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PHASE 1 ENVIRONMENTAL DESK STUDY REPORT

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Report on a Phase One Desk Study

Location:	Land at Reinwood Road Reinwood Road, Huddersfield, West Yorkshire, HD3 4DS	
For:	Rushby Town Planning	
Report No.	C5092/25/E/7764	Report date: September 2025

For and on behalf of **Rogers Geotechnical Services Ltd**

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1. Introduction

The site comprises an area of disused land located off Reinwood Road, Huddersfield, West Yorkshire, HD3 4DS. The site is approximately 0.42 hectares in size and its National Grid reference is centred around 411824 416784.

It is understood that the development proposals currently comprise the construction of a new residential development with associated garden areas and car parking. In order to assist with this decision-making process, and any planning and construction aspects of the development, a phase one environmental desk study has been commissioned and is the subject of this report.

In accordance with issued guidance, a site walkover was conducted on the 30th September 2025 and the following observations were made:

General site description/current site use

The site comprises an area of undeveloped land. Satellite imagery suggest chicken coops were once kept on the land.

Site boundaries/access

The site is accessible off Reinwood Road. There is a gate on the north-western corner.

Topography

The boundaries of the site slope gently downwards towards the southeast, away from Reinwood Road.

Surface cover of site

Rough vegetation covers the entire surface of the site.

Visible evidence of contamination/ contaminative sources

There were no visible signs of contamination present during the time of the walkover.

Presence of vegetation and wildlife

Vegetation seems to be healthy with no evidence of degradation. There were no obvious signs of invasive flora, fauna, nesting birds, burrowing animals or edible plants observed during the time of the site walkover.

Services

The status of underground services is unknown. There were no overhead services present within the site at the time of the walkover.

Site neighbours

The site is located within a residential area, with a playing field present along the northeast boundary.

In order to ensure that the site is fully characterised and to comply with the Environment Act 1995¹, a Phase One Desk Study has been commissioned by Rushby Town Planning. The desk study is intended to assess the environmental impact of historical, current and future factors on the development. This report will present the data obtained and provide a conceptual ground model and preliminary risk assessment as well as discussing the scope of any intrusive investigation that may be required. This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese Knotweed).

2. Review and Summary of Published Data

As a part of this desk study the following data has been considered.

- | | |
|----------------------|--------------|
| • Site Plan | - Appendix 1 |
| • Historical maps | - Appendix 2 |
| • Groundsure Reports | - Appendix 3 |
| • Photographs | - Appendix 4 |

The data obtained from the above-mentioned sources has been summarised below².

¹S57 of the Environment Act 1995 inserted the contaminated land regime into the Environmental Protection Act 1990 (Part 2A). The regime **'provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment'** See <http://www.environment-agency.gov.uk/research/planning/40405.aspx>. This places a duty on local authorities to inspect their areas for contaminated land and require its remediation using the 'suitable for use' approach. Much of this duty is discharged via the planning regime under the Town and Country Planning Act 1990 as historical land contamination is a 'material planning consideration.' The local authorities are required to secure the removal of unacceptable risks via remediation of the land, to therefore ensure the site is suitable for its new use. This is fulfilled via completion of a Phase One Environmental Desk Study, Phase Two Intrusive Investigation, Phase Three Remediation Strategy and Phase Four Validation Report. Therefore, as a minimum, once a site has been developed it should not be capable of being designated as 'contaminated land' under Part 2A of the Environmental Protection Act 1990, as inserted by the Environment Act 1995 (see also PPS 23 Planning and Pollution Control Section 8)

² This report is a summary only and reference must be made in full to the information provided in the Groundsure Report.

