



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

**Phase 1 Land Contamination
Risk Assessment
for
The Proposed Demolition and
Rebuilding of a Dwelling including
Basement and Ground Floor
Extension to Rear and Single-Storey
Extension to Front
on the site of
No.39 Bradshaw Road, Walshaw,
Tottington, Bury BL8 3PW**

Date: September 2024

Status:

Final Report

Reference:

3788D P1 MK Projects - Bury

Date:

04/09/2024

EXECUTIVE SUMMARY

The site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site and no soft-landscaping is present nor proposed. As such the risks from soil contamination are considered to be low. No significant potential sources of hazardous vapour generation have been identified with the site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site with such contaminants; however, potentially highly permeable bedrock geology below site (the Milnrow Sandstone Member, a subunit of the Pennine Lower Coal Measures) and the presence of an old coal shaft approximately 63m north west of site indicates there may be deep coal workings below site. As such, should these workings be producing gas or that, in the future, groundwater levels change and that highly permeable bedrock geology may be in contact with coal mining geology or coal mining workings / fracture pathways, there exists a limited risk from ground gas hazards to site.

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a **LOW** level of risk with respect to soil contamination and a **LOW to MODERATE** level of risk with respect to ground gas hazards.

It is recommended that remediation in-line with section 16.0 is planned and carried out on site as a matter of prudence due to the limited potential for ground gas hazards.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be written.

At this stage, based on the desk study information collected, it is considered that allowance be made for the following:

- Upgrading the required cellar tanking measures with ground gas protection measures suitable to protect against carbon dioxide / methane
- Allowance for specific remediation or point testing, should the Watching Brief (inline with the below) indicate the need for such.

A watching brief (as outlined in Appendix E) should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

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1.0 QUALITY ASSURANCE

Castledine Environmental confirm that all reasonable efforts have been made to ensure that the information outlined within this report is accurate.

Castledine Environmental would further confirm that due care, attention and technical skill were used in the creation of this report.

2.0 LIMITATIONS

The conclusions and recommendations made in this report are limited to those based on the findings of the investigation. Where comments are made based on information obtained from third parties, Castledine Environmental assumes that all third-party information is true and correct. No independent action has been undertaken to validate the findings of third parties. The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at the time.

This survey has not included asbestos within existing structures, invasive plant species, geotechnical considerations or any elements unconnected with potential ground contamination at the site. If required, such surveys should be undertaken by suitably accredited organisations.

There may be other conditions prevailing at the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

3.0 INTRODUCTION AND SITE PROPOSALS

Castledine Environmental have been appointed by Mr. M. Kenyon of MK Projects to undertake a Phase 1 Desk study on a site at No.39 Bradshaw Road, Walshaw, Tottington, Bury BL8 3PW.

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Mr. M. Kenyon of MK Projects and associated appointees for the purpose of ensuring compliance with:

- National Planning Policy Framework (NPPF) December 2023.
- Part C1 of the building regulations.
- Condition No.3 (preliminary risk assessment) of the Bury Metropolitan Borough Council planning approval reference No.69766

This report may not be used or relied upon by any unauthorised third party, or for any other proposed use than that specified above, without the explicit written agreement of Castledine Environmental.

This report is to be regarded as a Preliminary Risk Assessment in accordance with the Environment Agency's Land Contamination Risk Management (LCRM – 2021), which replaces *CLR11 "Model Procedures for the Management of Land Contamination"*, carried out in accordance with BS 10175:2011+A2:2017, "*Investigation of Potentially Contaminated Land - Code of Practice*" and relevant sections of BS5930:2015+A1:2020, "*Code of Practice for Ground Investigations*".

The objectives of the report are:-

- To assess historical activities at the site with respect to their potential impact on the site environment;
- To assess historical and current surrounding land use in relation to known or potential off-site contamination issues that may impact on the subject site;

- Review of geological, hydrological and hydrological conditions at the site, pertaining to land contamination issues;
- To characterise the environmental setting of the site, identify migration pathways and vulnerable receptors for contamination originating at the site, focusing on potential soil and groundwater liabilities; and
- To develop a preliminary conceptual site model (CSM).

This report has been produced in order to discharge any relevant planning conditions outlined by the Local Authority and Environment Agency; however, further requirements may be imposed after the findings of this report that may need to be addressed at a later date.

5.0 SITE DESCRIPTION

The site is located in Bury at National Grid Reference: 376439,412339 and is approximately 0.01ha in area.

The site is rectangular in shape and is orientated north east to south west. The site is located in a predominantly rural area and is directly bounded by Bradshaw Road to the north east, neighbouring and adjoining terraced dwellings to the south east north west and open field to the south west, with further open fields in all compass directions beyond neighbouring buildings.

The site itself comprises a small, two-storey dwelling with a cellar and a small, rear garden area occupied by hardstanding and a summerhouse. The main ground-floor rooms and the second-floor rooms were discounted from the site walkover, due to remaining in a residential usage (and as such, not photographed); however, they comprised a living-room kitchenette on the ground-floor and bedrooms on the first-floor. The rear ground floor room (south western extent of the dwelling), was seen to be under construction work with the flooring removed, exposing the underlying cellar. A gangway was present across the cellar, providing access to the rear garden. Access to the cellar was unavailable at the time of the walkover; however, from what could be seen the walling appeared

of old-building stone construction with slabbed paving at the base. The cellar was seen to be occupied by various construction materials, storage boxes and other, domestic items held in storage.

The rear garden area was seen to be terraced and wholly occupied by hardstanding (again, slabbed sandstone / millstone grit paving) with the only areas of exposed soil being small planting beds. A small summerhouse was also noted in the rear garden.

