



Hampshire Homes Group

Land at 31a North Street, Emsworth

Preliminary Risk Assessment

Project no. 305019

JULY 2018

RSK



RSK GENERAL NOTES

Project No.: 305019 R01 (00)

Title: Preliminary Risk Assessment: Land at 31a North Street, Emsworth

Client: Hampshire Homes Group

Date: July 2018

Office: RSK, Unit 26, Abbey Enterprise Centre, Premier Way, Romsey SO51 9AQ

Status: Draft

Author Andy Denton **Technical reviewer** Kirsten Fairall

Signature

Date: July 2018

Date: July 2018

Project manager Andy Denton **Quality reviewer** Carys Baker

Signature

Date: July 2018

Date: July 2018

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CONTENTS

1	INTRODUCTION.....	1
1.1	Objective	1
1.2	Scope	1
1.3	Existing Reports	2
1.4	Limitations	2
2	THE SITE	3
2.1	Site location and description	3
2.2	Proposed development	3
3	PRELIMINARY RISK ASSESSMENT (PRA).....	4
3.1	Site walkover	4
3.2	Ground conditions	5
3.2.1	Geology	5
3.2.2	Radon.....	5
3.2.3	Mining and quarrying	5
3.2.4	Landfilling and land reclamation	6
3.3	Hydrogeology	6
3.3.1	Aquifer characteristics.....	6
3.3.2	Vulnerability of groundwater resources	6
3.3.3	Risk from rising groundwater levels	7
3.3.4	Licensed groundwater abstraction	7
3.4	Hydrology	8
3.4.1	Surface watercourses	8
3.4.2	Surface water abstractions	8
3.4.3	Site drainage.....	8
3.4.4	Preliminary flood risk assessment	8
3.5	History of site and surrounding area	8
3.6	Sensitive land uses	11
3.7	Unexploded Ordnance	11
3.8	Licences and permissions.....	11
3.9	Local authority environmental health department information.....	12
3.10	Petroleum licensing information.....	12
3.11	Initial conceptual model	12
3.11.1	Summary of potential contaminant sources	12
3.11.2	Sensitive receptors	13
3.11.3	Summary of plausible pathways	14
3.11.4	Potentially complete pollutant linkages	14
4	CONCLUSIONS AND RECOMMENDATIONS	20
4.1	Conclusions.....	20
4.2	Recommendations	20
	BIBLIOGRAPHY	21

TABLES

Table 1: Site setting	3
Table 2: Geology at the site	5
Table 3: Groundwater abstractions	7
Table 4: Summary of historical development	9
Table 5: Potential sources and types of contamination	12
Table 6: Risk estimation for potentially complete pollutant linkages	15

FIGURES

Figure 1	Site location plan
Figure 2	Proposed development plan

APPENDICES

Appendix A	Service constraints
Appendix B	Summary of legislation and policy relating to contaminated land
Appendix C	Site photographs and walkover checklist
Appendix D	Risk assessment methodology
Appendix E	Environmental database report

1 INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Hampshire Homes Group to carry out a Preliminary Risk Assessment (PRA) of the land at 31a North Street, Emsworth. It is understood the site is being considered for redevelopment as residential housing.

This report is subject to the RSK service constraints given in **Appendix A**.

A summary of legislation and policy relating to contaminated land is given in **Appendix B**.

1.1 Objective

The objective of this assessment is to evaluate client liabilities as part of the due diligence process and to support a planning application to include development at the site.

The aims of this assessment are to:

- Examine whether there have been potentially contaminative uses on the site or nearby land;
- Develop an initial conceptual model;
- Use desk-based information regarding ground conditions to qualitatively assess risks to end-users and the environment in relation to the proposals; and,
- Make recommendations, where appropriate, for the proposed scope of Phase II intrusive site works.

1.2 Scope

The scope of the investigation and layout of this report has been designed with consideration of CLR11 (Environment Agency, 2014) and BS 10175: 2011 (BSI, 2011) and guidance on land contamination reports issued by the Environment Agency (EA) (2010a).

This risk assessment was carried out to an agreed brief as set out in RSK's proposal (305019 T01 (00), dated 5th July 2018). The scope of works for the assessment included:

- A site walkover inspection, including the identification of surrounding land use and location of possible sensitive environmental receptors in the site vicinity.
- A review of the geology and hydrogeology of the site to enable assessments to be made on the migration potential for contaminants that may be present on the site or in and around adjacent properties.
- A review of a commercially available environmental database to determine:

Records of past pollution or other incidents relevant to the site

Information regarding the location of recorded landfill sites within the site vicinity

Details of groundwater abstractions (location, water use, source strata)

Details of surface water quality classifications

Information relating to ground stability

A review of historical maps included with the database report to identify historical uses of the site and surrounding area.

- The identification of potential geological hazards, including radon.
- Preliminary UXO assessment.
- Production of a conceptual model identifying potentially complete contaminant linkages and qualitative risk assessment to identify the linkages for which further work may be necessary, e.g. site investigation.
- Recommended scope of Phase II intrusive investigations.

1.3 Existing Reports

At the time of reporting, no previous or existing reports pertaining to the site have been issued to RSK for review.

1.4 Limitations

The study aims principally to identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

The study was designed generally to meet the objectives of a preliminary (Phase 1) investigation, as defined by BS 10175:2011 "Code of Practice for the Investigation of Potentially Contaminated Sites".

This report should be considered in the light of any changes in legislation, statutory requirement or industry practices that have occurred subsequent to the date of issue.

The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250m radius of the site, although certain sources and/or sensitive targets further than 250m may also have been considered.

The opinions expressed in this report, and the comments and recommendations given, are based on the information obtained from the desk assessment and the site reconnaissance survey. No intrusive investigations have been undertaken to confirm the actual ground conditions and hence the environmental status of the site.

2 THE SITE

2.1 Site location and description

The site is located at 31a North Street, Emsworth PO10 7DL, south of Palmer's Road at National Grid reference 474919, 106081, as shown on **Figure 1**.

The area around the site is a mixture of residential and commercial properties as detailed in **Table 1** below.

Table 1: Site setting

To the north:	Palmer's Road immediately north of the northern boundary with residential housing and an industrial estate beyond. To the north of the western section of the northern boundary are residential and commercial properties. A gas holder is present to the north east.
To the east:	Residential properties immediately east with Palmer's Road beyond. An industrial estate lies beyond Palmer's Road with the River Ems and Brook Meadow beyond. Coombe Repair Group, a car maintenance company, is noted immediately east of the site.
To the south:	Residential properties immediately south with Palmer's Road beyond. Commercial properties lie over Palmer's Road.
To the west:	Residential and commercial properties immediately west with North Street beyond.

The site covers approximately 0.1 hectares at an elevation of approximately 8 m above Ordnance Datum (AOD) and comprises the following main attributes:

- Shared hardstanding entrance way;
- Hardstanding courtyard area in the central portion;
- Single storey brick built warehouse / workshop structure in the north;
- Two storey brick built commercial unit adjoining workshop to the south along the eastern boundary;
- Two storey brick built office building on the western side of the courtyard, along the western boundary.

2.2 Proposed development

The site in question is being considered for redevelopment as residential housing. The planned layout of the site is shown on **Figure 2**. Currently there is little detail available on the proposed development including the proposed structures or proposed soft landscaping areas.

3 PRELIMINARY RISK ASSESSMENT (PRA)

3.1 Site walkover

The site was visited on 23/07/2018 to undertake a site walkover. Photographs and the site walkover checklist are provided in **Appendix C**. Potentially significant environmental and geotechnical issues arising from the survey are summarised below.

