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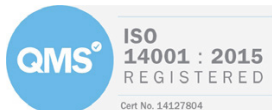


PHASE 1 ENVIRONMENTAL DESK STUDY REPORT

job number	C4539/24/E/6947	date	11.11.2024
site address	2a East Bath Street, Batley, West Yorkshire, WF17 5NP		
written by	S. Hale	checked by	R. Palmer
issued by	S. Hale		



Please consider the environment before printing this report.



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Rogers Geotechnical Services Ltd
Offices 1 & 2 Barncliffe Business Park, Near Bank, Shelley, Huddersfield, HD8 8LU
☎ 01484 604354 Company No. 5130864

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Report on a Phase One Desk Study

Location: 2a East Bath Street
Batley, West Yorkshire, WF17 5NP

For: Shazia Seedat

Report No. C4539/24/E/6947

Report date: November 2024

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

Steven Hale BSc FGS
Geo-environmental Technician

Rob Palmer MSc FGS ACIEH
Engineering Director

1. Introduction

The site comprises an area of land comprising 2a East Bath Street, Batley, West Yorkshire, WF17 5NP. The site is approximately 0.17 hectares in size and its National Grid reference is centred around 424854 424334.

It is understood that the development proposals currently comprise the demolition of the existing bungalow and garages, with the subsequent construction of two residential dwellings with 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 17th October 2024 and the following observations were made:

General site description/current site use

The site comprises an existing bungalow with attached garage located to the south western corner. The remaining site area consists of a driveway and garden areas.

Site boundaries/access

The site is accessible via 2a East Bath Street.

Topography

The boundaries of the site slope towards the southeast.

Surface cover of site

Grass covers the majority of surface of the site with the driveway and existing bungalow covering the remaining.

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 railway line present to the east.

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 Shazia Seedat. 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 |
| • Consultants Coal Mining Report | - Appendix 5 |

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 map is not clear enough to make out details.	The map is not clear enough to make out details.
1890 – 1892	A structure is present to the centre of the site. A railway line cuts through the east side of the site.	Mill Ponds – 60m S, 150m W & 200m NW Quarry – 90m E Cheapside Mills – 150m S Victoria Foundry – 190m SW Warehouses – 190m SW Hick Lane Mills – 240m SW
1905 – 1907	Site remains largely unchanged.	Mill Ponds located 150m W and 200m NW no longer appear. Quarry located 90m E no longer appears. Allotment Gardens – 120m SE
1922 – 1933	Site remains largely unchanged.	Surrounding land use remains largely unchanged.
1955 – 1957	The areas of railway cuttings on the site have been infilled. A small structure is now present to the south eastern corner.	Electrical Sub Station – 95m E Warehouses – 120m W & 160m W Garages – 160m W & 240m W
1971 – 1975	Site remains largely unchanged.	The railway line adjacent to the site to the north east is now dismantled. The Allotment Gardens located 120m SE has been built over with residential dwellings.
1977	The small structure located to the south east of the site no longer appears. Two structures that are assumed to be the existing bungalow and garage are now located to the south west of the site.	Warehouses and garages located 120m W, 160m W and 240m W appear to have been demolished. Mill Pond located 120m S has been infilled.
1987 – 1992	The structure present to the centre of the site has been demolished.	Surrounding land use remains largely unchanged.
1992 – 2024	Site remains largely unchanged.	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	Thornhill Rock	-	Generally, a fine-grained, thickly-bedded and cross-bedded sandstone, commonly split with a thin coal and mudstone around Batley.

³ See Appendix 3

⁴ Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and Geology of Britain 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 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	49m NW, 133m S, 147m NW & 177m SE	Faults	Normal faults, displacement unknown. These faults are not anticipated to affect the site.
	224m W	Coal Seam	Joan Coal (J). Not anticipated to affect the site.
Landslip Deposits	No data	No data	No data.
BGS BOREHOLE DATA			
Reference ⁶	Location	Strata Description	Depth
SE22SW1135	80m E	MADE GROUND (Sandstone gravel)	0.30m
		MADE GROUND (Sandstone gravel and firm clay)	1.00m
		Stiff CLAY	1.80m
SE22SW1384	90m NW	Ash, clay, brick FILL	1.00m
		Clay FILL	2.40m
		Clay with brick and sandstone boulders FILL	2.70m
NATURAL GROUND SUBSIDENCE & HAZARDS ⁷			
Type		Risk Rating	
Potential for shrinking or swelling clay ground stability		Negligible.	
Potential for running sand ground stability		Very Low.	
Potential for compressible ground stability		Very Low.	
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. Basic radon⁸ protective measures are necessary in the construction of new dwellings or extensions	

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 require 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 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 Thornhill 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. In particular, a row of large conifers was noted to be present along the southern border of the site which may need to be accounted for in foundation design.