No significant potential sources of contamination were noted on the site walkover and topographically, the site exists on several levels – with the front of site (north east) being above the level of the rear garden (the south west) with the surrounding landform largely dropping off to the south, south east and east.

Photos of the site are present in Appendix D.

6.0 REGULATORY AUTHORITY AND OTHER ENVIRONMENTAL DATA

An environmental search listing historical and environmental factors likely to affect the property has been reviewed.

The most pertinent information is summarised in the following sections.

A copy is presented in Appendix A.

Additional geological and hydrological data was obtained from the British Geological Survey.

6.1 HYDROLOGICAL**6.1.1 AQUIFER****6.1.1.1 SUPERFICIAL GEOLOGY**

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary (Undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general, these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.1.1.2 BEDROCK GEOLOGY

ID	Distance (m)	Direction	Designation	Description
1	0	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

6.1.2 ABSTRACTIONS AND PRIVATE WATER SUPPLIES

The Groundsure report records no active abstraction sites located within 1000m of site.

6.1.3 SOURCE PROTECTION ZONE

Site is not in a source protection zone (SPZ).

6.1.4 GROUNDWATER VULNERABILITY AND SOIL LEACHING POTENTIAL

An assessment of the vulnerability of groundwater to a pollutant discharged at ground level based on the hydrological, geological,

hydrogeological and soil properties within a one-kilometre square grid.

Groundwater vulnerability is described as High, Medium or Low as follows:

- High - Areas able to easily transmit pollution to groundwater. They are likely to be characterised by high leaching soils and the absence of low permeability superficial deposits.
- Medium - Intermediate between high and low vulnerability.
- Low - Areas that provide the greatest protection from pollution. They are likely to be characterised by low leaching soils and/or the presence of superficial deposits characterised by a low permeability.

ID	Location	Summary	Soil / Surface	Superficial Geology	Bedrock Geology
1	On site	Summary Classification: Secondary superficial aquifer - High Vulnerability Combined classification: Productive Bedrock Aquifer, Productive Superficial Aquifer	Leaching class: High Infiltration value: >70% Dilution value: >550mm/year	Vulnerability: High Aquifer type: Secondary Thickness: <3m Patchiness value: <90% Recharge potential: No Data	Vulnerability: High Aquifer type: Secondary Flow mechanism: Well connected fractures

6.1.5 POTENTIAL SURFACE WATER

The Groundsure report records the Walshaw Brook at surface level located 3m south and 40m, 60m, 70m, 101m, 159m and 167m south east of site with an unnamed, surface level watercourse located 234m and 249m north east of site.

6.1.6 FLOOD RISK

According to both the Groundsure report and Environment Agency interactive online maps, the site is recorded to be at a low risk of flooding from the River and Seas (RoFRaS) and a negligible risk from surface water flooding on site.

6.1.7 DISCHARGE CONSENTS

None recorded within 500m of site.

6.2 PERMITTED PROCESSES

None recorded within 500m of site.

6.3 POLLUTION INCIDENTS

The Groundsure report records no pollution incidents located within 250m of site and no significant impact incidents located within 500m of site.

6.4 RADIOACTIVE SUBSTANCES REGISTRATIONS

None recorded within 500m of site.

6.5 WASTE**6.5.1 LICENSED WASTE MANAGEMENT FACILITIES (LOCATIONS)**

None recorded within 500m of site.

6.5.2 LANDFILL SITES

None recorded within 500m of site.

6.6 HAZARDOUS SUBSTANCES

None recorded within 500m of site.

6.7 ECOLOGICAL RECEPTORS

The Groundsure report records the site as being located within the Merseyside and Greater Manchester Greenbelt, with a further greenbelt record located 406m west and operated by Bolton Local Authority.

No further sensitive land usages are recorded within 1000m of site.

6.8 SOILS AND GEOLOGY

"Contains British Geological Survey materials © NERC 2024" obtained from <http://www.bgs.ac.uk/data/mapViewers/home.html> under the [Open Government Licence](#)

6.8.1 SUPERFICIAL DEPOSITS

Both BGS geological mapping and the Groundsure report record superficial geological deposits of Glacial Till on site, comprising of a mixture of clay, sand, gravel, and boulders varying widely in size and shape (diamicton).

6.8.2 SUPERFICIAL DEPOSITS PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of superficial deposits is recorded as 'high' and the minimum permeability as 'low' and facilitated by mixed flow mechanisms.

This is a qualitative classification of estimated rates of vertical movement of water from the ground surface through the unsaturated zone of any superficial deposits (the zone between the land surface and the water table).

6.8.3 BEDROCK DEPOSITS

Both BGS geological mapping and the Groundsure report records bedrock geology of the Milnrow Sandstone (a subunit of the Pennine Lower Coal Measures – interbedded mudstone, siltstone and sandstones with coal seams) underlying site, comprising a blocky sandstone.

6.8.4 BEDROCK PERMEABILITY

The Groundsure report records the site as being within an area where the maximum permeability of bedrock geology is recorded as 'high' and the minimum permeability as 'moderate' and facilitated by fracture flow mechanisms.

6.8.5 ARTIFICIAL GROUND

BGS geological mapping records no artificial deposits located on or within 250m of site with the nearest record being an area of worked ground described as a 'void' located 357m south east of site.

6.8.6 COAL MINING

The site is located in a coal mining reporting area. According to National Coal Authority interactive mapping the site is not located within a development high risk area nor an area of known or probable shallow coal workings nor in an area of surface mining (past or current). Areas of development high risk correlating with known shallow coal workings are located approximately 201m east and correlating with probable shallow coal workings and outcrops are located approximately 108m north of site, with mine entrances mapped approximately 63-37m north west, 131m east and 140m south east of site.