At the time of the site walkover, the site comprised a hardstanding courtyard area with a workshop to the north and a two story commercial unit to the east. These two buildings were connected to form one unit. On the western side of the workshop, a small store was noted. A two storey office structure was present in the west of the site and a lean-to storage unit was present adjacent to a shed in the southern portion of the site.

At the time of the site walkover the site was not in use, however, historical potentially contaminative activities carried out on the site were identified in the form of machine engineering and carpentry, utilising lathes and milling machines.

A number of vehicle parts were noted within the workshop, suggesting some vehicle maintenance has been carried out on site. No evidence of fuel or waste storage was noted. Areas of the workshop floor were noted to be stained with substances likely associated with the vehicle parts.

All open areas of the site are covered by hardstanding with no obvious pollutant pathways to the underlying geology. No permanent vegetation was noted during the site walkover, however, some weeds were present at the edges of the hardstanding. A number of butane tanks were noted to the south of the commercial unit along the eastern boundary.

A number of areas on the site were considered likely to contain asbestos. These include the tiles on the building roofs and the vinyl floor tiles within the workshop toilet. The workshop roof was obscured and could not be fully examined. This assessment is not intended as an asbestos survey and it is recommended that a full survey is undertaken by a suitably qualified specialist and the details made available to RSK.

Japanese knotweed is a non-native, highly invasive species and spreads via rhizomes (underground 'stems') rather than seeds in the UK. It is found in a range of habitats across the UK including roadsides, riverbanks and derelict land.

Japanese knotweed was not identified during the site visit; however, this walkover was not undertaken by an ecologist trained in the identification of such species.

The site reconnaissance survey revealed potential issues associated with ground stability in relation to damaged structures adjacent to the access road off North Street. The damage was considered minor and is not considered significant given the likely age of these buildings.

3.2 Ground conditions

3.2.1 Geology

Published records (British Geological Survey, July 2018) for the area indicated the geology of the site to be characterised by the succession recorded in **Table 2**.

Table 2: Geology at the site

Geological unit	Description	Estimated thickness (m)
River Terrace Deposits (undifferentiated)	Sand and gravel, locally with lenses of silt, clay or peat.	4 - 6 m
Head Deposits (eastern boundary)	Gravel, sand and clay depending on upslope source, locally with lenses of silt, clay or peat and organic material.	4 - 6 m
London Clay Formation	Bioturbated blue-grey or grey-brown slightly calcareous, silty to very silty clay, clayey silt and lensoid beds of sand.	Up to 150 m
Source: BGS (2018)		

The existing topography and history of development of the site suggests that, in addition to these natural strata, made ground should be expected beneath the site.

3.2.2 Radon

The National Radiological Protection Board information contained within the environmental database (Envirocheck report 173779944, 18 July 2018) indicates that 1 to 3 % of homes are estimated to be at or above the Action Level. The British Geological Survey information contained within the environmental database (Envirocheck report 173779944, 18 July 2018) information indicated that no radon protective measures were necessary for the site.

3.2.3 Mining and quarrying

Evidence has been sought to identify any mining and quarrying operations, past and present, which have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- an environmental database report;
- records held by local authority/EA;
- geological maps.

With reference to the above data there are no recorded mines or quarries within a 500 m radius of the site.

The closest record of underground workings is 736 m south and consists of the Emsworth Brick Field. Works at this location are reported to have ceased.

3.2.4 Landfilling and land reclamation

Evidence has been sought to identify any landfilling or land reclamation operations, past and present, which have taken place in the vicinity of the site. The sources of information referenced in this element of the desk study include:

- environmental database report;
- records held by local authority/EA;
- geological maps.

There are no records of landfill sites (former or current) within 250 m of the site (i.e. within the planning consultation zone).

The nearest landfill is located approximately 847 m south east and is registered to Emsworth Yacht Harbour Limited, 3800/8127. The landfill included inert waste with a last recorded input date of 15 August 1986. Given the distance of the landfill from the site and the intervening land uses, this landfill is not considered as representing a significant potential risk to the site from the generation and migration beneath the site of landfill gases and/or leachate.

There are no further landfills within 1 km of the site.

3.3 Hydrogeology

3.3.1 Aquifer characteristics

Based on the published geological map referred to above, the hydrogeology of the site is likely to be characterised by the presence of an unconfined shallow aquifer comprising the River Terrace Deposits overlying the London Clay Formation, an aquitard.

The anticipated depth to the groundwater table is in the order of 2 - 3 m below ground level. Shallow groundwater in the site area is anticipated to flow in a south easterly direction, i.e. towards and in the direction of flow of the River Ems.

Due to the proximity of the site to the coast, groundwater beneath the site may be affected by saline intrusion. Groundwater levels in the River Terrace Deposits at the site may be affected by tidal variations.

It is also possible that localised perched water may also be present in the made ground.

The presence of low permeability clay at relatively shallow depths beneath the site, while restricting downwards migration, may increase the potential for lateral migration of shallow groundwater (and therefore mobile contamination, if present).

3.3.2 Vulnerability of groundwater resources

The site has been classified to overlie the following:

- Secondary A Aquifer, associated with the superficial geology: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers; and,

- 'unproductive' strata, associated with the bedrock geology: low permeability with negligible significance for water supply or river base flow.

The soils beneath the site are classified as having HIGH URBAN (HU) leaching potential.

HU - soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere, so a worst-case vulnerability classification is assumed until proven otherwise.

3.3.3 Risk from rising groundwater levels

Rising groundwater levels can affect foundations and structures, and may result in flooding if not controlled properly. In certain areas, groundwater levels are rising owing to reduced groundwater abstraction by industry. London is at particular risk but the situations in Birmingham, Liverpool, Glasgow and Nottingham are also being monitored.

The site is not considered to be at risk from rising groundwater levels.

3.3.4 Licensed groundwater abstraction

The environmental database (Envirocheck report 173779944, 18 July 2018) report indicates that there is one currently licensed groundwater abstraction (which is a commercial water bottling supply) within a 2-km radius of the site summarised in **Table 3**. The abstraction is located approximately 1862 m to the east of the site and is operated by Mr I.G.C Windsor for Water Bottling purposes.

Table 3: Groundwater abstractions

Reference	Distance and orientation from site	Comment
27/169/R01	1862 m east	Mr I.G.C Windsor, Water Bottling from groundwater

In terms of aquifer protection, the EA generally adopts a three-fold classification of source protection zones (SPZ) for public supply abstraction wells.

- zone 1 or 'inner protection zone' is located immediately adjacent to the groundwater source and is based on a 50-day travel time from any point below the water table to the source. It is designed to protect against the effects of human activity and biological/chemical contaminants that may have an immediate effect on the source
- zone 2 or 'outer protection zone' is defined by a 400-day travel time from a point below the water table to the source. The travel time is designed to provide delay and attenuation of slowly degrading pollutants.
- zone 3 or 'total catchment' is the area around the source within which all groundwater recharge is presumed to be discharged at the source.

Information available on the EA website indicates that the site does not lie within a currently designated groundwater Source Protection Zone.

3.4 Hydrology

3.4.1 Surface watercourses

There are no ponds, streams or drainage ditches on or adjacent to the site. The nearest identified surface watercourse to the site is the River Ems located approximately 89 m to the east of the site, flowing to the south. The stretch of the River Ems closest to the site is not believed to be tidal.

The tidal Southleigh Stream lies approximately 177 m west of the site, flowing to the south.

