways for Human Receptors

The main pathways via which on and off-site human receptors are likely to come into contact with, or be affected by any contamination present on the site can be summarised as follows:

- Dermal contact with contaminated soil (i.e. absorption through the skin) – through garden activities such as children playing, gardening etc.
- Ingestion of contaminated soil (either directly or via soil adhering to vegetables grown on the site)
- Inhalation of contaminated soil, fugitive dust and vapours.

12.3.2 Potential Pathways for Groundwater Receptors

The principal means by which contaminants can reach the groundwater is by leaching (i.e. downward movement through the soil pores with percolating and infiltrating water).

12.3.3 Potential Pathways for Surface Water Receptors

Routes by which contaminants from the site could reach surface water include via overland run-off, drainage and groundwater entering nearby rivers as base flow.

12.3.4 Potential Pathways for Ecological Receptors

The exposure pathways for terrestrial ecological receptors will be similar to those for humans. Pathways for aquatic receptors are via uptake of contaminated sediments and water.

12.3.5 Potential Pathways for Property Receptors

Pathways by which property receptors are exposed to potential contaminants include ground gas and vapour migration through the unsaturated zone and absorption of water containing dissolved contaminants (i.e. as in the case of sulphate attack).

12.4 Potential Pollutant Linkages

The Potential Pollutant Linkages (PPLs) were identified as part of the CRM. These were concerned with the following:

- Risk of direct contact with and inhalation of contaminants to on-site human health receptors (PPL1a)
- Risk of injury/death of on-site human health receptors as a result of explosion due to accumulation of ground gas from off-site sources in confined spaces within on-site dwellings. (PPL1b)
- Risk of direct contact with and inhalation of contaminants to off-site human health receptors as a result of on-site contaminants migrating off-site (PPL2a)
- Risk of injury/death to off-site human health receptors as a result of explosion due to migration of on-site ground gas and subsequent accumulation in confined spaces in off-site buildings. (PPL2b)
- Risk of derogation of groundwater quality resulting from the migration of on-site contaminants into the underlying aquifer (PPL3)
- Risk of derogation of surface water quality resulting from the migration and entry of on-site contaminants into the surface water receptor (PPL4)
- Risk of damage to buildings and services from on-site contaminants (PPL5a)
- Risk of damage to property as a result of explosion due to migration of on-site ground gas and subsequent accumulation in confined spaces in off-site buildings (PPL5b).

13 QUALITATIVE RISK ASSESSMENT

For land to be considered ‘contaminated land’ under Part IIA, the potential contamination source must be causing or have the significant possibility of causing harm to designated receptors. It is therefore necessary to focus on pollutant linkages that have the potential to be significant (i.e. those that are most likely to lead to a determination).

The identified PPLs were therefore individually qualitatively assessed using a basic risk assessment methodology which considers “Likelihood” and “Severity” to assess the magnitude of the potential risk. The methodology is summarised in Appendix 4.

Table 4 below summarises the conceptual site risk model (CRM) including the identified PPLs and the results of the qualitative risk assessment.

Table 4: Conceptual Site Risk Model - Potential Sources, Pathways and Receptors identified on the site.

Source	**Potential Contaminants Associated with Adjacent Uses as Warehouses, Morrison's Car Park, Agricultural Supplies Works and Martello Enterprise Centre and Offsite Uses as Tank and Electrical Substation:** i.e. Heavy Metals, Fuels & Fuel Oils, Acids & Alkalis, Chlorinated & Non-Chlorinated Solvents, Organic & Inorganic Compounds, PCBs and PAHs.							
Potential Contaminants	**On and Off-Site Contaminants**		**On Site Contaminants**		**On Site Contaminants**		**On and Off-Site Contaminants**	
Potential Pathways	• Ingestion of soils, garden vegetables and dust • Ingestion of contaminated drinking water • Dermal Absorption • Inhalation of dusts and vapours indoors and outdoors • Migration of ground gases and vapours into properties				Leaching in the unsaturated zone and diffusion in the saturated zone	• Overland run-off • Drainage channels • Base flow	• Migration of ground gases and vapours through the unsaturated zone • Attack on water supply service pipes	
Potential Receptors	**ON SITE HUMANS** Future occupiers, visitors, construction workers		**OFF SITE HUMANS** Residents, visitors		**GROUND WATER** Principal Aquifer	**SURFACE WATER** None	**ON SITE PROPERTY** Buildings and services	
Potential Hazards	• Adverse health effects • Injury/Death	Explosion/ Methane build up in confined spaces	• Adverse health effects • Injury/ Death	Explosion/ Methane build up in confined spaces	Derogation of groundwater quality	• Derogation of surface water quality • Ecological impacts	Damage to property and services	Explosion Methane build up in confined spaces
Potential Pollutant Linkage ID	**PPL1a**	**PPL1b**	**PPL2a**	**PPL2b**	**PPL3**	**PPL4**	**PPL5a**	**PPL5b**
SEVERITY	Major (4)	Major (4)	Major (4)	Major (4)	Moderate (3)	Moderate (3)	Major (4)	Major (4)
LIKELIHOOD	Remote (2)	Improbable (1)	Improbable (1)	Improbable (1)	Improbable (1)	Improbable (1)	Improbable (1)	Improbable (1)
RISK	Low to Moderate (6)	Low (4)	Low (4)	Low (4)	Very Low (3)	Very Low (3)	Low (4)	Low (4)
POTENTIALLY SIGNIFICANT?	**YES**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

13.1 Assessment of Potential Significance of Potential Pollutant Linkages

13.1.1 Potential Risks to On-Site Human Health

PPL1a was considered to have the potential to be significant. Adjacent potentially contaminative land uses were identified which could impact the site. As the proposal is to introduce residential dwellings, it is possible that human health receptors (i.e. future occupiers of the dwellings) could be exposed to potential contamination (migrating ground gases & vapours) after completion.