6.8.7 NON-COAL MINING

The Groundsure report records no non-coal mining operations located within 500m of site.

6.8.8 SURFACE WORKINGS

ID	Distance (m)	Direction	Land Usage	Year of Mapping
A	13	S	Unspecified heap	1956
A	19	S	Unspecified pit	1938
A	19	S	Unspecified pit	1928
A	19	S	Unspecified pit	1909
A	19	S	Unspecified pit	1891

6.8.9 UNDERGROUND WORKINGS

ID	Distance (m)	Direction	Land Usage	Year of Mapping
B	63	NW	Old coal shaft	1909
B	63	NW	Unspecified old shaft	1938
B	63	NW	Unspecified old shaft	1891

ID	Distance (m)	Direction	Land Usage	Year of Mapping
B	64	NW	Unspecified old shaft	1956
B	66	NW	Unspecified old shaft	1928
B	67	NW	Unspecified disused shaft	1980
B	67	NW	Unspecified disused shaft	1969
B	67	NW	Unspecified disused shaft	1974

6.8.10 RADON

The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are necessary as described in publication BR211:2015 by the Building Research Establishment.

6.9 AERIAL PHOTOGRAPHY

Aerial photography shows the following:

6.9.1 GOOGLE EARTH

14 No. images are held in the historic imagery dataset, as follows:

Date	Description
December 2000	The site is shown as occupied by the terraced dwelling and a small, rear garden area.
April 2003	Imagery is indistinct; however, there appears no discernible change on site nor site relevant change to the surrounding areas.
December 2005	No discernible change on site nor site relevant change to the surrounding areas.
April 2013	No discernible change on site nor site relevant change to the surrounding areas.
March 2017	No discernible change on site nor site relevant change to the surrounding areas.
March 2018	No discernible change on site nor site relevant change to the surrounding areas.

Date	Description
April 2018	No discernible change on site nor site relevant change to the surrounding areas.
May 2019	No discernible change on site nor site relevant change to the surrounding areas.
April 2020	No discernible change on site nor site relevant change to the surrounding areas.
April 2021	The rear garden is now occupied by the summerhouse seen on the site walkover.
January 2022	No discernible change on site nor site relevant change to the surrounding areas.
April 2022	No discernible change on site nor site relevant change to the surrounding areas.
July 2022	No discernible change on site nor site relevant change to the surrounding areas.
April 2023	No discernible change on site nor site relevant change to the surrounding areas.

6.9.2 GOOGLE STREET VIEW

Google Street View imagery is dated circa.2008, 2009, 2018, 2022 and 2023 with the site viewed off Bradshaw Road and facing south west.

Imagery between circa.2008 and 2023 shows the site as remaining occupied by the dwelling seen on the site walkover, with no major changes are noted from historical imagery between these dates. The rear of site cannot be viewed from the roadside.

6.10 HISTORIC MAPPING

The following historic maps have been reviewed as part of this assessment:

Map	Onsite	Offsite
OS County Series: 1850, 1:10,560	Imagery is small-scale; however, the site appears occupied by terraced housing or a linear structure.	The immediate surroundings to site comprise similar features as in the present-day, i.e. bounding and adjoining buildings directly SE and NW, open field in remaining compass directions and roadsides / nearby junction in the same orientated and layout as that in the present-day. Notable features include an unspecified pit directly south of site, an old shaft approx.63m NW, ponds approx.100m east and 250m NE and an old coal pit approx.256m east of site.
OS County Series: 1890, 1:2,500	Markings on mapping indicate the onsite structure and those adjoining to be in use for the 'Dog & Partridge Inn' Public House (as does client supplied information). Higher resolution imagery shows outbuildings / sheds in the far SW extent of site.	Surrounding areas see little site relevant change.
OS County Series: 1890-1891, 1:10,560	No discernible change on site.	Coal pit formerly located east of site no longer marked on mapping.
OS County Series: 1908-1909, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
OS County Series: 1910, 1:2,500	No discernible change on site.	One of the two ponds located approx.250m NE of site is now shown as marshy / silted up.
OS County Series: 1927-1928, 1:10,560	No discernible change on site.	Pond approx.100m east of site no longer marked on mapping – replaced with outbuildings / barn.
OS County Series: 1930, 1:2,500	No discernible change on site.	Surrounding areas see little site relevant change.

Map	Onsite	Offsite
OS County Series: 1937, 1:2,500	The site is no longer marked as a public house.	Surrounding areas see little site relevant change.
OS County Series: 1938, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
Provisional: 1956, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1967, 1:2,500	No discernible change on site.	Pond now once again located approx.100m east of site (persistent until present-day).
Provisional: 1969, 1:10,560	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1974, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1980, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 1992, 1:2,500	No discernible change on site.	Pond approx.100m east of site removed once again.
National Grid: 2001, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
Landline: 2003, 1:1,250	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2010, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.
National Grid: 2024, 1:10,000	No discernible change on site.	Surrounding areas see little site relevant change.

6.11 CURRENT LAND USE DATA

ID	Distance (m)	Direction	Company	Activity	Category
1	76	NW	Shaft (disused)	Unspecified mines or quarries	Extractive industries
A	204	S	Mast (telecoms)	telecoms features	Infrastructure and facilities
A	208	S	Pylon	Electrical features	Infrastructure and facilities
A	235	S	Pylon	Electrical features	Infrastructure and facilities

6.12 PETROL AND FUEL SITES

None recorded within 500m of site.