The EA classification of the water quality in the stretch of the River Ems nearest to the site is grade B (good).

The base flow of the River Ems is likely to be recharged by groundwater in the shallow aquifer in the site area. A linkage between the river and any ground or groundwater contamination beneath the site may therefore exist.

3.4.2 Surface water abstractions

No surface water abstractions were identified within a 2-km radius of the site.

3.4.3 Site drainage

Surface drainage from the site appears to be discharged into the mains system.

3.4.4 Preliminary flood risk assessment

The indicative floodplain map for the area, published by the EA, shows that the site lies within Flood Zone 1. The risk of flooding each year has been assessed by the EA as low, i.e. less than 1 in 1000.

The nearest designated Flood Zones 2 and 3 are located approximately 85 m east and 76 m north east respectively.

3.5 History of site and surrounding area

The history of the land-use and development of the site and surrounding area has been assessed based on the following sources:

- historical maps within the environmental database from 1866 to 2018
- internet search
- Interviews with site staff
- information from the local planning authority
- aerial photography

Copies of OS and County Series maps are included in the environmental database report in **Appendix E**. Reference to historical maps provides invaluable information regarding the land use history of the site, but historical evidence may be incomplete for the period pre-dating the first edition and between successive maps.

Planning records held by Havant Borough Council pertaining to the site date from 1986, when permission was granted for the rebuilding of the two storey engineering workshops (15466/13). No subsequent planning consents have been granted for the site.

The development history of the site and surrounding area from the above sources is summarised below.

Upon review of the available information, the first records of the site show a row of terraced houses known as 'Knight's Row' across the centre of the site. A smithy is also present in the south western portion of the site. The surrounding land comprises of farmland to the north with a gas works beyond, a railway line is also present to the north, open land and the River Ems to the east, open land with a church and graveyard to the west and sparse residential development to the south.

The site underwent development throughout its history, with the terraced properties no longer present from 1932. Industrial/commercial buildings have been present on site since around 1952 with a number of buildings being demolished and rebuilt to constitute the current site layout.

The gasworks to the north significantly expanded towards the site from 1866 to the present day with a gasholder still being present, as noted during the site walkover. Residential development has occurred surrounding the site as well as road infrastructure and 2 No. industrial estates to the north and the east.

Table 4: Summary of historical development

Date	Land use/features on site	Land use/features in vicinity of site (of relevance to the assessment)
1866 (1:2,500)	Terraced housing, with associated gardens, present across the centre of the site known as 'Knight's Row'. Smithy is present in the south western portion of the site. Northern portion of the site lies within open agricultural land.	Brook Farm is present directly north of the site. A Grave Yard is present ~30 m south west of the site. A Gas Works is noted ~50 m north of the site. The River Ems is present ~80 m east. A stream is located ~130 m west, the section closest to the site is noted as tidal. A Railway Line, on a raised embankment, and Station are noted ~180 m north of the site.
1883 (1:2,500)	No significant change	Residential development is noted to the north west.
1898 (1:2,500)	No significant change	Brook Farm is no longer noted, residential properties occupy the land. The Gas Works to the north was expanded toward the site with the addition of a tank ~90 m north east of the site. Extensive residential development

Date	Land use/features on site	Land use/features in vicinity of site (of relevance to the assessment)
		including road infrastructure is noted to the north and north west.
1909 (1:2,500)	'Knight's Row' properties remain on site however the off-site properties in the terrace are no longer present. A series of small buildings, believed to be garages, are present to the south of the houses.	Residential properties are present immediately east and west of the site. Palmer's Road has been constructed to the north of the site and ~20 m east and south of the site. Another Tank has been constructed ~50 m north of the site within the Gas Works area. A hospital is noted ~120 m south of the site.
1932 (1:2,500)	No structures are noted on the site.	The Gas Works Tank ~50 m north of the site is no longer noted, one tank remains present.
1938 - 1942 (1:10,560)	Scale too small	A Gasholder in a similar position to the present day is noted north east of the site, this and one tank are present.
1952 - 1953 (1:2,500)	Buildings, industrial in appearance, are noted across the northern portion and central southern portion of the site.	A row of buildings, industrial in appearance, are noted ~50 m east of the site. The Gasholder, to the north east, is noted as the Gas Works and the area previously occupied by the Gas Works has a number of small outbuildings present.
1962 - 1969 (1:2,500)	The building across the southern portion of the site is no longer present. A building, similar in shape to that noted in the site walkover, is noted along the eastern boundary. The site is noted as a Builder's Yard.	A Tank is noted adjacent to industrial buildings ~60 m to the east. A Coachworks is noted ~60 m east. A drain leading from the Coachworks to the south ends at a Pond ~150 m south east. Electrical substations are noted ~80 m north, and 140 m west. Nursery noted ~150 m north west.
1979 - 1980 (1:1,250)	The site is no longer noted as a Builder's Yard. The building in the north of the site is noted as a Works.	The industrial buildings to the east are noted as Bus Depots and Works. The Coachworks is noted as a Works. Land to the north of the Gasholder is occupied by a Builder's Yard and Works from ~70 - 120 m north to north east. An electrical substation is noted ~150 m north of the site. The hospital to the south is noted as Victoria Cottage Hospital.

Date	Land use/features on site	Land use/features in vicinity of site (of relevance to the assessment)
		A road, later labelled as the A259, has been constructed ~150 m south running east to west over the River Ems. A section road, to the south east, is on embanked land.
1993 (1:1,250)	Site layout resembles that noted in the Site Walkover.	The industrial buildings to the east are noted as an industrial estate. An electrical substation is noted ~70 m south east and ~140 m north.
2018 (1:10,000)	No significant change	No significant change

3.6 Sensitive land uses

Brook Meadow over the River Ems to the east is designated as a Local Nature Reserve.

Chichester Harbour SSSI, Chichester and Langstone Harbours Ramsar Site and Special Protection Area and the Solent Maritime Special Area of Conservation are located approximately 500 m to the south of the site.

No other national or internationally designated sensitive land uses were identified in the vicinity of the site.

3.7 Unexploded Ordnance

An online search has shown that the site lies within an area of moderate unexploded ordnance (UXO) risk as a result of the extensive bombing of the south coast that occurred during World War II.

This report is not suitable for use as a substitute for a standalone preliminary UXO risk assessment. The risk discussed above is indicative and a detailed UXO Risk Assessment should be undertaken.

3.8 Licences and permissions

No discharge consents, planning permits or local authority pollution controls (LAPPC) are in effect on the site. A single active discharge consent is active within 250 m of the site, based 85 m east and registered to A D Williams Coachworks for Trade Effluent Discharge (Site Drainage). The same property has a permitted LAPPC for Respraying of Road Vehicles. One more LAPPC is present within 250 m of the site comprising the permitted use of Waste Oil Burners at Weldrite Engineering Limited 201 m north west.

3.9 Local authority environmental health department information

The environmental health department (EHD) of Havant Borough Council were contacted on 25 July 2018 and asked to provide details of any information the council may hold that is pertinent to this assessment.

Havant Borough Council have yet to issue a response based on the query sent. Once a response has been issued this report will be updated if the response is considered significant to the assessment of the site.

3.10 Petroleum licensing information

The Trading Standards Department of Hampshire County Council were contacted on 25 July 2018 regarding any records the council hold on current or former petroleum storage tanks at the site.

Hampshire County Council have yet to issue a response based on the query sent. Once a response has been issued this report will be updated if the response is considered significant to the assessment of the site.