The site has been identified as being at between a 1 – 3% chance of being affected by naturally occurring radon gas. However, no radon protective measures are considered necessary for the site in accordance with publication BR211 by the Building Research Establishment.

PPL1b was considered unlikely to have the potential to be significant as no potential sources of explosive ground gases (i.e. landfills) were identified in the vicinity of the site.

13.1.2 Potential Risks to Off-Site Human Health

PPL2a was considered unlikely to have the potential to be significant. It is considered unlikely that any contaminants present at the site would be of sufficient magnitude as to significantly impact off-site human receptors.

PPL2b was considered unlikely to have the potential to be significant as no potential sources of explosive ground gases (i.e. landfills) were identified onsite.

13.1.3 Potential Risks to Groundwater Receptors

PPL3 was considered unlikely to have the potential to be significant. Although the site is underlain by a Principal Aquifer it is understood that there will be no ground break involved as part of the development. Therefore, it is considered unlikely that any contaminants present at the site would be of sufficient magnitude as to significantly impact groundwater receptors.

13.1.4 Potential Risks to Surface Water Receptors

PPL4 was considered unlikely to have the potential to be significant as no surface water bodies were identified within 250m of the site.

13.1.5 Potential Risks to Property Receptors

PPL5a is considered unlikely to have the potential to be significant. The site has only ever been used as commercial offices and it is therefore considered unlikely that any contaminants present at the site would be of sufficient magnitude as to significantly impact property receptors.

PPL5b was considered unlikely to have the potential to be significant as no potential sources of explosive ground gases (i.e. landfills) were identified in the vicinity of the site.

14 CONCLUSIONS

This Phase 1 Desk Study was carried out to support planning permission for the change of use from B1a Office to C3 residential, comprising 30 one-bedroom apartments (16 one bedroom and 14 studio flats).

A review of historical maps and planning records suggests that the site and immediate adjacent land have been subject to previous potentially contaminative land uses (PCLUs). No onsite PCLUs have been identified, however, offsite PCLUs include Warehouses, Morrison's Car Park, Agricultural Supplies Works, Martello Enterprise Centre, Tank and Electrical Substation.

A conceptual site risk model was developed and a qualitative risk assessment undertaken. The conclusions of the risk assessment are presented in Table 5 below.

Table 5: Summary of qualitative risk assessment

Potential Receptor	PSPPLs	Risk
On-Site Human Health (i.e. future occupiers and construction workers)	Yes	Low to Moderate
Off-Site Human Health (i.e. occupiers of neighbouring properties)	No	Low
Groundwater	No	Very Low
Surface Water	No	Very Low
Property (i.e. buildings and services)	No	Low

15 RECOMMENDATIONS

Given that potentially significant potential pollutant linkages (PSPPLs) were identified, it is recommended that a limited intrusive site investigation, including ground gas and vapour monitoring, is undertaken with the objective of determining the presence and extent of any soil contamination at the site. The scope of the investigation should be agreed with the Local Planning Authority prior to commencement of the works.

15.1 Watching Brief and Discovery Strategy

It is recommended that a "watching brief" is kept at all times during the development. Should any unexpected contamination be encountered then the discovery strategy outlined below should be followed.

- Works should be halted if any suspicious ground conditions are identified by groundworkers;
- The Contractor should assess the need for any immediate health and safety or environmental management control measures. If control measures are considered to be required, they should be implemented;
- The Contractor should notify the Client's Environmental Consultant and the Local Planning Authority;
- The Environmental Consultant should attend the site to record the extent of 'contamination' and if necessary to collect samples;
- If remedial action is considered necessary then the proposed works should be agreed with the Local Planning Authority prior to implementation;
- Once remediation is complete, the Environmental Consultant should collate evidence of work carried out for inclusion in a Remediation Verification Report which should be submitted to the Local Planning Authority.

15.2 Health and Safety

All site works should be carried out in accordance with Health and Safety Executive regulations and guidelines, the Contractor's Construction Health and Safety Plan and the Construction (Design and Management) Regulations 2015.

Precautions should be taken to minimise exposure of site workers during ground works through the implementation of site safety. Such precautions should include, but not be limited to:

- Provision of appropriate Personal Protective Equipment (PPE);
- Availability of site welfare;
- Good personal hygiene, washing and changing procedures;
- Daily safety briefings.

15.3 Services

The local Statutory Water Undertaker should be contacted in the event that new services are proposed as part of the redevelopment in order to determine their specification for the type of pipework which should be used on this site.