6.13 HISTORICAL PETROL AND FUEL SITE DATABASE

None recorded within 500m of site.

6.14 POTENTIAL CONTAMINATIVE LAND USES IDENTIFIED ON MAPPING

ID	Distance (m)	Direction	Use	Date
A	13	S	Unspecified heap	1956
A	19	S	Unspecified pit	1891-1938
B	63	NW	Old coal shaft	1909
B	63	NW	Unspecified old shaft	1938
B	633	NW	Unspecified old shaft	1891
B	64	NW	Unspecified old shaft	1956
B	66	NW	Unspecified old shaft	1928
B	67	NW	Unspecified disused shaft	1969-1980
1	256	E	Coal pit	1850
D	304	NW	Unspecified pit	1956
D	306	NW	Unspecified ground workings	1891
D	306	NW	Unspecified pit	1938
D	307	NW	Unspecified pit	1928
E	359	NE	Unspecified tank	1956
E	364	NE	Unspecified tank	1938
E	374	NE	Unspecified tank	1909-1928
3	390	E	Unspecified pit	1956
6	432	N	Unspecified ground workings	1890
G	477	N	Unspecified pit	1938
7	478	SW	Unspecified pit	1891-1938
8	481	NW	Old smithy	1891-1909
G	482	N	Unspecified pit	1928
G	483	N	Unspecified pit	1956
G	484	N	Unspecified pit	1891

6.15 HISTORICAL TANK DATABASE

ID	Distance (m)	Direction	Use	Date
C	207	SW	Unspecified tank	1967
C	208	SW	Unspecified tank	1967
2	279	NW	Unspecified tank	1992
E	351	NE	Unspecified tank	1910-1937
F	374	E	Unspecified tank	1937
F	381	E	Unspecified tank	1930
4	409	NW	Unspecified tank	1967-1992
5	419	W	Unspecified tank	1967-1992

6.16 HISTORICAL ENERGY FACILITIES

None recorded within 500m of site.

6.17 HISTORICAL GARAGE DATABASE

None recorded within 500m of site.

7.0 PRELIMINARY CONCEPTUAL SITE MODEL

The risk posed by any contaminants in soil or groundwater will depend on the nature of the hazard, the probability of exposure, the pathway by which exposure occurs, and the likely effects on the receptors. A contaminant is defined as a substance in, on or under land (or within groundwaters) that has the potential to cause harm, while a risk 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. The following sections discuss all the identified potential on and off-site sources, pathways and receptors in the context of the proposed development and plausible pollutant linkages which may represent a risk to identified receptors from the data gained from the desk study. At this stage the assessment is qualitative and aimed to determine all pollutant linkages, irrespective of significance or allowing for uncertainty.

Source	A contaminant or pollutant that is in, on or under land that has the potential for cause harm or pollution to a receptor.
Pathway	The physical route by which a receptor is or could be affected by a contaminant or pollutant.
Receptor	Something or someone that could be adversely affected by a contaminant, i.e. people, controlled waters, ecological systems, buildings, crops, livestock.

By considering each of the three elements above, an assessment of actual and potential hazards to receptors can be carried out, taking into account the significance and degree of risk of each. The three elements above can exist separately; however, they only create a risk where they are linked together, thus creating a contaminant linkage. During the Preliminary Risk

Assessment Stage, the linkages are referred to as 'Potential Contaminant Linkages', until they are confirmed via intrusive sampling, thus becoming 'Relevant Contaminant Linkages'.

A tabled, diagrammatic or matrix of pollutant linkages is considered to be a Conceptual Site Model (CSM), the source-pathway-receptor linkages are reviewed and displayed, apportioning a risk-rating and mitigation suggestion after each summary.

Three impact potentials exist for any given site, these are:

- The site impacting upon itself;
- The site impacting on its surroundings; and
- The surroundings impacting on the site.

All three impacts need to be considered in a risk assessment.

7.1 SOURCES

The following potential sources of contamination have been identified:

7.1.1 ONSITE

- Bedrock geology of the Milnrow Sandstone Formation - a subunit of the Pennine Lower Coal Measures).

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Bedrock geology of the Milnrow Sandstone Formation - a subunit of the Pennine Lower Coal Measures).	Ground gases (CO ₂ , CH ₄ , CO)

7.1.2 OFFSITE

- Old coal shaft (approx.63m NW – indicates deep coal workings)
- Old coal pit (approx.256m east, likely infilled by circa.1890/91)

Potential Sources and Associated Contaminants Identified	
Source	Potential Contaminants of Concern
Old coal shaft (approx.63m NW – indicates deep coal workings)	Ground gases (CO ₂ , CH ₄ , CO), Leachate (heavy metals)
Old coal pit (approx.256m east, likely infilled by circa.1890/91)	Ground gases (CO ₂ , CH ₄ , CO), Leachate (heavy metals)

7.2 PATHWAYS

A pathway is defined as a mechanism or route by which a contaminant comes into contact with, or otherwise affects a receptor. Pathways by which the identified receptors may be impacted upon in the context of the proposed development are identified as follows:

- Ingestion (direct and indirect via crop uptake);
- Dermal contact;
- Inhalation;
- Plant uptake;
- Direct contact by buried structures (i.e. pipe degradation and leaching, pH & Sulphate attack on concrete); and
- Leaching of soluble contamination into groundwater.

7.3 RECEPTORS

Receptors are defined as people, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by contaminant(s).