3.11 Initial conceptual model

The information presented in Sections 2 and 3.1 to 3.9, has been used to compile an initial conceptual model. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 3.10.4. The risk classification has been estimated in accordance with information in **Appendix D**.

3.11.1 Summary of potential contaminant sources

Potential sources and contaminants of concern are summarised in **Table 55**.

Table 5: Potential sources and types of contamination

Potential sources	Contaminants of concern
On-site historical	
Smithy (c.1866 - 1930s)	Heavy metals, Fuel oils, polycyclic aromatic hydrocarbons (PAHs), Total Petroleum Hydrocarbons (TPHs), chlorinated and other organic solvents, sulphates, asbestos
Builder's Yard (1960s - 1970s)	Heavy metals, ash, clinker, sulphates, polycyclic aromatic hydrocarbons (PAHs) and asbestos.
Engineering Works (1980s - c. 2017)	Heavy metals, inorganics, acids and alkalis, polychlorinated biphenyls (PCBs), chlorinated and other organic solvents, Mineral oils and asbestos.
On-site present day	
Office building	Asbestos
Warehouse	Asbestos, hydrocarbons

Potential sources	Contaminants of concern
Off-site	
Gas Works / Gasholder ~20 - 50 m north and north west (c.1866 - present)	Heavy metals, Fuel oils, PAHs, TPHs and asbestos.
Electrical substations to the north, south east and west (1960s - present)	Heavy metals and PCBs
Various industrial land uses including Works, Coachworks, Bus Depots:	Fuel oils, lubricating oils, heavy metals, polychlorinated biphenyls (PCBs), PAHs, solvents and asbestos.

The potential sources of historical contamination on the site comprise of the Smithy, builder's Yard and Engineering Works all previously present on the site. The site is believed to have been totally covered by hardstanding for the majority of its recent history, which reduces the likelihood of contaminants being present in the soils underlying the site.

Currently, 3 No. buildings, and 2 no. sheds are present on site. The site is currently not in use, however, potentially asbestos containing material (ACM) was identified during the site walkover.

A number of potential sources lie within the surrounding area. These include the Gas Works / Gasholder to the north and north west as well as the electrical substations to the north, east and west. A number of works and depots were also noted throughout the development history of the surrounding area. These have potential, albeit limited, to contaminate the site.

3.11.2 Sensitive receptors

Sensitive receptors at this site include:

- future site occupants
- adjacent site users
- vegetation
- potable water supply pipes
- groundwater beneath the site
- groundwater in wider aquifer body (limited to Secondary A Aquifer of the superficial deposits)
- surface watercourses (including the River Ems).

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures including CDM regulations.

3.11.3 Summary of plausible pathways

The plausible pathways are summarised below:

- direct contact (soil, dust and vegetable ingestion, dermal contact, dust and fibre inhalation)
- vertical and lateral migration including leaching
- root uptake
- chemical attack of infrastructure (including water supply pipes) and buildings.

3.11.4 Potentially complete pollutant linkages

The outline conceptual model is shown and an estimate of the risk associated with each linkage is summarised in **Table 6**. The risk classification has been undertaken in accordance with CIRIA C552 (Rudland et al., 2001), a summary of which is included in **Appendix D**.

Table 6: Risk estimation for potentially complete pollutant linkages

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
On site					
Smithy (c.1866 - 1930s)	Future site occupants	Direct contact	Low likelihood	Medium	Moderate/Low: Potential for chronic levels of contamination to be present beneath the existing hardstanding on site.
	Adjacent site occupants				
	Building materials above and below ground	Chemical attack of infrastructure	Low likelihood	Medium	Moderate/Low: Potential Made Ground beneath the site may be contaminated from the historic Smithy. Due to the age of the contaminant source risk is assessed to be moderate to low.
	Water supply pipes	Permeation into water supply	Low likelihood	Medium	Moderate/Low: Potential Made Ground beneath the site may be contaminated from the historic Smithy. Due to the age of the contaminant source risk is assessed to be moderate to low.
	Groundwater beneath the site	Leaching followed by vertical and lateral migration	Low likelihood	Medium	Moderate/Low: Potential Made Ground beneath the site may be contaminated from the historic Smithy. Lateral migration is possible within the superficial River Terrace Deposits however due to the age of the contaminant source risk is assessed to be moderate to low.

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
Builder's Yard (1960s - 1970s)	Future site occupants	Direct contact	Low likelihood	Medium	Moderate/Low: Potential for chronic levels of contamination to be present beneath the existing hardstanding on site. Potentially asbestos containing materials were noted during the site walkover in the building make-up, the year of construction would correlate with the use of asbestos in the buildings.
	Adjacent site occupants				
	Building materials above and below ground	Chemical attack of infrastructure	Low likelihood	Medium	Moderate/Low: Due to the relatively short time the Builder's Yard was present on the site (<10 years) it is not considered likely that large amounts of Made Ground are present underlying the site. However, the make-up of Made Ground underlying the hardstanding on site is unknown.
	Water supply pipes	Permeation into water supply	Low likelihood	Medium	
	Groundwater beneath the site	Leaching followed by vertical and lateral migration	Low likelihood	Medium	
Engineering Works (1980s - c. 2017)	Future site occupants	Direct contact	Unlikely	Medium	Low: Potential Made Ground from the Engineering Works is not considered likely to be present due to the presence of hardstanding across the site from beginning of tenure. Interviews undertaken during the site walkover confirm that the hardstanding was present throughout the time of the Works.
	Adjacent site occupants				
	Building materials above and below ground	Chemical attack of infrastructure	Unlikely	Medium	
	Water supply pipes	Permeation into water supply	Unlikely	Medium	
	Groundwater beneath the site	Leaching followed by vertical and lateral migration	Unlikely	Medium	

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
Off site					
Gas Works / Gasholder ~20 - 50 m north and north west (c.1866 - present)	Future site occupants	Direct contact / inhalation of soil vapour	Low likelihood	Severe	Moderate: Made Ground is not expected to be present from this source on the site. Historical Gas Works not always well maintained and due to its close proximity to the site, there is potential for lateral migration of gases.
	Adjacent site occupants				
Electrical substations ~80 and 150 m north, ~70 m south east and ~140 m west (1960s - present)	Future site occupants	Direct contact	Unlikely	Medium	Low: The contaminants found within electrical substations are found within close proximity to the substations themselves as they bind strongly to soils. Due to the distance of the substations from the site, these are a low risk.
	Adjacent site occupants				
	Water supply pipes	Permeation into water supply	Unlikely	Medium	Low: The contaminants found within electrical substations are found within close proximity to the substations themselves as they bind strongly to soils. Due to the distance of the substations from the site, these are a low risk.
	Groundwater beneath the site	Leaching followed by vertical and lateral migration	Unlikely	Medium	Low: The contaminants found within electrical substations are found within close proximity to the substations themselves as they bind strongly to soils. This minimises the possibility that the contaminants will pass into the groundwater.

Potential Contaminant	Potential receptor	Possible pathway	Likelihood	Severity	Risk and justification
Various industrial land uses including Works, Coachworks, Bus Depots to the north and east	Future site occupants	Direct contact	Unlikely	Medium	Low: The site was developed prior to the development of these potential sources. No evidence of fill being imported onto the site is present. Potential for Made Ground containing contaminants from these sources being present on site is considered low.
	Adjacent site occupants				
	Building materials above and below ground	Chemical attack of infrastructure	Unlikely	Medium	
	Water supply pipes	Permeation into water supply	Unlikely	Medium	
	Groundwater beneath the site	Leaching followed by vertical and lateral migration	Unlikely	Medium	
Low: The sources in question are not up the likely groundwater gradient and as such pose a low risk to the site through lateral migration.					