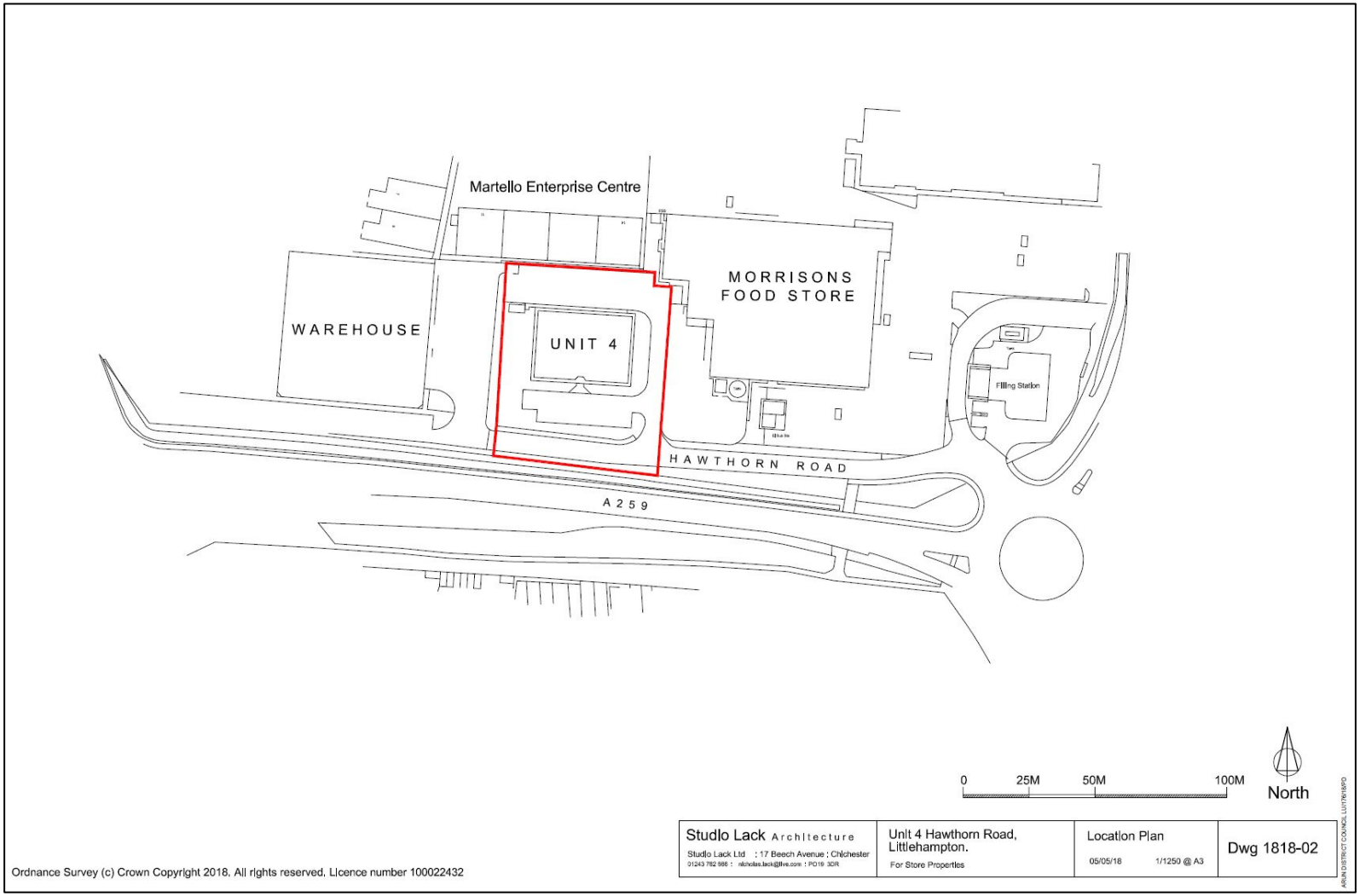
It is recommended that all services, and in particular potable water, should be supplied using materials that are resistant to attack and degradation to chemical attack.

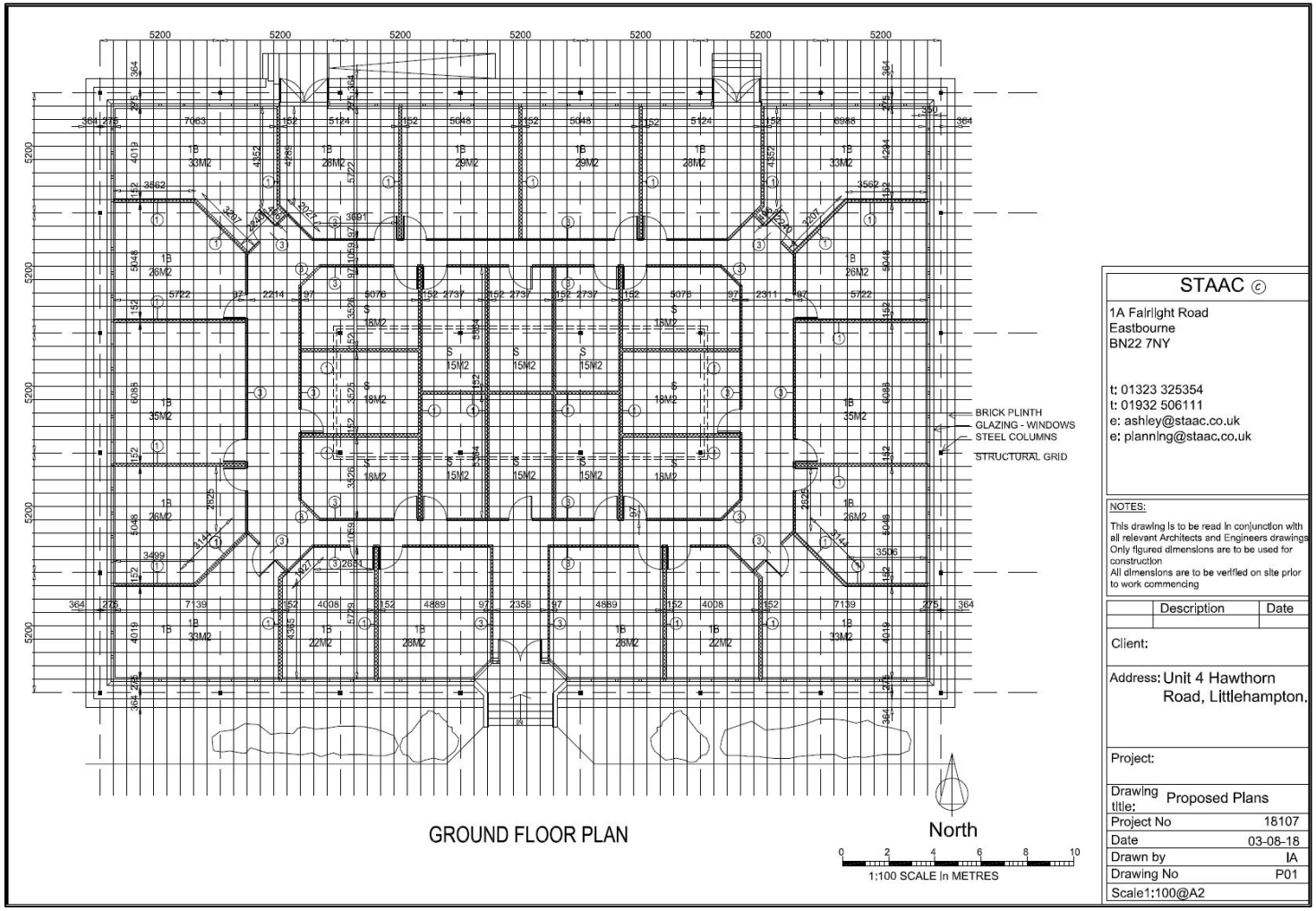
Further information can be found within the published guidance for the '*Selection of Water Supply Pipes to be used in Brownfield Sites'*, issued in January 2011 by the UK Water Industry Research.