- Human Health;
 - Current users of the site;
 - Future users of the site;
 - Users of neighbouring sites;
 - Construction workers;
 - Services personnel working in trenches;
 - Construction Materials;

- Buried concrete, which may be affected by high concentrations of sulphate and/or low pH, in the soils and groundwater underlying the site;
- Buried water pipes;
- Controlled Waters;
- Ecological Receptors; and
- Flora and fauna using the proposed development.

8.0 CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) is a hypothesis of the nature and sources of contamination, potential receptors that may be the recipient of contamination arising from those sources and any pathways that may exist. It creates a plausible source-pathway-receptor pollutant linkage (hazard), set within the context of the ground and proposed end use of the site.

8.1 PRELIMINARY CONCEPTUAL SITE MODEL

8.1.1 SOIL CONTAMINATION

The site is currently occupied by a dwelling which has been present on site since the earliest mapping dated circa.1850; however, the site was known to be within a larger pub structure (the Dog & Partridge Inn) from at least 1890 through until potentially 1937, following which the site has remained in residential usage.

The site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site and no soft-landscaping is present nor currently proposed, as such, the risks from soil contamination are considered to be low.

8.1.2 GROUND GAS AND HAZARDOUS VAPOURS

No significant potential sources of hazardous vapour generation have been identified with the site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site with such contaminants; however, potentially highly permeable bedrock geology

below site (the Milnrow Sandstone Member, a subunit of the Pennine Lower Coal Measures) and the presence of an old coal shaft approximately 63m north west of site indicates there may be deep coal workings below site. As such, should these workings be producing gas or that, in the future, groundwater levels change and that highly permeable bedrock geology may be in contact with coal mining geology or coal mining workings / fracture pathways, there exists a limited risk from ground gas hazards to site.

TABLE 1. SUMMARY OF SIGNIFICANT POLLUTION LINKAGES

Contaminant	Pathway	Receptor	Probability of Pollutant Linkage	Conseq.	Risk	Possible Mitigation
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Direct Ingestion & Direct Contact	Site Workers (during site works, excavations, eating and drinking)	UI	Md	L	Site workers to wear appropriate PPE for health and safety reasons, suitable usage of PPE and adherence to relevant HSE guidance during site works considered sufficient to mitigate hazards to LOW.
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Inhalation of Dust, Dry Arisings	Site Workers (during site works, excavations, eating and drinking)	UI	Md	L	
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Crop Uptake & Direct Ingestion, Direct Contact	End Users (residents / tenants, children, visitors, service personnel)	UI	Md	L	The site is currently occupied by a dwelling which has been present on site since the earliest mapping dated circa.1850; however, the site was known to be within a larger pub structure (the Dog & Partridge Inn) from at least 1890 through until potentially 1937, following which the site has remained in residential usage. The site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site and no soft-landscaping is present nor proposed, as such, the risks from soil contamination are considered to be low. Hazards from asbestos not considered present due to pre-asbestos usage age of construction (at least prior to circa.1850).
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Inhalation of Dust, Dry Arisings	End Users (residents / tenants, children, visitors, service personnel)	UI	Md	L	
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Crop Uptake & Direct Ingestion, Direct Contact	Flora and Fauna (on and offsite)	UI	Md	L	
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Vertical and lateral migration (both superficial and bedrock geologies potentially highly permeable)	Controlled Waters (Secondary Undifferentiated & Secondary A Aquifers)	UI	Md	L	
Contaminated Soils (no significant potential sources of soil contamination identified and no soft-landscaping present nor proposed on site)	Direct contact (pipe degradation and leaching)	Services (impacted new potable supply piping)	UI	Md	L	
Ground Gases (Methane and CO ₂) (coal mining geology and old coal shaft)	Vertical and lateral migration (both superficial and bedrock geologies potentially highly permeable)	Site Workers & Excavations, End Users & Building Envelope (ingress and build-up)	UI	Sv	M/L	Underlying bedrock geology (potentially in contact with coal mining geology or deep workings) and nearby old coal shaft are considered potential sources of ground gas and indicative of deeper coal workings, respectively. As a matter of prudence, it is recommended that the tanking already required within the basement works be upgraded to ground gas resistant measures.
Volatile and Semi-volatile Organic Compounds (no significant potential sources of hazardous vapours identified)	Vertical and lateral migration (both superficial and bedrock geologies potentially highly permeable)	Site Workers & Excavations, End Users & Building Envelope (ingress and build-up)	UI	Md	L	No significant sources of potential hazardous vapours identified and as such, the risks from such contamination are considered to be low.
Radon	Vertical and lateral migration	End Users & Building Envelope	UI	Md	L	Site is not located in a Radon Affected Area.

KEY: Probability of pollutant linkage Hi = Highly likely, Li = Likely, Lw = Low Likelihood, UI = Unlikely
Consequence Sv = Severe, Md = Medium, Mi = Mild, Mr = Minor,
Overall Risk VH = Very High, H = High, M = Moderate, M/L = Moderate/Low, L = Low, VL = Very Low

Based on the preliminary CSM for the site, an environmental risk assessment has been undertaken. A simple matrix can provide a consistent basis for decision making. It should be used with caution, recognising the over-simplification that it will normally represent. The probability and consequences are defined according to parameters relevant to the situation; the boundaries of risk acceptability (and tolerability, where relevant) indicated on the matrix provided in Table 2, can be tailored to the factors influencing the significance of the risk. Individual situations are mapped onto the matrix to provide a ready and consistent indication of their acceptability or tolerability.