Note: Risk Assessment Methodology is presented with Appendix D.

The potential pollutant linkages with a risk of moderate or above that may drive site investigation works are:

- Made Ground associated with the historical Smithy that was present on site from c. 1866 to 1930s;
- Made Ground associated with the historical Builder's Yard present on site between the 1960s and 1970s, as well as the buildings currently on site, with potentially asbestos containing materials, constructed during the same timeframe; and,
- Gas Works / Gasholder to the north east of the site.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The indicative result for UXO risk shows the site lies within an area of moderate risk, as such a detailed UXO Risk Assessment is recommended to determine the whether further assessment is required prior to any intrusive works.

The contaminant linkages of concern are those with risk estimations of moderate/low. The main area of concern is the potential for chronic levels of contamination within Made Ground underlying the site.

The potential for ground gas production on site is considered low, however, there is a moderate/low potential for lateral migration onto site from the nearby Gas Works.

4.2 Recommendations

To reduce any uncertainty associated with the conceptual model of contamination and confirm the onsite geology, RSK recommends a programme of intrusive investigation including:

- Up to 5 No. approximately 5 m deep drive-in sampler boreholes to confirm the shallow ground conditions across the site and to enable ground gas monitoring well installation.
- Associated sampling and on site testing, including the use of a photo-ionisation detector (PID) to screen for the presence of volatile organic compounds;
- Testing of approximately ten to fifteen (10 - 15 No.) soils samples for a range of potential contaminants including metals, PCBs and PAHs with a number of samples for TPH and asbestos;
- A programme of geotechnical laboratory testing to reflect the encountered geology, to inform foundation design;
- 3 - 6 No. post fieldwork visits to monitor ground gas and groundwater levels over a 1 - 2 month period;
- Development of a refined conceptual site model followed by generic quantitative risk assessment (GQRA) to assess complete pollutant linkages that may require mitigation measures to be implemented to facilitate the proposed development; and,
- Combined factual and interpretative report.

Whilst outside the scope of the current study and any contaminated land risk assessment, the presence of potential ACM within the existing building fabric requires addressing through targeted Asbestos Surveys, which should be conducted prior to any demolition works commencing.

BIBLIOGRAPHY

- AGS Interim Guidance (2013), 'Site investigation and asbestos risk assessment for the protection of site investigation and geotechnical laboratory personnel', February.
- Baker, K., Hayward, H., Potter, L., Bradley, D. and McLeod, C. (2009), *CIRIA Report C682. The VOCs Handbook. Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination* (London: CIRIA).
- Boyle, R. A. and Witherington, P. J. (2007), 'Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are Present', National House-Building Council and RSK Group.
- British Geological Survey (1998), Sheet Number 316 Solid/Solid & Drift/Drift Edition, 1:50,000.
- British Standards Institution (2015), 'BS 5930:2015. Code of practice for ground investigations'.
- British Standard Institution (BSI) (2015), 'BS 8485:2015. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings '.
- British Standards Institution (2011), 'BS 10175:2011 + A2:2017. Investigation of potentially contaminated sites: Code of practice'.
- British Standards Institution (2013), BS8576:2013. Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs)
- Building Research Establishment (BRE) (2001), *BRE Report 414. Protective measures for housing on gas-contaminated land* (London: BRE).
- Building Research Establishment (2005), *BRE Special Digest 1: Concrete in aggressive ground* (London: BRE).
- Card, G. B. (1995), *CIRIA Report 149. Protecting development from methane* (London: CIRIA).
- Chartered Institute for Environmental Health and Land Quality Management (2009), 'The LQM/CIEH Generic Assessment Criteria for Human Health', second edition.
- Chartered Institute of Environmental Health (CIEH) and CL:AIRE (2008), *Guidance on Comparing Soil Contamination Data with a Critical Concentration* (London: CIEH).
- CIRIA (2014). Good practice on the testing and verification of protection systems for buildings against hazardous ground gases
- CL:AIRE (2009), *Soil Generic Assessment Criteria for Human Health Risk Assessment* (London: CL:AIRE).
- CL:AIRE (2011), *CL:AIRE Code of Practice. The Definition of Waste: Development Industry Code of Practice, Version 2* (London: CL:AIRE).
- Dangerous Substances Directive (76/464.EEC).
- Department for Environment, Food and Rural Affairs (2010), *The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010* (London: HMSO).

Environment Agency (2015), 'Technical Guidance WM3. Guidance on the classification of and assessment of waste. 1st Edition.

Environment Agency (2004), *Model Procedures for the Management of Contaminated Land. Contaminated Land Report Number 11 (CLR11)*, September (Bristol: Environment Agency).

Environment Agency (2004b), 'Policy Number 199_04, dated 9 March 2004, Part IIA – Detailed Quantitative Assessment of Chronic Risks to Human Health from Contaminated Soils'.

Environment Agency (2006a), 'Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination'.

Environment Agency (2006b), 'The Knotweed Code of Practice – managing Japanese Knotweed on development sites'.

Environment Agency (2008), *Science Report SC050021/SR7. Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values* (Bristol: Environment Agency).

Environment Agency (2009a), Contaminated Land Exposure Assessment (CLEA) software, version 1.06.

Environment Agency (2009b), *Human health toxicological assessment of contaminants in soil. Science Report – Final SC050021/SR2*, January (Bristol: Environment Agency).

Environment Agency (2009c), 'Science Report SC050021/benzene SGV, toluene SGV, ethylbenzene SGV, xylene SGV, mercury SGV, selenium SGV, nickel SGV, arsenic SGV, cadmium SGV, phenol SGV, dioxins, furans and dioxin like PCBs SGVs', 'Supplementary information for the derivation of SGV for: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin- like PCBs', and 'Contaminants in soil: updated collation of toxicological data and intake values for humans: benzene, toluene, ethylbenzene, xylene, mercury, selenium, nickel, arsenic, cadmium, phenol, dioxins, furans and dioxin- like PCBs', March 2009, May 2009 and September 2009.

Environment Agency (2009d), *Science Report – SC050021/SR3. Updated technical background to the CLEA model* (Bristol: Environment Agency).

Environment Agency (2010a), 'GPLC1 – Guiding Principles of Land Contamination', 'GPLC2 – Frequently Asked Questions, Technical Information, Detailed Advice and References', and 'GPLC3 – Reporting Checklists', all March.

Environment Agency (2010b), 'Horizontal Guidance Note H1 - Environmental risk assessment for permits'.

Environment Agency (2011) Chemical Standards Database.

Environment Agency (no date) Freshwater environmental quality standards.

Environment Agency www.environment-agency.gov.uk/.

Environmental Permitting (England and Wales) Regulations 2010 (London: HMSO).

Hartless, R. (1991), 'BRE Report 212: Construction of new buildings on gas-contaminated land', Building Research Establishment.