2.1 Historical Land Use

Table 1: Historical Land Use³

HISTORICAL MAPPING SUMMARY		
Map Dates	On site	Within 250m
1854	The site is present as part of an undeveloped field of presumed agricultural use. A road is present towards the northern corner of the site.	The surrounding land use consists of mainly fields with the occasional residential dwelling.
1888 – 1893	The road travelling through the northern corner of the site has been moved so it is present adjacent to the northwest boundary of the site. This road is now labelled as 'Reinwood Road'.	Pond – 30m NE Quarry – 200m NW Old Quarry – 245m S
1905 – 1907	The site remains unchanged.	The Quarry and Old Quarry are no longer labelled. Quarmby Chemical Works – 245m S
1918	The site remains unchanged.	The surrounding land use remains largely unchanged.
1930 – 1932	The site is now covered in an area of Allotment Gardens.	The Quarmby Chemical Works are now labelled as the 'Crest Mill'. A residential development is now present 20m NW of the site and beyond.
1938 – 1956	The site remains unchanged.	The surrounding land use remains largely unchanged.
1961 – 1962	The site remains unchanged.	The Crest Mill is no longer present. The Pond located 30m NE has shrunk in size. Garage – 170m W
1975	The site is still labelled as 'Allotment Gardens'.	While the historical map during this year is of poor quality, it is noted that the map suggests the Allotment Gardens and Pond present adjacent to the site are now labelled as a 'Refuse Tip'.
1984	The site is no longer labelled as 'Allotment Gardens'.	The Refuse Tip is no longer labelled.
1993 – 2025	The site remains unchanged.	The surrounding land use remains largely unchanged.

NB. All distances given are approximate only.

2.2 Published Geology and Geological Hazards

Table 2: Geological Data for the Site

BGS MAPPING DATA			
Strata Type	Strata Name ⁴	Previous Name ⁴	Description ⁵
Made Ground/Fill	N/A	N/A	Not indicated on site although previous construction may have resulted in the presence of made ground.
Superficial Geology	N/A	N/A	Not indicated to underlie the site.
Solid Geology	Pennine Lower Coal Measures Formation	Grey Measures of Yorkshire and Nottingham	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.
	Rough Rock	Rough Rock Formation	Coarse-grained feldspathic sandstone.

³ See Appendix 3

⁴ Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and GeoIndex Onshore Viewer [online resource from www.bgs.ac.uk]

⁵ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

GEOLOGICAL FEATURES			
Type	Location	Features	Comments
Mining Activity	On site	Coal mining	The study site is located within a coal mining area as defined by the Coal Authority.
		Non-coal Mining	Localised small-scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered.
Linear Features	On site	Fossil Horizon	Subcrenatum (Pot Clay) Marine Band
Landslip Deposits	No data	No data	No data.
BGS BOREHOLE DATA			
Reference ⁶	Location	Strata Description	Depth
-	-	-	There are no boreholes within the local area relevant to the site.
NATURAL GROUND SUBSIDENCE & HAZARDS ⁷			
Type		Risk Rating	
Potential for shrinking or swelling clay ground stability		Very Low.	
Potential for running sand ground stability		Negligible.	
Potential for compressible ground stability		Negligible.	
Potential for collapsible ground stability hazards		Very Low.	
Potential for landslide ground stability		Very Low.	
Potential for ground dissolution stability		Negligible.	
Radon		The property is in a Radon Affected Area as between 3% and 5% of properties are affected. Basic radon ⁸ protective measures are necessary in the construction of new dwellings or extensions.	

2.3 Construction Issues

2.3.1 Foundation Construction

On the basis of the prevailing geology and assuming that there are no areas of significantly filled ground, it is anticipated that shallow strip or spread foundations could be utilised at this site. It should be appreciated that an intrusive investigation will be required to validate this opinion. Moreover, it is possible that undifferentiated strata within the Rough Rock may include very fine-grained rocks which are likely to have weathered to cohesive soils at or near the surface. Such soils could be sensitive to soil moisture variations and thus be susceptible to desiccation as result of tree root action. In light of this, it is possible that footings within the zone of influence of trees (existing or previously removed), may need to be founded at extended depths in excess of 1m.