TABLE 2. RISK CLASSIFICATION MATRIX

		Consequence			
		Severe (Sv)	Medium (Md)	Mild (Mi)	Minor (Mr)
Probability	High (Hi)	Very high risk	High risk	Moderate Risk	Moderate/Low Risk
	Likely (Li)	High risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low Likelihood (Lw)	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely (UI)	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

These attributes are evaluated qualitatively against individual hazard assessments to determine the likelihood of a given hazard occurring. The risk evaluations for each plausible pollutant linkage are given in the last three columns of Table 1.

TABLE 3. CLASSIFICATION OF RISK

Very high risk (Vh)	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk (Hi)	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short-term and are likely over the longer term.
Moderate risk (Md)	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer-term.
Low risk (Lw)	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk (VI)	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

Source: CIRIA Report C552, Contaminated Land Risk Assessment. A Guide to Good Practice, 2001

9.0 ENVIRONMENTAL RISK ASSESSMENT

Based on the information contained in this report, it is the opinion of Castledine Environmental that the site represents a LOW level of risk with respect to soil contamination and a **LOW** to **MODERATE** level of risk with respect to potential ground gas hazards.

It is recommended that remediation in-line with section 16.0 is planned and carried out on site as a matter of prudence due to the limited potential for ground gas hazards.

This report should be submitted to your Local Planning Authority for agreement to allow the Phase 3 Remediation Strategy and Verification Plan to be written.

10.0 SUMMARY OF RISKS**11.0 HUMAN HEALTH****11.1.1 RESIDENTS / END-USERS**

The risks to end-users of the site are considered to be low in regards to soil contamination, due to the lack of significant contamination expected on site (residential usage unlikely to have introduced significant contamination nor mobile contamination) and the lack of present nor proposed soft-landscaping. The risks to end-users of the site in regards to ground gas hazards are considered to be low to moderate, due to the underlying coal mining associated geology and the potential for deeper coal workings (evidenced by a nearby 'old' coal shaft).

11.1.2 SITE WORKERS

The risks to site workers during site works are considered to be low, with provision of suitable PPE usage during site works and adherence to relevant HSE guidance. No significant or mobile physical contamination is expected on site and asbestos has been negated as a potential hazard due to the age of the structure (at least pre-1850).

12.0 CONTROLLED WATERS

The risks to controlled waters are considered to be low, due to lack of significant and mobile contamination expected on site, residual superficial deposits protecting the deeper Secondary A Aquifer and the lack of active abstraction sites or an SPZ within 1000m of site. structures

12.1.1 GROUND GASES

No significant potential sources of hazardous vapour generation have been identified with the site's historical usage as a pub and a subsequent dwelling is not considered to have significantly impacted site with such contaminants; however, potentially highly permeable bedrock geology below site (the Milnrow Sandstone Member, a subunit of the Pennine Lower Coal Measures) and the presence of an old coal shaft approximately 63m north west of site indicates there may be deep coal workings below site.

As such, should these workings be producing gas or that, in the future, groundwater levels change and that highly permeable bedrock geology may be in contact with coal mining geology or coal mining workings / fracture pathways, there exists a limited risk from ground gas hazards to site.

12.1.2 POTABLE WATER SUPPLY PIPING

No significant contamination considered capable of impacting new potable piping is expected on site and as such, the risks is considered to be low.

13.0 RECOMMENDATIONS

At this stage, based on the desk study information collected, it is considered that allowance be made for the following:

- Upgrading the required cellar tanking measures with ground gas protection measures suitable to protect against carbon dioxide / methane
- Allowance for specific remediation or point testing, should the Watching Brief (inline with the below) indicate the need for such.

A watching brief (as outlined in Appendix E) should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

14.0 REFERENCES**14.1 LEGISLATION AND REGULATIONS****14.1.1 ACTS**

- [1] Environmental Protection Act 1990, Part IIA: inserted by Environment Act 1995, Section 57. See Environment Act 1995 for text of Part IIA.

14.1.2 PLANNING REGULATIONS

- [2] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 SI1999/No.293
- [3] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2000 SI2000/No.2867
- [4] The Town and Country Planning (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017 SI2017/No.571

14.1.3 CONTAMINATED LAND REGULATIONS

- [5] The Contaminated Land (England) Regulations 2000. SI2000/No.227
- [6] The Contaminated Land (England) (Amendment) Regulations 2001 SI2001/No.663
- [7] The Contaminated Land (England) Regulations 2006 SI2006/No.1380

14.2 STATUTORY GUIDANCE

- [8] Department of Environment, Food and Rural Affairs. 2012. *Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*. Department of Environment, Food and Rural Affairs
- [9] Communities and local Government, 2023: National Planning Policy Framework.

14.3 BRITISH STANDARDS

- [10] BS 5930:2015+A1:2020 Code of practice for site investigations
- [11] BS 10175:2011+A2:2017 Investigation of potentially contaminated sites - Code of practice
- [12] BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- [13] BS 8576:2013 Guidance on investigations for ground gas. Permanent gases and Volatile Organic Compounds (VOCs)
- [14] BS 10176:2020 Taking Soil Sample for Determination of Volatile Organic Compounds (VOCs)

14.4 NON-STATUTORY TECHNICAL GUIDANCE**14.4.1 ENVIRONMENT AGENCY**

- [15] Land Contamination Risk Management (LCRM) 2020, updated 2023

14.4.2 CIRIA PUBLICATIONS

- [16] Wilson, S., Oliver, S., Mallett, H., Hutchings, H., and Card, G.. 2007, *C 665 Assessing risks posed by hazardous ground gases to buildings* London: Construction Industry Research and Information Association
- [17] Mallett, H., Cox, L., Wilson, S. and Corban, M... 2014, *C 735 Good practice on the testing and verification of protection systems for buildings against hazardous ground gases* London: Construction Industry Research and Information Association