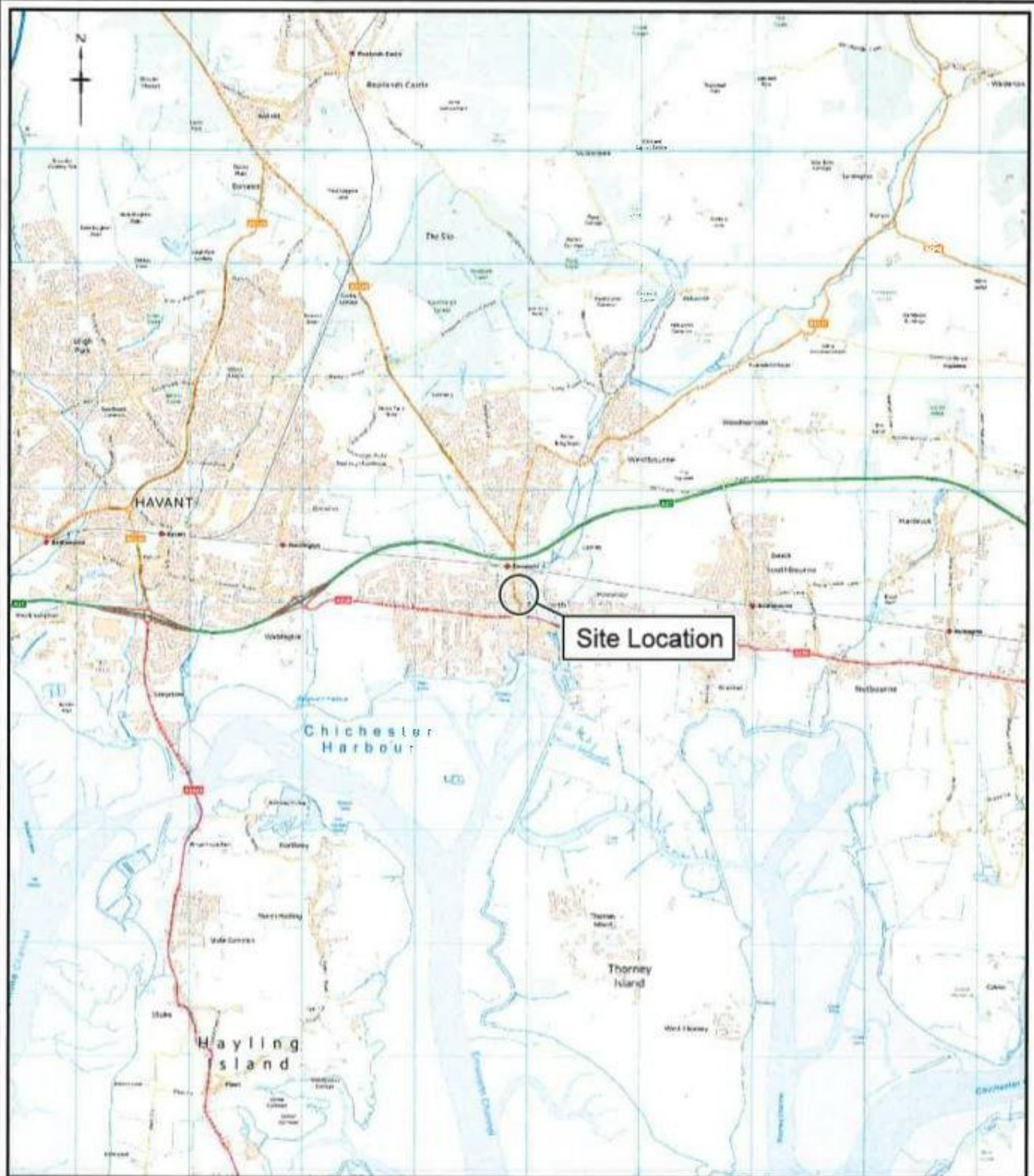
Hazardous Waste Regulations 2005 (London: HMSO).

Knipp, C. V., Lloyd, J. W., Lerner, D. N. and Greswell, R. (1993), *CIRIA Special Publication 92. Rising groundwater levels in Birmingham, and their engineering significance* (London: CIRIA).

- Landmark Information Group (2018), 'Envirocheck report 173779944', dated 18 July.
- Lord, J. A., Clayton, C. R. I. and Mortimore, R. N. (2002), *CIRIA Report C574 Engineering in chalk* (London: CIRIA).
- National House-Building Council (1999), 'Chapter 5.2: Suspended Ground Floors' in *NHBC Standards*, revised September 1999, effective January 2000.
- Norbury, D. (2010), *Soil and Rock Description in Engineering Practice* (Caithness: Whittles).
- Office of the Deputy Prime Minister (2004), *Planning Policy Statement 23: Planning and Pollution Control* (London: The Stationery Office).
- Part IIA of the Environmental Protection Act (Contaminated Land Regulations (England) 2002 (London: HMSO).
- Rudland, D. J., Lancefield, R. M. and Mayell, P. N. (2001), *CIRIA C552. Contaminated Land Risk Assessment: A Guide to Good Practice* (London: CIRIA).
- Simpson, G., Blower, T., Craig, R. N. and Wilkinson, W. B. (1989), *CIRIA Special Publication 69. The engineering implications of rising groundwater levels in the deep aquifer beneath London* (London: CIRIA).
- Stone, K., Murray, A., Cooke, S., Foran, J., Gooderham, L., (2009) CIRIA C681, Unexploded Ordnance (UXO). A guide or the construction industry.
- The Building Regulations (revised December 2004) 'Approved Document C. Department of the Environment and The Welsh Office'.
- The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (London: HMSO).
- The Surface Waters (Dangerous Substances) (Classification) Regulations 1998 (London: HMSO).
- The Water Supply (Water Quality) Regulations 1989, 2000 and 2001 (London: HMSO).
- Transport and Road Research Laboratory (1970), 'TRRL Road Note 29 (Appendix 1). Road pavement design'.
- Transport and Road Research Laboratory (1984), 'TRRL Report LR1132 (Table C1)'.
- UK Water Industry Research (2010) *UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (London: UKWIR).
- Water Framework Directive (2000/60/EC).
- Wilson, S., Oliver, S., Mallet, H., Hutchings, H. and Card, G. (2007), *CIRIA Report C665: Assessing risks posed by hazardous ground gases to buildings* (London: CIRIA).
- World Health Organization (2004), *Guidelines for drinking-water quality*, 3rd edn (Geneva: WHO).
- WRc plc (2002), 'Polycyclic Aromatic Hydrocarbons (PAH): Priorities for Environmental Quality Standard Development, R&D Technical Report P45'.



FIGURES



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18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 8RT
United Kingdom

Tel: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
Email: info@rsk.co.uk
Web: www.rsk.co.uk

HAMPSHIRE HOMES GROUP

**LAND AT 31a NORTH STREET,
EMSWORTH**

SITE LOCATION PLAN

Rev	Drawn	Date	Checked	Date	Approved	Date
01	AP	24.07.18	AD	24.07.18	KF	24.07.18
Dimensions		m	Scale		Original Size	
		m			A4	

Client	Project Title	Drawing Title	Project Number	Drawing File	Drawing Number
HAMPSHIRE HOMES GROUP	LAND AT 31a NORTH STREET, EMSWORTH	SITE LOCATION PLAN	305019 - R01 (00)	305019 - SLP.dwg	FIGURE 1



Rev.	Date	16 Frogmore Hemel Hemp Hertfordshire HP3 8RT United Kingd	Client HAMPSH	Project Title 31a N E	Drawing Title F DE	Drawn AP	Date 27.07.18	Scale 1:1000
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APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Hampshire Homes Group (the "client") in accordance with the terms of a contract between RSK and the "client", dated July 2018. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.
2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.
8. The intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (boreholes, trial pits etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

APPENDIX B

SUMMARY OF LEGISLATION AND POLICY RELATING TO CONTAMINATED LAND

Part IIA of the Environmental Protection Act 1990 (EPA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land 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 significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered to include all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA of the EPA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2010 provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2010 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF).