⁶ <https://mapapps2.bgs.ac.uk/geoindex/home.html>

⁷ See Groundsure report

⁸ In outline, 'basic' radon protective measures involve the fitting of a gas tight ground barrier to protect against radon ingress. This should cover the whole building foot print and be lapped to the damp proof course in the walls and sealed around service penetrations. In addition, the membrane should also act as a damp-proof barrier. 'Full' radon protective measures requires the radon-proof ground barrier, together with a sump in the foundation, ready to take a fan if high levels of radon are detected after occupancy.

2.3.2 Site Won Materials

Where sandstone outcrops, it is possible that the resulting soil may provide a suitable bulk granular fill and may prove suitable for re-compaction.

Should any residual mudstone be encountered at shallow depth over much of the site, this material is likely to be relatively difficult to re-engineer as a construction material. Therefore, depending on the results of laboratory testing, it may possible to modify/stabilise the soil using lime and/or cement to form a suitable sub-base replacement for pavements and hard standings.

2.3.3 Disposal of Site Materials

If made ground is present, then contamination/WAC testing will be required to establish the nature of the underlying soil before disposal to a licensed landfill site. However, it is anticipated that the naturally occurring soils would not be significantly contaminated, thus would probably be accepted by a waste disposal site catering for inert material.

2.4 Mining and Natural Cavities

2.4.1 Coal Mining

The Groundsure Report states that the site is within an area that may be affected by coal mining. However, the site is not present within a Development High Risk area. As such, it is not considered necessary for a Consultants Coal Mining Report in this instance and the risk can be considered as low.

2.4.2 Non-Coal Mining

Localised small-scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered.

2.5 Waste Management and Gas Monitoring

Table 3: Landfill Data and Artificial Ground, Recorded and Anticipated			
ENVIRONMENT AGENCY, LOCAL AUTHORITY, BGS & HISTORIC LANDFILLS			
Waste Type	Location	Comments	Monitoring Requirement
Active Landfill	Within 250m	None recorded within 250m	-
Historic Landfill	On site	No further information given.	Y
Historic waste sites	Within 250m	None recorded within 250m	-
Licensed waste sites	Within 250m	None recorded within 250m	-

Waste Exemptions	Within 250m	None recorded within 250m	-
MADE GROUND & INFILLED GROUNDWORKINGS			
Description	Location	Comments	Monitoring Requirement
Records of Potentially Infilled Features	30m NE	Pond (1888 – 1893)	Y
	70m SW, 180m W, 209m W, 213m W, 217m W & 220m W	Unspecified Ground Workings (1905 – 1985)	Y
	200m NW	Quarry (1888 – 1893)	Y
	225m W	Refuse Heap (1905)	N
	245m S	Old Quarry (1888 – 1893)	N

2.6 Hydrogeology, Hydrology

Table 4: Ground/Controlled Water Sensitivity and Flooding

ENVIRONMENT AGENCY AQUIFER DESIGNATION⁹		
Strata	Designation	Description
Solid Geology On Site	Secondary A	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. These are generally aquifers formerly classified as minor aquifers.
GROUNDWATER SENSITIVITY¹⁰		
Description	Location	Details
Source Protection Zone	Within 250m	None recorded within 250m.
Abstraction Licences	Within 250m	None recorded within 250m.
Records of Part A(2) and Part B Activities and Enforcements	Within 250m	None recorded within 250m.
Records of Licensed Discharge Consents	Within 250m	None recorded within 250m.
High Soil Leaching Potential	On Site	Leaching class: High.
CONTROLLED WATERS¹¹		
Description	Location	Details
River Network Entries	Within 250m	None recorded within 250m.
Surface Water Features	Within 250m	None recorded within 250m.