14.4.3 CL:AIRE

- [18] Card G, Wilson S, Mortimer S. 2012. *A Pragmatic Approach to Ground Gas Risk Assessment. CL:AIRE Research Bulletin RB17.* CL:AIRE, London, UK. ISSN 2047- 6450 (Online)

15.0 APPENDICES

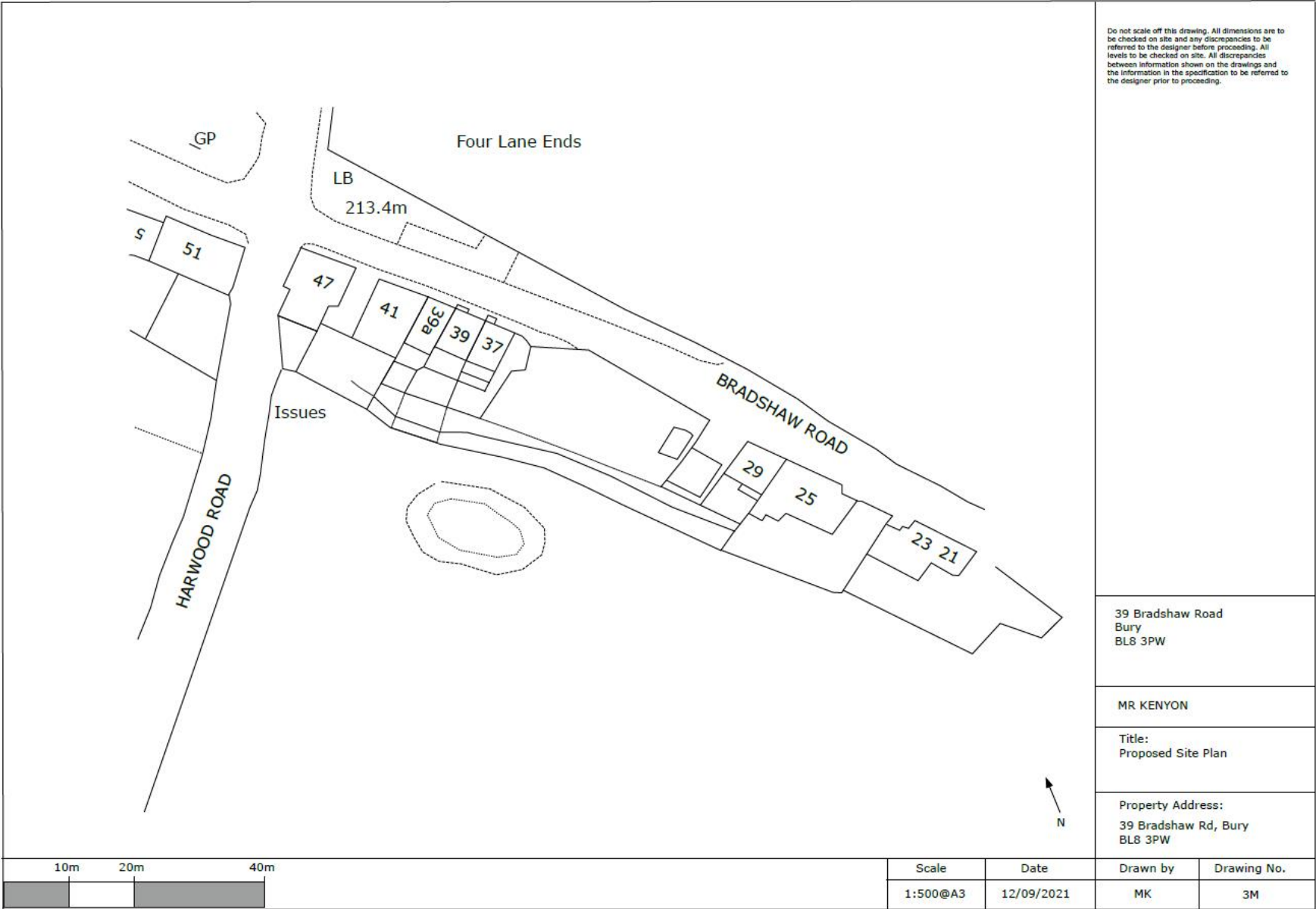
APPENDIX A ENVIRONMENTAL SEARCH

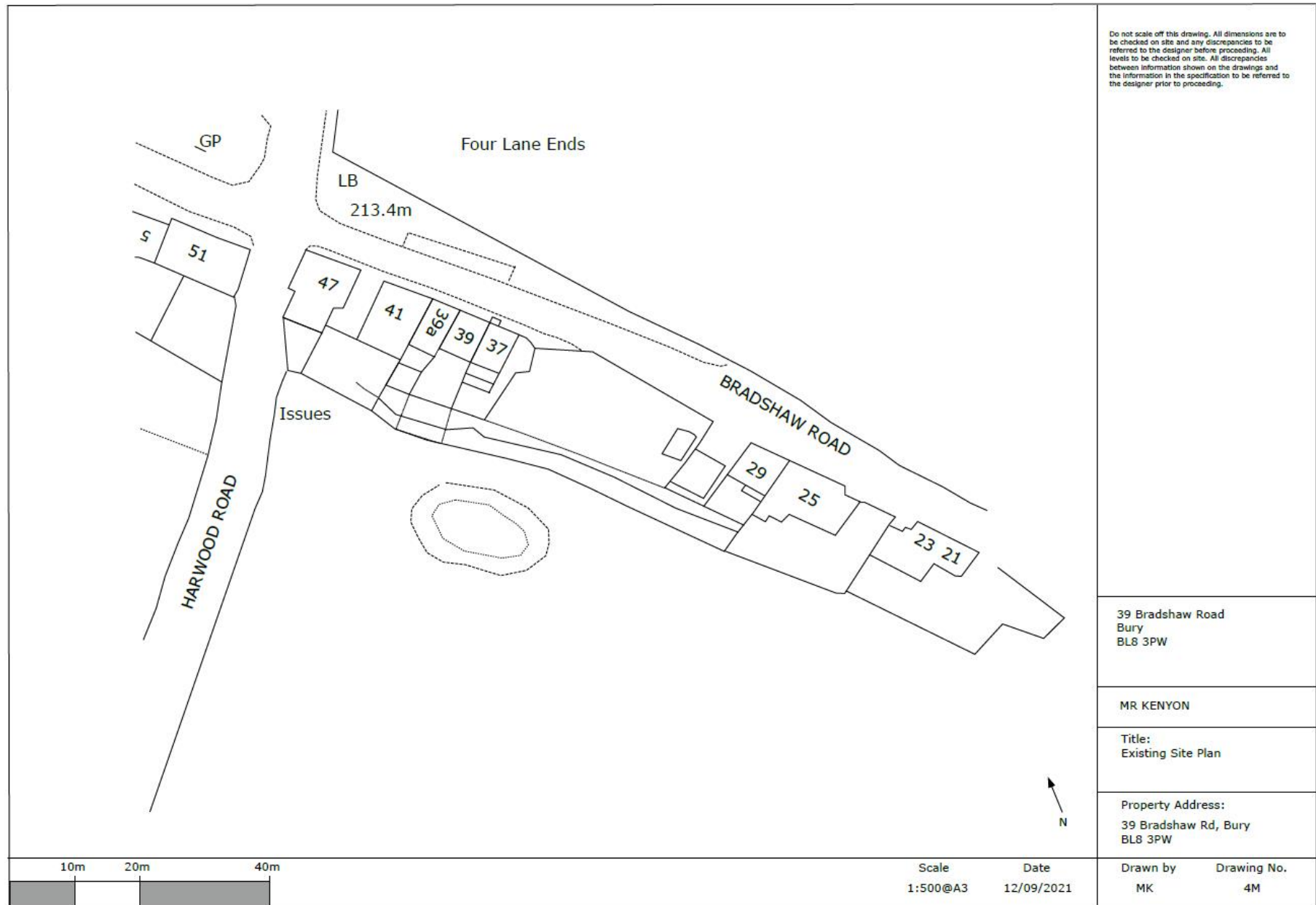
Separate Groundsure Report

APPENDIX B HISTORICAL MAPPING

Separate Map Packs (2 No. files)

APPENDIX C PROPOSED AND CURRENT SITE PLANS





APPENDIX D

SITE PHOTOS AND LOCATIONS



Site Walkover Photos

Photo No.1: Facing SW from the opposite side of Bradshaw Road showing the front (NE) face of the dwelling



Address: No.39 Bradshaw Road, Bury
Client: MK Projects Ltd

Photo No.2: Facing slightly NE showing the rear (SW) face of the dwelling from the garden area





Site Walkover Photos

Photo No.3: Facing slightly SW from the rear garden area showing the extent of the garden, hardstanding and summerhouse



**Address: No.39 Bradshaw Road, Bury
Client: MK Projects Ltd**

Photo No.4: Facing slightly SW showing extent of site





Site Walkover Photos

Photo No.5: Looking directly down from the ground-floor level to the underlying basement in the SW extent of the dwelling



Address: No.39 Bradshaw Road, Bury
Client: MK Projects Ltd

Photo No.6: Looking directly down from the ground-floor level to the underlying basement in the SW extent of the dwelling



APPENDIX E**WATCHING BRIEF**

It remains possible that previously unexpected soil conditions may be encountered during the construction process. Examples may include oily pockets within the soil, potential for asbestos containing materials, black ashy materials, soils exhibiting strong odours, brightly coloured materials, and former demolition materials.