The new framework has only limited guidance on contaminated land, as follows:

- *"planning policies and decisions should also 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".*

APPENDIX C

SITE PHOTOGRAPHS AND WALKOVER CHECKLIST

PHOTOGRAPHIC LOG		
Photo no. 1	Date: 23/07/2018	
Direction photo taken: East		
Description: View of the site entrance from North Street		
Photo No. 2	Date: 23/07/2018	
Direction photo taken: East		
Description: View of the central hardstanding area and the building along the eastern boundary		

Photo No. 3	Date: 23/07/2018	
Direction Photo Taken: North		
Description: View of the warehouse/workshop in the north of the site plus the remaining hardstanding courtyard		

Photo No. 4	Date: 23/07/2018	
Direction Photo Taken: North		
Description: View inside the workshop, showing minor staining on the hardstanding floor and vehicle parts in the north eastern corner		

Photo No. 5	Date: 23/07/2018	
Direction Photo Taken: South		
Description: View showing the ground floor of the workshop adjoining office block along the eastern boundary		

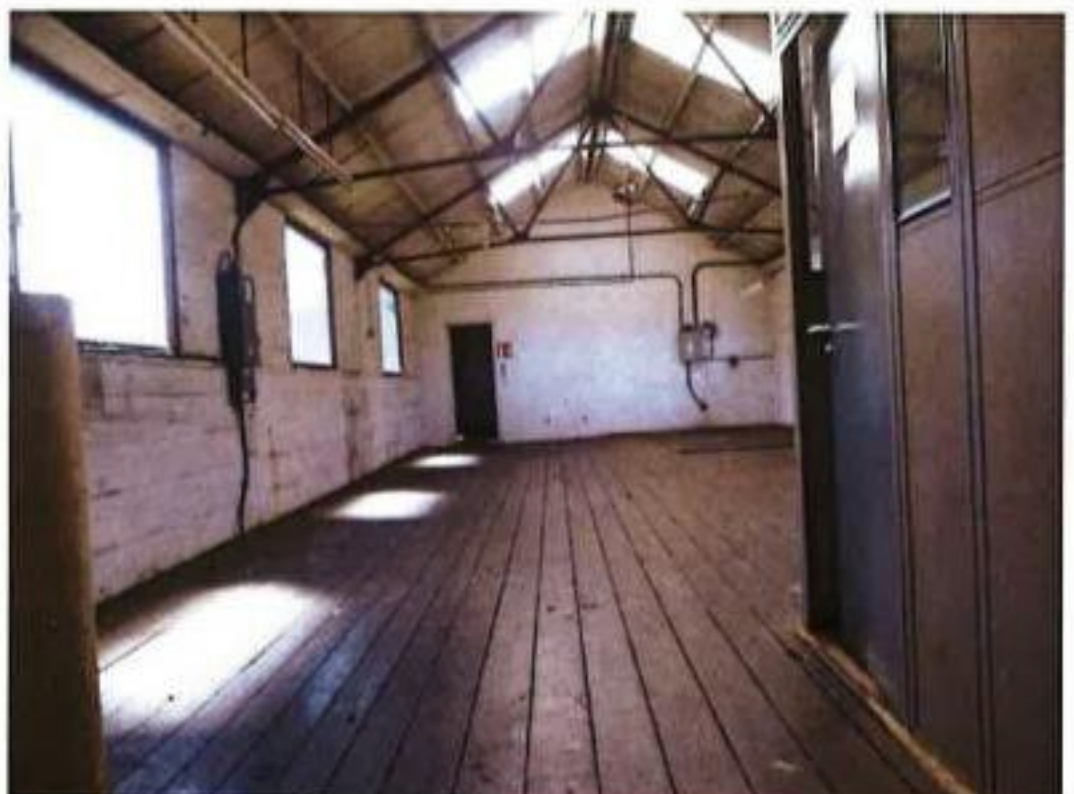
Photo No. 6	Date: 23/07/2018	
Direction Photo Taken: South		
Description: View of the first floor of the workshop adjoining office block along the eastern boundary		

Photo No. 7	Date: 23/07/2018	
Direction Photo Taken: South		
Description: View showing the shed in the south of the site and the level change noted in the site walkover.		

Photo No. 8	Date: 23/07/2018	
Direction Photo Taken: East		
Description: View showing the butane bottles to the south of the commercial building in the east of the site.		

WALKOVER SURVEY CHECKLIST: GEOSCIENCES

SITE NAME: North Street, Emsworth

SITE REFERENCE: 305019

NGR: 474919, 106081

These inspections can provide useful information on:

- Potential geotechnical hazards
- Suitable and appropriate locations for investigation
- The groundwater and surface water environments
- Potentially sensitive receptors (targets) including issues that require further investigation, e.g. ecology surveys
- Potential sources of contaminants
- Nature of contamination
- Potential migration routes (pathways)

Mark locations of features described on a map and give them a reference number.

Describe features in as much detail as possible. Continue on the back of the checklist if necessary, using the feature letter for reference. Take photos of site and relevant features in immediate surrounding area.

The walkover survey can also provide information for the environmental consultant in planning the site investigation.

Points that should be addressed in a walkover survey are as follows:

Features	Description	Photo no.	Map ref.
a) Describe materials exposed in nearby road or railway cuttings, in pits and quarries and natural exposures of soils and rocks near to the site. <i>This will give an indication of the geology beneath the site</i>	No natural or man made cuttings in the vicinity or natural exposure of soils.		
b) Describe surrounding properties/land use and name occupiers. Type of boundary demarcation (if any) on each side. <i>This will identify any potential sources of contamination from adjacent sites and any sensitive receptors</i>	Palmer's Road forms northern boundary with residential properties beyond. Residential gardens and properties along eastern boundary. Emsworth dental practice and co-op funeral care forms southern boundary Pizza restaurant and storeroom and psychotherapy centre form western boundary.		
c) Describe present land use. Are there areas of hardstanding (if yes describe location, types and condition)? <i>Especially crops, for consideration of appropriate timing for further investigation, compensation and reinstatement. Also note hardstanding, obstructions etc. Note any old buildings/ivy covered trees as these may be used by owls or bats</i>	Whole site covered in hard standing in relatively good condition. Workshop floor considered likely to be relatively thick.	1 - 4	

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: North Street, Emsworth

SITE REFERENCE: 305019

NGR: 474919, 106081

Features	Description	Photo no.	Map ref.
d) Describe the site in terms of ground slopes and changes in slope. Is there any evidence of subsidence or landslip/slope erosion? <i>Old scarps or hummocky ground may be evidence of previous landslips that could be reactivated. A terraced appearance may be indicative of superficial solifluction movement or cambering. Trees that are leaning may indicate instability or general slope movement.</i>	Step level change down to shed in west of the site. Minor slopes within the two warehouse structures. Otherwise generally flat and level.		
e) Describe the types and condition of surface vegetation. <i>Nettles may indicate an old cesspit for example or unhealthy vegetation may indicate the presence of phytotoxic fill or landfill gas. Note invasive weeds, e.g. Japanese knotweed.</i>	Occasional weeds (eg. Dandelions) breaking through the hardstanding at the edges otherwise no vegetation present.		
f) Note the number, location, height and species of trees and hedges. <i>This is important in terms of shrinking and swelling ground. Trees and hedgerows may be protected; their condition should be noted along with any restrictions they will impose for site access. It is important to note any areas with the potential for nesting birds, roosting bats, water voles and badger setts.</i>	N/A		
g) Describe any evidence of animal activity. <i>For example obvious animal paths or areas of excavations and burrows.</i>	No activity noted. No evidence of bats in warehouse.		
h) Describe any damage to existing structures on site or adjacent to the site <i>For example, cracks in buildings both on the site and in the neighbourhood, and other evidence of settlement or differential settlement. Note presence of any suspected asbestos-containing materials (ACM)</i>	Properties along access road off North Street minor structural damage not considered significant given likely age and construction.		
i) Note the remains of structures that have been demolished. Look for evidence of remnants of any historical structures. <i>This will provide valuable information on the location of previous foundations, processes etc. Note presence of any suspected asbestos-containing materials (ACM)</i>	No evidence. Current owner has owned the site since 1982.	1 - 4	