⁹ See Appendix 2

¹⁰ See Appendix 2

¹¹ See Appendix 2

POLLUTION INCIDENTS ¹²			
Pollutant	Receptor	Location	Date
-	-	None recorded within 250m	-
ENVIRONMENT AGENCY FLOOD RISK ¹³			
Description	Location	Details	
Zone 2	-	The site is not situated within a Zone 2 flood plain.	
Zone 3	-	The site is not situated within a Zone 3 flood plain.	
Flood Defences	-	None recorded within 250m.	
Groundwater Flooding Area	On site	Negligible potential for groundwater flooding to occur.	

2.7 Sensitive Land Use

Table 5: Sensitive Land Uses within 250m

REGISTERED SENSITIVE LAND USES ¹⁴		
Description	Location	Details
Nitrate Vulnerable Zone	Within 250m	None recorded within 250m.
Green Belt Land	Within 250m	None recorded within 250m.

2.8 Industrial Land Use and Potential Sources of Contamination

In order for a conceptual site model and preliminary risk assessment to be completed the historical maps and Groundsure data requires analysis to identify any past or present activities on the site and in the area that may have the potential to cause contamination on the site. Guidance has been issued by the Environment Agency, NHBC and Chartered Institute of Environmental Health.¹⁵ Within this document, annex 3 provides examples of important contaminants that are associated with individual uses of land. This data assists in the formulation of any chemical testing regime.

Those that we consider potentially contaminative according to the guidance are given below:

Table 6: Potentially Contaminative Sources

HISTORICAL		
Land Use	Location	Classification
Allotment Gardens	On site	Artificial/made ground.
Refuse Tip	On site	
Pond	30m NE	
Quarry	200m NW	
Old Quarry	245m S	

¹² See Appendix 2

¹³ See Appendix 2

¹⁴ See Appendix 2

¹⁵ Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 Volume 1 and 2.

Garage	170m W	Road vehicle fuelling, service and repair: garages and filling stations.
Quarmby Chemical Works	245m S	Unspecified works/factories/features.
CURRENT		
Land Use	Location	Classification
Electricity Sub-stations	193m N, 205m W, 227m SW	Unspecified works/factories/features.

3. Preliminary Qualitative Risk Assessment

The potential of contamination hazards on the land has been identified and the risks associated with them are assessed in the following preliminary risk assessment in accordance with industry practice and the 'suitable for use' approach. This has been conducted using the source-pathway-receptor approach. This method dictates that there must be a risk contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed, DEFRA and The Environment Agency state that **'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'**

R&D Publication 66: 2008 states that the groups at risk of harm (receptors) can be identified by the following categorisation:

1. Humans: site personnel, end users, visitors and adjacent land users.
2. The water environment – receptors: groundwater, surface water, coastal waters and artificial drainage.
3. Ecosystems: plants and animals.
4. Construction/building materials/services

In order to complete a conceptual site model and therefore a preliminary risk assessment, an appraisal of the sources of contamination, potential and actual, on and in the area of the site has therefore been completed with reference to this pollution linkage.¹⁶

3.1 Conceptual Ground Model & Preliminary Qualitative Risk Assessment

It is understood that the development proposals currently comprise the construction of a new residential development with associated garden areas and car parking. In view of the sensitivity of the end users it is considered that the soil screening values (SSVs) for a residential with plant uptake end use should be employed.

¹⁶ This assessment has been based on the information as to the proposed development that has been provided by the client. If the plans should change, the assessment should be re-evaluated.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

- N/A -** A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
- Low -** A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
- Moderate -** The linkage exists but further field or laboratory data is required to confirm that the contaminant has reached the receptor and the levels of contaminant are harmful.
- High -** The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.