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 be 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. A Consultant's Coal Mining Report has therefore been obtained that is included in appendix 5 of this report and may be summarised as follows:

Table 3: Summary of the Consultant's Coal Mining Report

Has the report highlighted evidence or potential of:			
Ref	Mining Feature	Yes/No	Comments
1	Underground Coal Mining	Yes	The property is in a surface area that could be affected by underground mining in 2 seams of coal between 151m and 314m depth and worked between 1880 and 1909.
2	Probable Unrecorded Shallow Workings	No	None.
3	Spine Roadways at Shallow Depth	No	No spine roadway recorded at shallow depth.
4	Mine Entries	No	None recorded within 100 metres of the site boundary.

5	Abandoned mine plans	Yes	Plans of abandoned mine workings below the site are suggested to be available by the coal authority.
6	Outcrops	No	No outcrops recorded.
7	Geological Faults	No	No faults, fissures or breaklines recorded.
8	Opencast Mines	Yes	A large historic opencast site is located approximately 370m E of the site.
9	Coal Authority Managed Tips	No	None recorded within 500 metres of the enquiry boundary.
10	Site Investigations	No	None recorded within 50 metres of the enquiry boundary.
11	Remediated Sites	No	None recorded within 50 metres of the enquiry boundary.
12	Coal Mining Subsidence	No	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.
13	Mine Gas	No	None recorded within 500 metres of the enquiry boundary.
14	Mine Water Treatment Schemes	No	None recorded within 500 metres of the enquiry boundary.
15	Future Underground Mining	No	None recorded.
16	Coal Mining Licensing	No	None recorded within 200 metres of the enquiry boundary.
17	Court Orders	No	None recorded.
18	Section 46 Notices	No	No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.
19	Withdrawal of Support Notices	No	The property is not in an area where a notice to withdraw support has been given. The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.
20	Payments to Owners of Former Copyhold Land	No	The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

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 4: 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	49m NW	Bridge Street, Batley – Waste Type: Liquid Sludge	Y
	146m N	Bridge Street, Batley	Y
Historic waste sites	Within 250m	None recorded within 250m	-
Licensed waste sites	Within 250m	None recorded within 250m	-
Waste Exceptions	210m SW	Treating and Storing waste exemptions.	Y
MADE GROUND & INFILLED GROUNDWORKINGS			
Description	Location	Comments	Monitoring Requirement
Records of Potentially Infilled Features	Adjacent to site NE	Railway Cuttings (1890 – 1892)	Y
	60m S, 150m W & 200m NW	Mill Ponds (1890 – 1892)	Y
	90m E	Quarry (1890 – 1892)	N
	120m SE	Allotment Gardens (1905 – 1907)	N
	150m E	Unspecified Ground Workings (1905)	N

2.6 Hydrogeology, Hydrology

Table 5: Ground/Controlled Water Sensitivity and Flooding		
ENVIRONMENT AGENCY AQUIFER DESIGNATION ⁹		
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 SENSITIVITY ¹⁰		
Description	Location	Details
Source Protection Zone	Within 250m	None recorded within 250m.
Abstraction Licences	Within 250m	None recorded within 250m.

⁹ See Appendix 2

¹⁰ See Appendix 2

Records of Part A(2) and Part B Activities and Enforcements	Within 250m	None recorded within 250m.	
Records of Licensed Discharge Consents	87m E	Sewage Discharges – Sewer Storm Overflow	
High Soil Leaching Potential	On Site	Leaching class: Low	
CONTROLLED WATERS ¹¹			
Description	Location	Details	
River Network Entries	40m SE – 231m S	Howley Beck	
Surface Water Features	Within 250m	2 surface water records present within 250m. Unknown type. One assumed to be the Howley Beck.	
POLLUTION INCIDENTS ¹²			
Pollutant	Receptor	Location	Date
Oils and Fuel	Water Category 2 (Significant) Land Category 3 (Minor)	70m S	June 2004
ENVIRONMENT AGENCY FLOOD RISK ¹³			
Description	Location	Details	
Zone 2	Within 250m	The site is not situated within a Zone 2 flood plain.	
Zone 3	Within 250m	The site is not situated within a Zone 3 flood plain.	
Flood Defences	Within 250m	None recorded within 250m.	
Groundwater Flooding Area	Within 250m	Negligible potential for groundwater flooding to occur.	