16 INFORMATION GAPS AND UNCERTAINTIES

Assumptions have been made regarding the nature and scale of the activities that took place on the site and the types of potential contaminants that may have resulted. These assumptions will need to be reviewed along with the Conceptual Site Model should further information come to light.

17 APPENDIX 1 – PROPOSED DEVELOPMENT PLANS





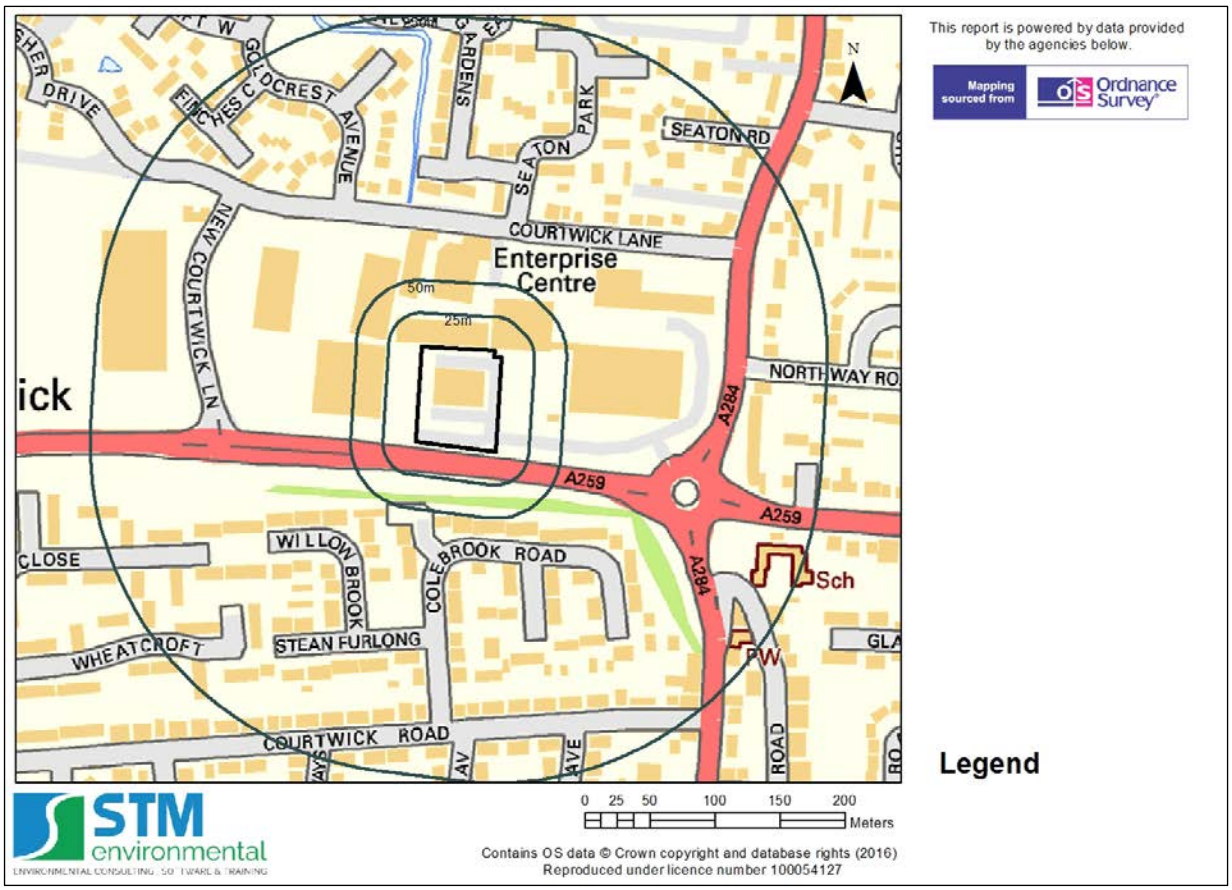
- Site: Unit 4 Hawthorn Road, Littlehampton, BN17 7LT
- Report Reference: PH1-2018-001033
- Date: September 18