Table 7: Conceptual Site Model and Preliminary Qualitative Risk Assessment

CONCEPTUAL SITE MODEL			PRELIMINARY RISK ASSESSMENT	
Pathways	Receptor	Linkage Present?	Risk Rating	Notes
Direct contact/dermal absorption/soil ingestion	Operative	Yes – operatives are likely to come in contact with the soil.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
	End User	Yes – end users are likely to come in contact with the soil.	Moderate	Any on site sources of contamination could migrate to neighbouring properties.
	Neighbours	Yes – possible source on site and immediate neighbours are present.	Moderate	Further testing required to reach a firm conclusion.
Inhalation of Dust/Vapours	Operative	Yes – contact with soil likely during works and vapours may accumulate in enclosed spaces.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site. Any on site sources of contamination could migrate to neighbouring properties.
	End User	Yes – dust may be produced by end users and vapours may accumulate in enclosed spaces.	Moderate	Construction activities may create dust on and off site, which, if contaminated, could adversely affect operatives, end users and neighbours.
	Neighbours	Yes – neighbouring properties present and possible inhalation of dust during the works.	Moderate	In the event that harmful vapours are present they may accumulate in enclosed spaces, affecting operatives, end users and neighbours. Further testing required to reach a firm conclusion.
Ingestion of fruit/vegetables and/or waters	Operative	No – no edible plants or contained water sources in the area of the proposed new works.	N/A	There are potential on and off-site sources of contamination that may have caused contamination of the site. Further testing required to reach a firm conclusion.
	End User	Yes – soft landscaping proposed as part of the new development.	Moderate	
	Neighbours	Yes – residential dwellings present within 250m of the proposed development.	Moderate	

Migration of hazardous gases via permeable strata	Operative	Yes – possible off-site sources and potential source on site associated with historical refuse tip.	Moderate	Possible source on site and within 250m. A programme of monitoring is recommended but is suggested to be limited to 6 readings over three months in the first instance. If significant made ground considered capable of producing harmful gases is revealed during the investigation works, the monitoring regime may require reassessment to consider a higher potential risk.
	End User		Moderate	
	Neighbours	Yes – possible source on site due to the site use as a historical refuse tip.	Low to Moderate	
Spillage/loss/run off direct to receiving water	Controlled Waters	No – there are no controlled waters present within 250m of the site.	N/A	There are potential on and off-site sources of contamination that may have caused contamination of the site.
Migration via permeable unsaturated strata	Controlled Waters	Yes – possible source on site and Secondary A aquifer beneath the site.	Moderate	Controlled waters within 250m. Secondary A aquifer underlies the site. Permeability of underlying geology should be assessed.
Run off via drainage/sewers etc	Controlled Waters	Yes – possible source on site.	Moderate	Further testing required to reach a firm conclusion.
Direct contact with contaminated soils	Plants	Yes – some soft landscaping areas may be present as part of the proposed development.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
Uptake via root system			Moderate	Any on site sources of contamination could migrate to neighbouring properties. Further testing required to reach a firm conclusion.
Direct contact with contaminated soils/ Direct contact with contaminated groundwater	Building Materials	Yes – possible source on and off site and foundation and service installation materials may be affected by the site soil.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site. Further testing required to reach a firm conclusion.

Migration of mine gas via permeable strata	Operative	Yes – the site is present within a coal mining area, however, the site is not located within a development high risk zone.	Low	No further action required.
	End User			
Exposure to Radon	Operative	Yes – site currently indicated to be present in a radon affected area ¹⁷ .	Moderate	Between 3% and 5% of properties are affected. The publication BR211 states that basic protection measures are necessary.
	End User			
Mining Instability	End User	Yes – the site is present within a coal mining area, however, the site is not located within a development high risk zone.	Low	No further action required.
Unexploded Ordnance (UXO) Risk	Operative	Yes – the Zetica ¹⁸ online maps indicate that the site is at low risk from UXO.	Low	Unlikely to be affected by UXO.

Notes:

1. The above data and table is a qualitative assessment of the probable risks identified at this site, based on the information made available to us from the client, third party professional data and walkover survey.
2. Should any additional or new data come to light, the risk assessment should be revisited and any necessary changes made to any recommendations resulting from this study.
3. Where further testing is recommended as part of the risk assessment, this is in order to provide a quantitative assessment of any contamination issues. It should at all times be considered that uncertainties may remain, and therefore any testing regime and ground investigation philosophy should be ready to accommodate any necessary alterations should any data come to light or it become evident that it has not been previously considered.