2.7 Sensitive Land Use

Table 6: Sensitive Land Uses within 250m

REGISTERED SENSITIVE LAND USES¹⁴		
Description	Location	Details
Nitrate Vulnerable Zone	Within 250m	None recorded within 250m.
Green Belt Land	Within 250m	None recorded within 250m.

¹¹ See Appendix 2

¹² See Appendix 2

¹³ See Appendix 2

¹⁴ See Appendix 2

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 7: Potentially Contaminative Sources		
HISTORICAL		
Land Use	Location	Classification
Historical construction	On site	Artificial/made ground.
Mill Ponds	60m S, 150m W & 200m NW	
Quarry	90m E	
Allotment Gardens	120m SE	
Garages	120m W & 160m W	Road vehicle fuelling, service and repair: garages and filling stations.
Electrical Sub Station	95m E	Unspecified works/factories/features.
Warehouses	120m W, 160m W & 190m SW	
Cheapside Mill	150m S	
Victoria Foundry	190m SW	
Hick Lane Mills	240m SW	
Railway Line	Adjacent NE	Transport and haulage centres.
CURRENT		
Land Use	Location	Classification
Works	184m SW & 186m SW	Unspecified works/factories/features.
Electricity Sub Stations	185m NW, 244m E & 246m SW	
Low Kost Motor Spares	206m SW	Road vehicle fuelling, service and repair: garages and filling stations.
Upper Batley Service Station	229m W	
Fast Fit Tyres	237m SW	
BP Service Station	240m W	

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

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 demolition of the existing bungalow and garages, with the subsequent construction of two residential dwellings with 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.

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.

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.

Table 8: 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.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site.
	End User	Yes – dust may be produced by the end users.	Moderate	Any on site sources of contamination could migrate to neighbouring properties.
	Neighbours	Yes – neighbouring properties present and possible inhalation of dust during the works.	Moderate	Construction activities may create dust on and off site, which, if contaminated, could adversely affect operatives, end users and neighbours.
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	Further testing required to reach a firm conclusion.
	End User	Yes – soft landscaping proposed as part of the new development.	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.
	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 construction.	Moderate	Possible source on site and within 250m. A programme of monitoring is recommended but is suggested to be limited to 4 readings over one month 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 historical construction.	Low to Moderate	It is unlikely that significant thicknesses of made ground will have been brought on to site for previous construction. Therefore, a generative source has unlikely been produced on site. This should be re-assessed during any intrusive works should this be proven to the contrary.
Spillage/loss/run off direct to receiving water	Controlled Waters	Yes – possible source on site and controlled waters within 250m.	Moderate	There are potential on and off-site sources of contamination that may have caused contamination of the site. Controlled waters within 250m. Secondary A aquifer underlies the site. Permeability of underlying geology should be assessed. Further testing required to reach a firm conclusion.
Migration via permeable unsaturated strata	Controlled Waters	Yes – possible source on site and Secondary A aquifer beneath the site.	Moderate	
Run off via drainage/sewers etc	Controlled Waters	Yes – possible source on site.	Moderate	
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. Any on site sources of contamination could migrate to neighbouring properties. Further testing required to reach a firm conclusion.
Uptake via root system			Moderate	
Direct contact with contaminated soils/	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.
Direct contact with contaminated groundwater				

Migration of mine gas via permeable strata	Operative	Yes – in an area affected by coal mining activity, however, shallow worked seams are not anticipated.	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 property is in a surface area that could be affected by underground mining in 2 seams of coal between 151m and 314m depth and worked between 1880 and 1909. However, instability at the surface from these depths is unlikely.	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 0.17ha, the number of sampling points at the site should be considered with respect to the table below.

Table 9: Summary of Sampling Strategy					
NUMBER OF SAMPLING POINTS					
	Soil	Water	Asbestos	Standpipes	Standpipe Readings
Exploratory Investigation 50m x 50m grid	3	-	3	3	A minimum of 4 readings over 1 month 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 10: 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:

- a) 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.
- b) 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.
- c) 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.
- d) Historical data can be used as part of the data set.
- e) Not all sites will require gas monitoring. However, this would need to be confirmed with demonstrable evidence.
- f) 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.
- g) 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:

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

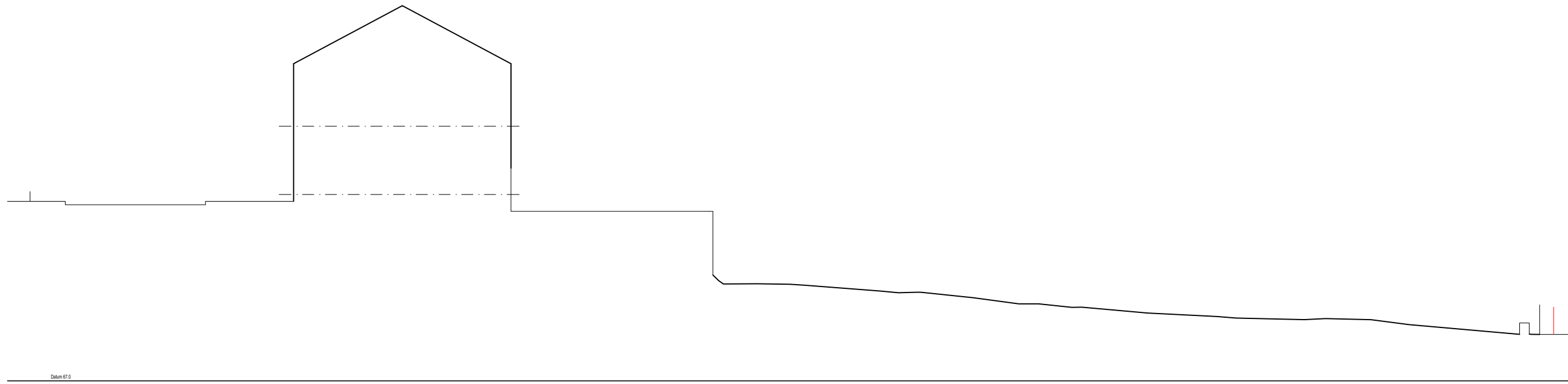
As soon as is practicable, and prior to the above, this Phase 1 report should be forwarded to the relevant authorities, in order to ensure they have sufficient time to review and discuss any issues.

5. References

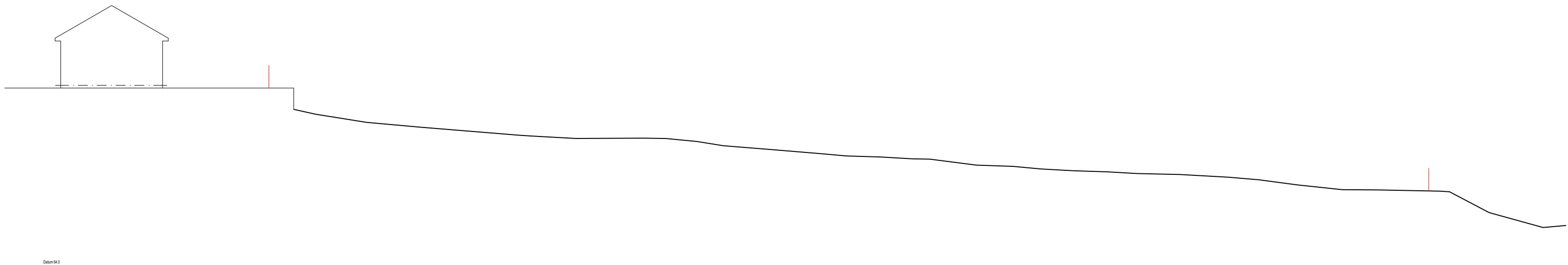
- British Standards Institution (2015), BS5930 2015 + A1:2020: *Code of practice for site investigations*, B.S.I., London.
- British Standards Institution (2007), Amendment No 1 to BS5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011) +A2:2017, BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- 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.