18 APPENDIX 2 – ENVIRONMENTAL SCREENING REPORT

18.1 Summary Datasheet

Search Layer Name	Search Distance	Data Available	No. of features identified
Potential Infilled Land	250 m	No	0
Potential Contaminated Land	250 m	Yes	9
Environment Agency Historic Landfill	250 m	No	0
Environment Agency Authorised Landfill	250 m	No	0
Industrial sites	250 m	No	0
Red List Discharge Consents	250 m	No	0
Pollution Incidents	250 m	No	0
List 1 Dangerous Substances	250 m	No	0
List 2 Dangerous Substances	250 m	No	0
Radioactive Substance Registrations	25 m	No	0
Aquifer (Superficial)	250 m	Yes	1
Source Protection Zones	250 m	No	0
Aquifer (Bedrock)	0 m	Yes	1
Superficial Geology	0 m	Yes	1
Bedrock Geology	0 m	Yes	2
Areas of Outstanding Natural Beauty	500 m	No	0
Listed Building	50 m	No	0
Special Sites of Scientific Interest	500 m	No	0
Special Protection Areas	500 m	No	0
Special Areas of Conservation	500 m	No	0
Ramsar	500 m	No	0
National Nature Reserves	500 m	No	0
Local Nature Reserves	500 m	No	0
World Heritage Sites	50 m	No	0

Search Layer Name	Search Distance	Data Available	No. of features identified
HistoricPark and Gardens	50 m	No	0
Scheduled Ancient Monuments	50 m	No	0
BGS Coalfields	50 m	No	0
BGS Brine Areas	50 m	No	0
BGS Methane/CO2 Superficial	250 m	No	0
BGS Methane/CO2 Bedrock	50 m	No	0
Areas Potentially Affected by Radon	50 m	Yes	2
Flood Zone 3	0 m	No	0
Flood Zone 2	0 m	No	0

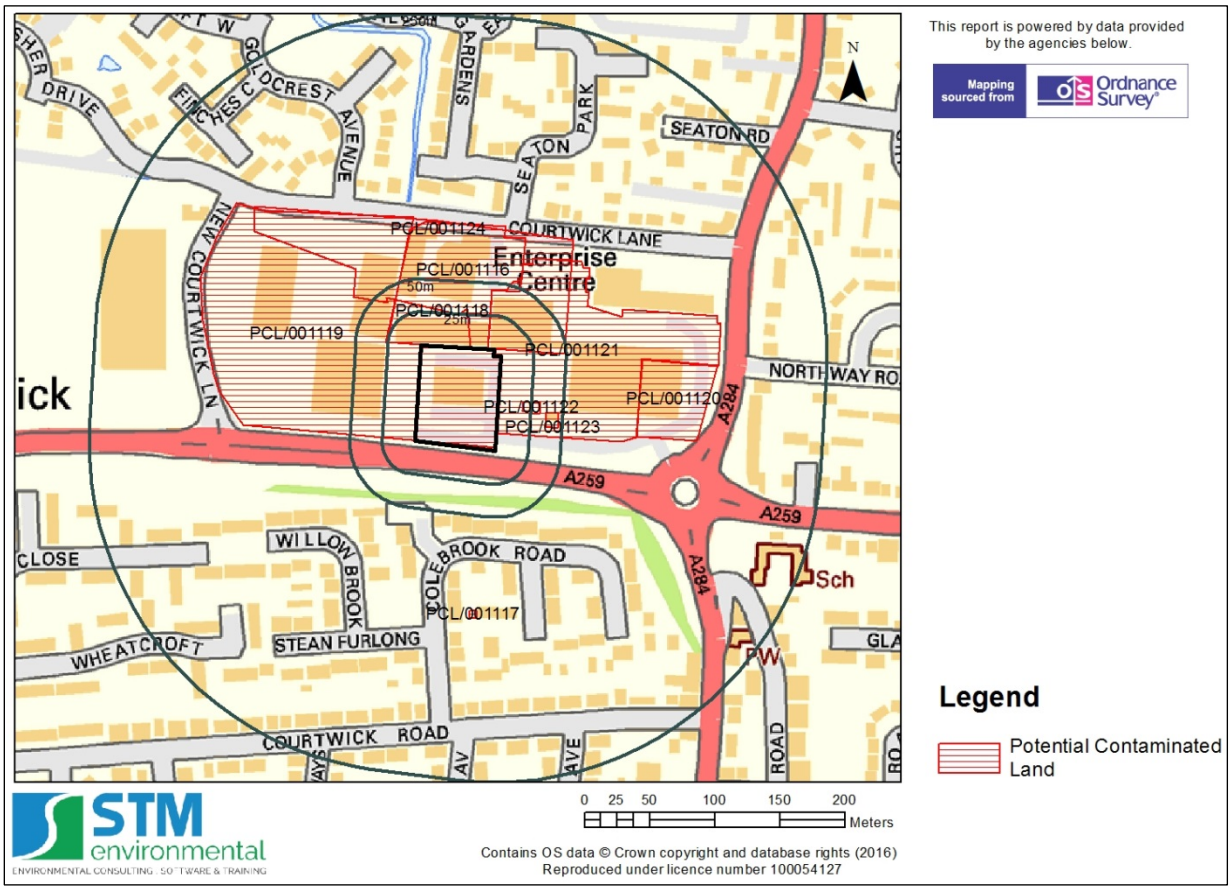


18.2 Historical Industrial and Waste Uses

This layer provides data on potential contaminated land sites, operational landfills and waste sites.

Part 2A of the Environmental Protection Act 1990 defines contaminated land as "land where substances could cause either significant harm to people or protected species or significant pollution of surface waters or groundwater". Part 2A is enforced by Local Authorities, who have a duty to inspect their areas for the purposes of identifying such land. Where an Authority designates land to be "contaminated land", it has a duty to serve notice on the person who caused the pollution (the polluter) requiring them to remediate the land. If the polluter cannot be found, then the duty to remediate falls upon the current owner or occupier of the land.