Should previously undiscovered contamination be encountered during the demolition/construction of the new buildings the following course of action should be adhered to:

1. The ground workers should report any suspected contamination immediately to the Client's site supervisor. The supervisor should contact the Client or their appointed agent who will in turn contact Castledine Environmental to request an engineer to visit the site to assess the extent of the 'contamination'.
2. Castledine Environmental shall make records of their inspection, and pass details of these to the Local Authority.
3. Where the conditions revealed differ from those previously anticipated, the Castledine Environmental shall take samples as deemed appropriate to be dispatched for appropriate chemical testing.
4. Depending on the results of the testing either:
 - a. no further work will be required;
 - b. a further detailed risk assessment will be required; and/or
 - c. Localised specific remedial measures will be necessary.Appraisal criteria will vary depending on the nature of the assessment.
5. The results of any such testing will be sent to the Local Authority Pollution Control Section, Local Authority development control section, and the appointed building inspector. If remediation is required, the LA/Building inspector will be informed of the date and time of the proposed works.

6. Remediation will be undertaken in accordance with a method statement submitted for approval. The works shall be supervised where necessary by Castledine Environmental who shall provide a Verification Report for the Local Authorities.
7. A copy of the discovery strategy should be lodged on site and provisions made to ensure that all workers are made aware of their responsibility to observe, report and act on any potentially suspicious or contaminated materials they may encounter.

APPENDIX F

DISCOVERY STRATEGY