¹⁷ Radon interactive map [online resource <https://www.ukradon.org/radonmaps/>] It should be appreciated that radon maps are subject to change and are updated regularly.

¹⁸ Pre-desk study assessment [online resource from www.zeticauxo.com].

4. Intrusive Investigation

4.1 Site Investigation Philosophy

The information from the Phase 1 Desk Study shows there are potential sources of contamination on the site and in the surrounding area. In view of the above, any intrusive investigation should be undertaken in accordance with the sampling strategies given in BS10175: 2011 +A2:2017 and CLR4:1994. These two sampling strategies may be classified as:

- Non-Targeted – using a defined sampling pattern (BS10175)
- Targeted – based on prior knowledge and professional judgement (CLR4)

These sampling strategies are considered in more detail below. However, it is emphasised that they can be used individually or in combination depending on the depth of site knowledge.

Non-Targeted Sampling

If no obvious 'hot spots' of contamination have been identified on a site, it would be recommended that a stratified random pattern of sampling points be considered. This work should be undertaken with reference to BS10175: 2011 +A2: 2017 *Investigation of potentially contaminated sites – Code of practice: 7.6*, and BS5930 2015 + A1:2020, *Code of practice for ground investigations*.

Targeted Sampling

If a possible 'hot spot' of contamination has been identified on a site, it is recommended that a herringbone pattern of sampling points be considered in the immediate vicinity. If strong evidence of contamination has then been identified, it is recommended that sampling be highly focused to reflect that evidence and the investigator's experience. This work should be undertaken with reference to CLR4, *Sampling Strategies for Contaminated Land, 1994*.

The density of sampling required is defined in BS10175: 2011: +A2: 2017: 7.7.2.2.3, which indicates that an *exploratory* investigation usually requires a lower density sample spacing than does a *main* investigation. The BS goes on to state that *the actual density should depend upon the confidence and robustness required of decisions that will be based on the information obtained. Thus, the area and depth of interest will be related to the contaminants present, the pathways and the receptors. Typical densities of sampling grids can vary from 25m to 50m centres for exploratory investigations, and 10m to 25m centres for main investigations.*

4.2 Site Specific Investigation

In view of the information provided above it is considered that an investigation of the site should include the following main elements.

4.2.1 Contamination Assessment

It may be appreciated that BS 10175 clause 7.7.2.2.3 suggests that the number of sampling points at the site should be based on a minimum of three testing locations or the size of the site with respect to the appropriate grid spacing, whichever the greater. On the basis of the site area being 0.42ha, the number of sampling points at the site should be considered with respect to the table below.

Table 8: Summary of Sampling Strategy					
NUMBER OF SAMPLING POINTS					
	Soil	Water	Asbestos	Standpipes	Standpipe Readings
Exploratory Investigation 50m x 50m grid	4	-	4	3	A minimum of 6 readings over 3 months would be required as per risk assessment, however any regime must take into account the guidance detailed below.
Target Areas	Should be assessed during any investigation.				

Chemical testing should be undertaken on the above grid spacing and the following standard testing regime should be undertaken:

- **Metals** – Cd, Cr, Cu, Hg, Ni, Pb, Zn, V.
- **Semi Metals and Non-Metals** – As, Se, Free Cyanide and Phenols.
- **Hydrocarbons** – Polycyclic aromatic hydrocarbons (PAH EPA16), Total petroleum hydrocarbons (TPH CWG).
- **Others** – pH, Organic Content.
- **Asbestos**

Sampling Method

Investigation should include the installation of three gas monitoring standpipes for subsequent monitoring. Furthermore, soils should be obtained for chemical sampling. The sampling strategy should employ the non-targeted strategy given above in the first instance, i.e. at least three sampling points, if it is anticipated that made ground is significant across the site. However, if the made ground at the site is thought to be localised to specific areas, then the targeted strategy should be used.