Land that has been subject to previous industrial use (i.e. former workshops/factories, landfills, mining, petrol stations etc) will typically have become contaminated to some extent and is therefore referred to as "potentially contaminated land" (PCL). We have searched databases compiled from a variety of sources (i.e. Environment Agency, BGS, Coal Authority, Ordnance Survey) in order to make an assessment as to whether the land on which the property of interest lies and its immediate surrounding area has been subject to previous industrial uses and as such if the property could be at risk of being declared as "Contaminated Land". With respect to search distances for PCLs, we have searched within 50m of the site for non-landfills and 250m for known landfills/unknown filled ground as the latter has the potential to generate hazardous ground gases which can migrate over substantial distances.



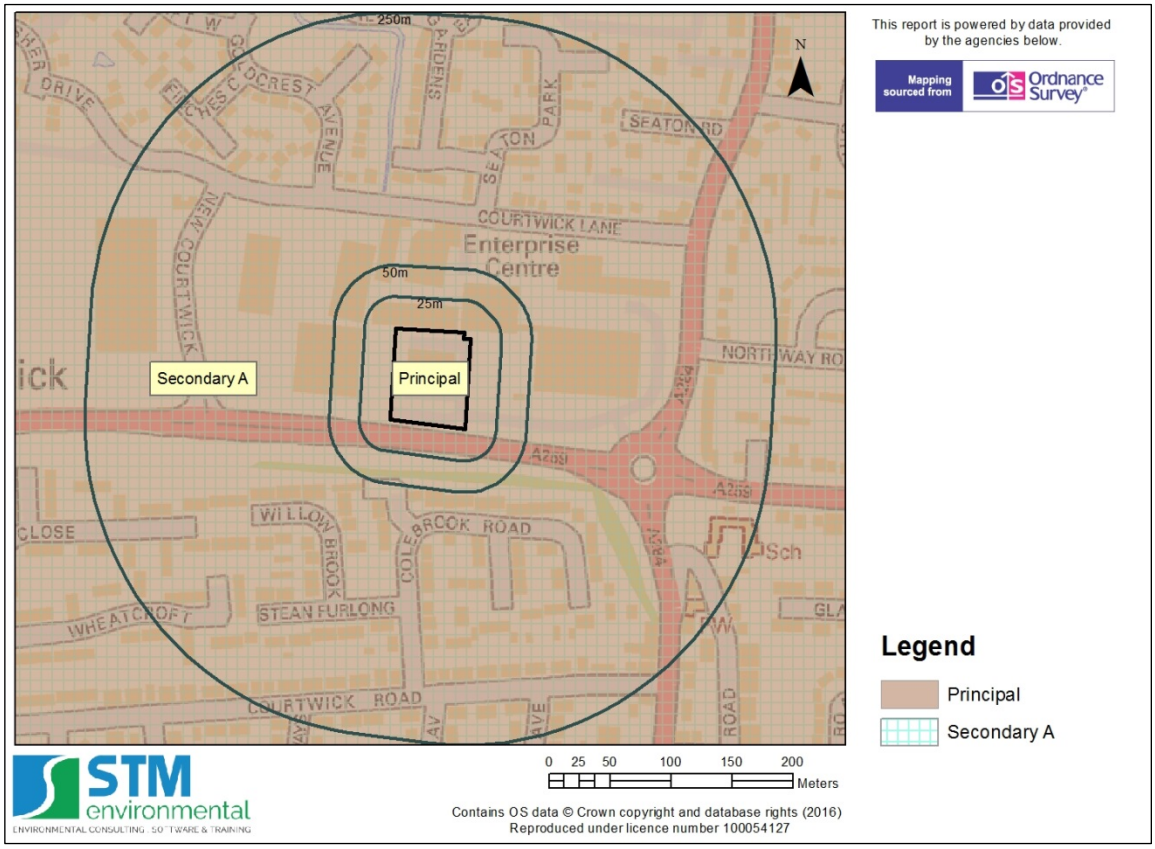
18.2.1 Search Information for Potential Contaminated Land

Selection Summary for layer
2 feature(s) identified on site.
4 feature(s) identified off site within 50 metres
3 feature(s) identified off site within 50 - 250 metres

ID	name	Approx. distance (m)	Approx. Area (m2)	Grid Ref.
On Site				
PCL/001119	Warehouses	0.00	29166.3	502377, 103561
PCL/001121	Morrisons Car Park	0.00	14977.97	502567, 103545
Identified Off-site - Within 0-50m				
PCL/001116	Agricultural Supplies Works	0.59	14831.08	502463, 103609
PCL/001118	Martello Enterprise Centre	0.59	7487	502468, 103600
PCL/001122	Tank	18.71	105.61	502529, 103506
PCL/001123	Electrical Substation	37.42	102.86	502545, 103496
Identified Off-site - Within 50-250m				
PCL/001117	Electrical Substation	121.04	30.52	502484, 103350
PCL/001120	Morrisons Petrol Station	107.53	3059.02	502638, 103512
PCL/001124	Electrical Substation	84.90	14.05	502458, 103641

18.3 Hydrogeology

The hydrogeology classification is provided by British Geological Society Mapping describing the nature of the bedrock and superficial aquifer that might be located at the site. The ground source protection zones provide an indication of protected ground water areas and the travel time associated with a contaminant reaching the sensitive aquifer.