Appendix 1

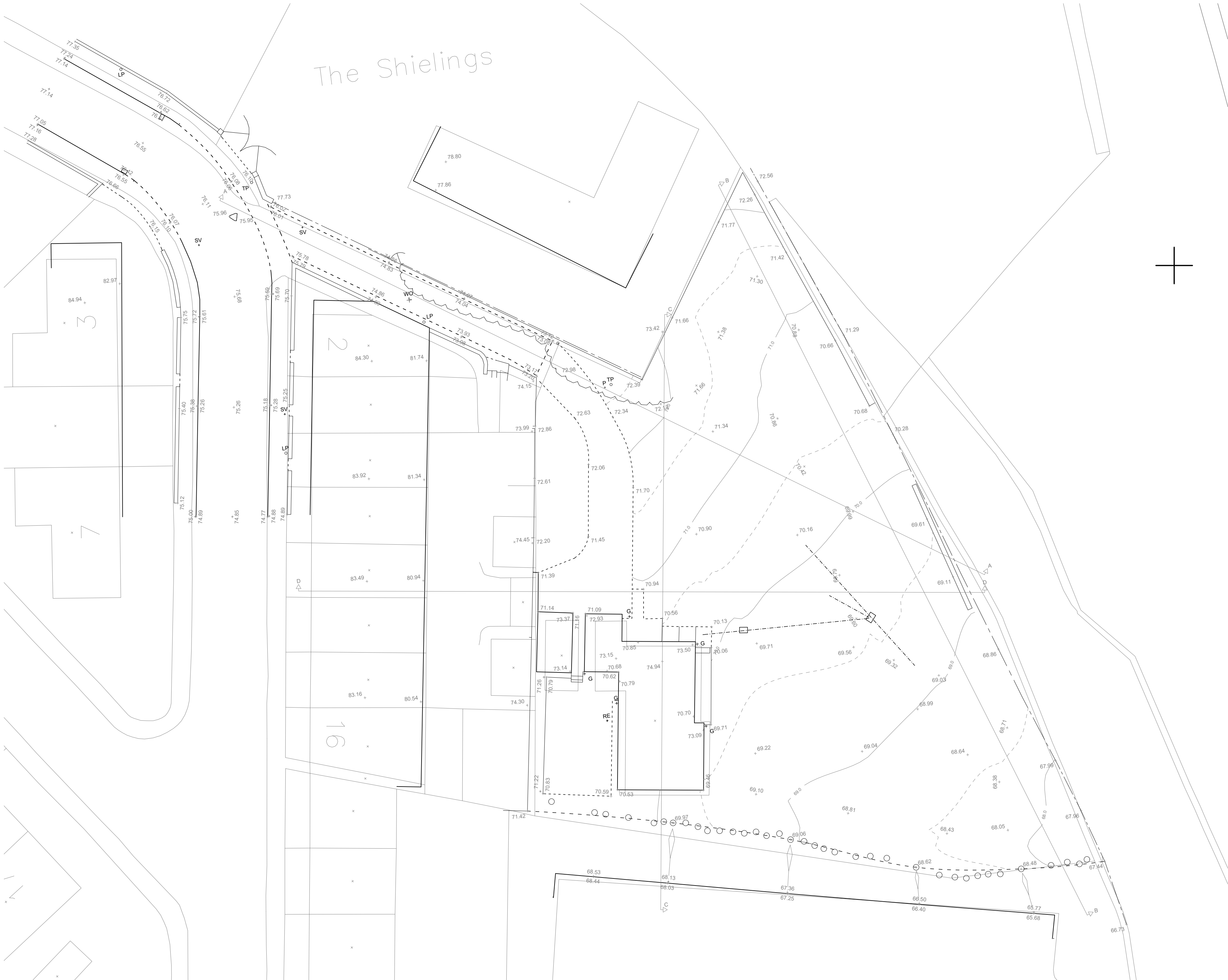
Site Plans



Existing Section D - D



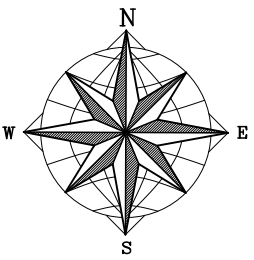
Existing Section B - B



EXISTING SITE PLAN 1:200



LOCATION PLAN 1:1250



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DK
ARCHITECTS

DK ARCHITECTS

t 01924 477212
m 07718 990668
e info@dkarchitects.net
w dkarchitects.net

DK Architects, Suite 4, Batley
Business Park, Technology Drive,
Batley, WF17 6ER

PROJECT: REPLACEMENT & NEW DWELLING	
ADDRESS: 2A EAST BATH STREET, BATLEY, WF17 5NP	
DRG: EXISTING SITE & LOCATION PLANS	
STATUS: PLANNING APPLICATION subject to approval	
DATE: 23.07.24 SCALE: 1:200,1250 SIZE: A1	DRAWN: AHD CHECKED: ANK DRG NO: 24.2756.01A
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THE CLIENT & THE CONTRACTOR IS REMANDED OF THE PARTY WALL ACT 1996 AND TO APPOINT / OBTAIN SEPARATE LEGAL ADVICE FROM A PARTY WALL SURVEYOR TO ENSURE COMPLIANCE WITH THE LAW. NOTICES MAY REQUIRE SERVING ON THE ADJACENT OWNERS/S PRIOR TO COMMENCEMENT. ENSURE NEIGHBOURS CONSENT IS OBTAINED WHERE WORKS ARE CARRIED OUT TO PARTY WALLS, PARTY FENCE WALLS, EXCAVATIONS ETC. APPOINTED PARTY WALL SURVEYOR TO FULLY ADVISE.