It should be possible to carry out the above work with a windowless sampling drilling rig, however, it may be more pragmatic to employ hand-held digging tools for a targeted strategy.

Gas Monitoring

The final gas monitoring regime should be undertaken in accordance with Table 4.2 of CIRIA C665: 2007: *Assessing risks posed by hazardous ground gasses to buildings*. In that document guidance for the frequency of monitoring is provided on tables 5.5a and 5.5b *Typical/idealised frequency and period of monitoring* on page 60. For convenience, these tables have been combined and reproduced below.

Table 9: Typical/idealised Frequency and Period of Monitoring.

Sensitivity of development	Generation potential of source				
	Very low	Low	Moderate	High	Very High
Low (commercial)	4/1	6/2	6/3	12/6	12/12
Moderate (flats)	6/2	6/3	9/6	12/12	24/24
High (residential + gardens)	6/3	9/6	12/6	24/12	24/24

Notes:

- The first number is the minimum number of readings and the second number is the minimum period in months, for example 4/1 – four sets of readings over 1 month.
- At least two sets of readings must be at low and falling atmospheric pressure (but not restricted to periods below 1000mb) known as worst case conditions.
- The frequency and period stated are considered to represent typical minimum requirements. Depending on specific circumstances fewer or additional readings may be required (e.g. any such variation subject to site specific justification). The NHBC guidance is also recommending these periods/frequencies of monitoring.
- Historical data can be used as part of the data set.
- Not all sites will require gas monitoring. However, this would need to be confirmed with demonstrable evidence.
- Placing high sensitivity end use on a high hazard site is not normally acceptable unless the source is removed or treated to reduce its gassing potential. Under such circumstances long-term monitoring may not be appropriate or required.
- This guidance should be read in conjunction with BS 8576:2013 figure 6 which may justify fewer readings in the first instance, where the generation potential is considered to be very low to low. However, this should be undertaken pragmatically, and further readings obtained according to the above table, where a potentially significant source is identified and initial readings suggest that remedial measures are not necessary.

4.2.2 Geotechnical Assessment

In addition to the above contamination assessment which is likely to be required by planning authorities and insurance providers, the following investigation strategy could be considered:

Sampling Method

It is anticipated that a windowless sampling drilling rig will be able to gain sufficient data in regard to the near surface soils. Moreover, such equipment should be able to undertake Standard Penetration Testing (SPT) and/or Dynamic Probing.

Soakaway Design

Should soakaway data be required for drainage design, trial pits could be excavated and infiltration tests conducted. Alternatively, these tests could be undertaken within boreholes.

Geotechnical Testing

An allowance for geotechnical testing of the soils should be included in any ground investigation.

4.2.3 Reporting

The above data will need to be formulated into a formal assessment that should include the following:

- Geotechnical recommendations.
- Contamination assessment.
- Contamination remediation strategy.
- Any recommendations for further work, if required and including validation reports where site remediation is necessary.

As soon as is practicable, and prior to the above, this Phase 1 report should be forwarded to the relevant authorities, in order to ensure they have sufficient time to review and discuss any issues.

5. References

- British Standards Institution (2015), BS5930 2015 + A1:2020: *Code of practice for site investigations*, B.S.I., London.
- British Standards Institution (2007), Amendment No 1 to BS5930: *Code of practice for ground investigations*, B.S.I., London.
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- British Standards Institution (2013), BS 8576 Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds.
- Department for Environment, Food and Rural Affairs and the Environment Agency, DEFRA R&D Publications, Environment Agency, Bristol.
- CLR 2, 1994, *Guidance on preliminary site inspection of contaminated land*, Volume 1.
- CLR 4, 1994, *Sampling Strategies for contaminated land*.
- R&D Publication 66: 2008 Guidance for the Safe Development of Housing on Land Affected by Contamination.
- CIRIA Report C665 (2007), *Assessing risks posed by ground gasses in buildings*.
- The Environment Agency: Groundwater source protection.