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: North Street, Emsworth

SITE REFERENCE: 305019

NGR: 474919, 106081

Features	Description	Photo no.	Map ref.
j) Note any abrupt changes in ground level. Is there evidence of Made Ground/fill on site <i>May indicate that minerals have been worked in surface excavations. May indicate cut and fill.</i>	Level change to shed as previously noted.		
k) Note any surface hollows. <i>Which may indicate the presence of solution features or swallow holes in rocks such as chalk limestone, gypsum and salt, or collapsed underground workings in these materials. May also indicate badger setts or other wildlife activity.</i>	None noted.		
l) In areas of country underlain by coal or other minerals note any hummocky ground. <i>Which may be the remnants of spoil tips and surface depressions that may indicate collapsed shallow workings. Areas of general unevenness may be evidence of waste disposal activities.</i>	N/A		
m) Note any evidence of gas from nearby landfill sites <i>Can be indicated for example by poor vegetation or gas bubbles in water-filled trenches.</i>	N/A		
n) Are there any evidence of gas protection measures (gas membrane, gravel filled trenches, venting pipes, cowls etc)	None noted.		
o) Note the location of streams, culverts, ponds, seepages and sinks and signs of previous flooding. Note direction of flow. Note where the stream is accessible for sampling. May need to take dimensions of stream. <i>If ponds are present on site they may contain great crested newts. Ditches, streams and rivers that border or run through a site may contain water voles, otters or white-clawed crayfish. Presence of water features on site may prompt the need for a survey during a site investigation.</i>	No surface water features on the site or within the immediate vicinity.		
p) All surface waters should be examined for evidence of contamination. <i>For example, oil sheen, silt, solid matter, discoloured sediment.</i>	N/A		

Features	Description	Photo no.	Map ref.
q) Note site drainage. Are there any drain covers/soakaways (if yes describe locations). Are there any outfalls to surface watercourses? Are there any interceptors/lagoons/effluent treatment plants?	No evidence of soakaways or outfalls. Site assumed to be on mains drainage.		
r) Describe storage of fuels and chemicals. Are there any drums/containers (if yes, describe quantity, full/empty, stored on hardstanding/softstanding, banded)? <i>Is there evidence of underground fuel tanks (if yes, describe locations, how many, volumes, bunding, used/disused, condition)?</i>	Site heating run off mains gas. Hot water heated electrically using wall mounted heaters. No access to office to confirm. 2 gas bottles noted within east of site to side of warehouse unit.		
s) Note any discoloured ground. <i>This may provide evidence of contamination.</i>	Slight sheen on workshop floor likely associated with vehicle parts along eastern section of warehouse unit.		
t) Accidents: In the event of a large spillage would runoff affect any vulnerable watercourses/culverts? <i>Are emergency procedures/equipment in place?</i>	No		
u) Waste: Are there any waste skips on site? Are waste storage facilities adequate? Is there any litter/fly-tipped material?	No waste storage areas noted, site no longer in use.		
v) Are there any electricity substations on or adjacent to site?	None noted.		
w) Identify any old structures, pipework etc. wherever possible and, if safe, inspect for evidence of stored waste. <i>Old tanks may contain oil. Old electricity transformers should be noted. Asbestos risk should be assessed together with the need for a specialist hazardous materials survey.</i>	Main fuse box noted in outhouse in east of the site adjoining office and warehouse units. No tanks noted. Defunct pipework noted throughout warehouse. Site contact states all services with exception of electricity have been turned off.		
x) Examine surrounding areas for evidence of contamination which could migrate onto the site. <i>For example a leaking oil tank on an adjacent site.</i>	None noted		
y) Note the presence of any underground structures, services, mine workings, tunnels etc <i>From a safety point of view for development of the site and also as they may provide contaminant migration routes.</i>	None noted		
z) Note any anecdotal information in past uses of the site. <i>Local street names etc. can provide indicators of past industry or ground problems</i>	Site purchased in 1982 and used as machine shop engineering using computerised numerical control machines. Previously in use as a carpenters utilising lathes and milling machines.		

WALKOVER SURVEY CHECKLIST Continued

SITE NAME: North Street, Emsworth

SITE REFERENCE: 305019

NGR: 474919, 106081

Features	Description	Photo no.	Map ref
aa) Description of buildings on site. Is there any evidence of asbestos construction materials, e.g. roofing, insulation materials. Do any of the buildings have basements? Do any of the buildings have a boiler room? (if yes describe fuel type and storage arrangements)	Warehouse roofing difficult to see but thought to be roofing felt or similar. Office tiles considered possible to comprise ACM. First loo off main warehouse building considered likely to comprise vinyl floor tiles potentially containing asbestos.		
bb) Identify potential access routes to the site for plant for the site investigation <i>Excavators and drilling rigs may be required for the next stage of the investigation, or if the access is limited window sampling techniques may need to be specified. Note any specific obstructions such as unsafe/unstable ground, protected trees or hedgerows, or protected buildings.</i>	Main access off north street. Site has roller doors to main warehouse units. Office problematic as cannot access currently and up a step making access for plant difficult.		
cc) Evidence of buried services (water, gas, electricity, telephone, cable, television, pipelines) <i>Both for safety considerations and in the case of water as supply for further investigation. As well as danger, there is the question of considerable expense, which can arise from an inadequate knowledge of the location of buried services. The locations and heights of overhead cables may be important when considering the movement of site equipment.</i>	Service covers noted across site to include sewage, electricity and likely gas.		

Walkover survey completed

Approved:



Kirsten Fairall

Notes: None

APPENDIX D

RISK ASSESSMENT METHODOLOGY

CLR11 outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. Under CLR11, three stages of risk assessment exist: preliminary, generic quantitative and detailed quantitative. An outline conceptual model should be formed at the preliminary risk assessment stage that collates all the existing information pertaining to a site in text, tabular or diagrammatic form. The outline conceptual model identifies potentially complete (termed possible) pollutant linkages (contaminant–pathway–receptor) and is used as the basis for the design of the site investigation. The outline conceptual model is updated as further information becomes available, for example as a result of the site investigation.

Production of a conceptual model requires an assessment of risk to be made. Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk. RSK has adopted guidance provided in CIRIA C552 for use in the production of conceptual models.

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- highly likely: the event 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: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term
- low likelihood: circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term
- unlikely: circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000)
- medium: chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem
- mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment

- minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the probability of an event occurring and its consequences have been classified, a risk category can be assigned according to the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	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

Definitions of these risk categories are as follows together with an assessment of the further work that may be required:

- Very high: there is a high probability that severe harm could occur or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability; urgent investigation and remediation are likely to be required.
- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required. Remedial works may be necessary in the short term and are likely over the long term.
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term.
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild.
- Very low: there is a low possibility that harm could occur and if realised the harm is unlikely to be severe.