18.3.1 Search Information for Aquifer (Superficial)

Selection Summary for layer
1 feature(s) identified on site.
0 feature(s) identified off site within 50 metres
0 feature(s) identified off site within 50 - 250 metres

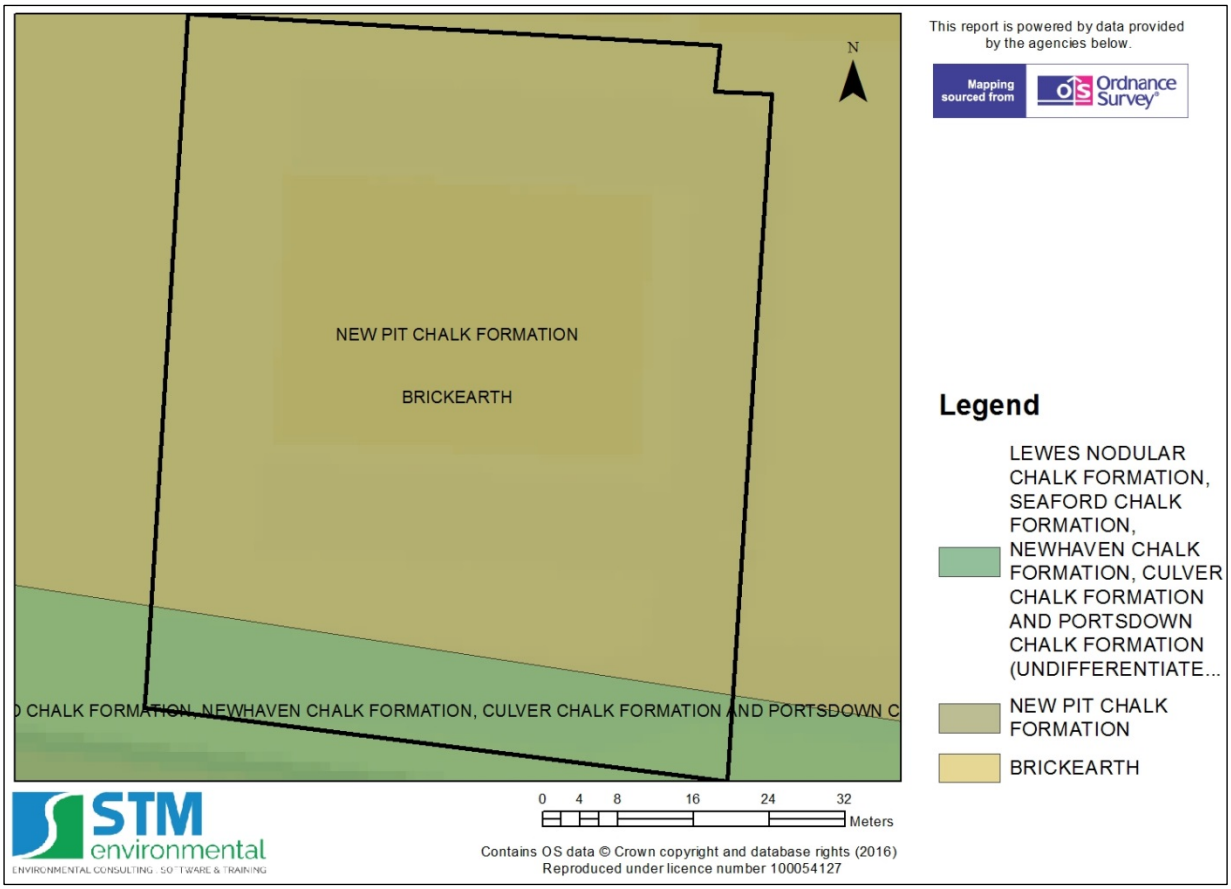
Designation	Grid Ref.
On Site	
Secondary A	502414, 103057
Identified Off-site - Within 0-50m	
None	
Identified Off-site - Within 50-250m	
None	

18.3.2 Search Information for Aquifer (Bedrock)

Selection Summary for layer
1 feature(s) identified on site.

Designation	Grid Ref.
On Site	
Principal	502437, 102873

18.4 Geology



18.4.1 Search Information for Superficial Geology

Selection Summary for layer
1 feature(s) identified on site.

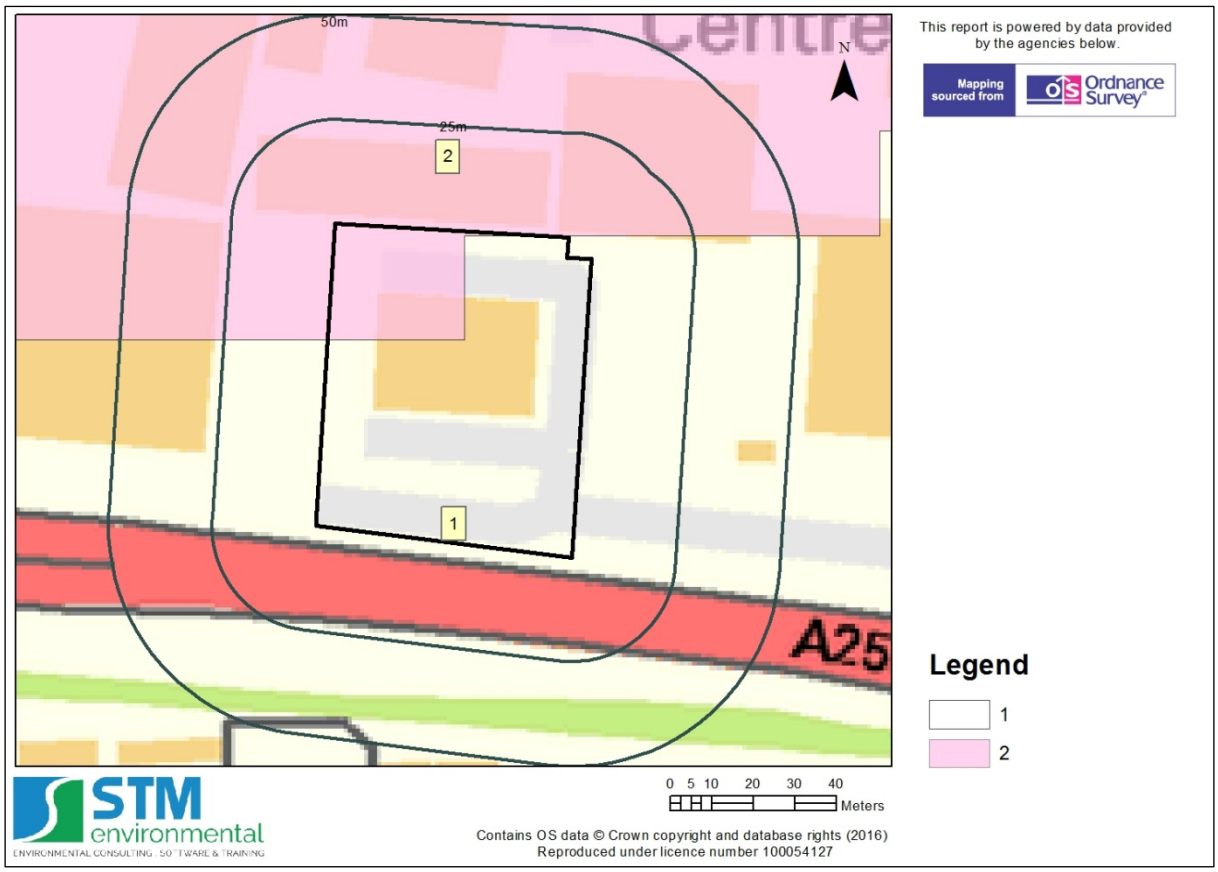
Classification	Type	Grid Ref.
On Site		
BRICKEARTH	SILT	503631, 102828

18.4.2 Search Information for Bedrock Geology

Selection Summary for layer
2 feature(s) identified on site.

Classification	Type	Grid Ref.
On Site		
NEW PIT CHALK FORMATION	CHALK	503559, 103713
LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION, NEWHAVEN CHALK FORMATION, CULVER CHALK FORMATION AND PORTSDOWN CHALK FORMATION (UNDIFFERENTIATED)	CHALK	502268, 102955

18.5 Radon Gas



18.5.1 Search Information for Areas Potentially Affected by Radon

Selection Summary for layer
2 feature(s) identified on site.
0 feature(s) identified off site within 50 metres

Class	Grid Ref.
On Site	
2	502244, 102838
1	503263, 102050
Identified Off-site - Within 0-50m	
None	

Radon Classes

- 1 = <1%
- 2 = 1-3%
- 3 = 3-5%
- 4 = 5-10%
- 5 = 10-30%
- 6 = 30-100%

The class in which the property lies defines the percentage of properties which are above the action level of 200 Bqm-3 for radon gas within the UK according to Public Health England. Properties with a greater than 1% chance of a house having radon levels above the Action Level are designated as Affected Areas. Public Health England recommends that people in Affected Areas should test their homes for radon.

19 APPENDIX 3 – SITE PHOTOGRAPHY

fittleworth

20 APPENDIX 4 - RISK ASSESSMENT METHODOLOGY

- Severity considers the potential impact of the linkage on the receptors, if the linkage was active. Categories range from slight/superficial to fatal.
- Likelihood considers the chances of the linkage occurring and is classified into categories from improbable to frequent.

By assigning scores with each of the above categories, the risk assessment can be undertaken using the formula:

RISK = LIKELIHOOD × SEVERITY

The matrix given in Table 6 provides a means of calculating the overall risk; while Table 7 provides the qualitative assessment based on the risk score.

Table 6: Contamination Risk Matrix

		Potential Severity				
		Fatal = 5	Major = 4	Moderate = 3	Minor = 2	Slight = 1
Probable Likelihood	Frequent = 5	Very High	High	Moderate	Low	Very Low
	Probable = 4	High	High	Moderate	Low	Very Low
	Possible = 3	Moderate	Moderate	Moderate	Low	Very Low
	Remote = 2	Low	Low	Low	Low	Very Low
	Improbable = 1	Very Low	Very Low	Very Low	Very Low	Very Low

Table 7: Assessment description for risk scores

Risk Score	Risk Assessment
1-5	Very Low to Low
6-10	Low to Moderate
11-15	Moderate
16-20	High
21-25	Very High

Table 8: Risk Classification System

Risk Term	Description
Very Low to Low	The presence of an identified hazard does not give rise to the potential to cause significant harm to a designated receptor. In the event of such harm being realized, it is not likely to be Severe.
Low to Moderate	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if

	realized, would at worst normally be mild.
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.
High	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action. Investigation is required and remedial works may be necessary in the short term and are likely over the longer term.
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or, there is an evidence that severe harm to a designated receptor is currently happening. Urgent investigation and remediation are likely to be required.

21 ABBREVIATIONS

Abbreviation	Description
c.	circa
CLRA	Contaminated Land Risk Assessment
CSM	Conceptual Site Risk Model
EA	Environment Agency
IPC	Integrated Pollution Control
LAPC	Local Authority Pollution Control
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PAHs	Polycyclic aromatic hydrocarbons
Part IIA	Part IIA of the Environmental Protection. Act 1990
PCB	Polychlorinated Biphenyl
PCL	Potentially Contaminative Land Use
PPL	Potential Pollutant Linkage
PSPPL	Potentially Significant Potential Pollutant Linkage
SI	Site Investigation
SPOSH	Significant Possibility of Significant Harm
UXO	Unexploded Ordnance