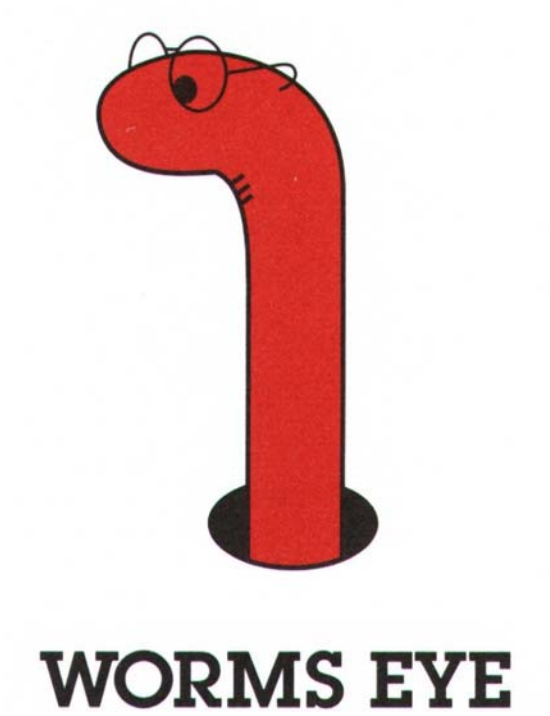
Electronic Report



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Our Ref: Abbey Gardens/BB7 4LE/2022
Date: 28 November 2022

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ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
PRELIMINARY RISK ASSESSMENT (DESK STUDY)

INTRODUCTION

A residential development is proposed. The objective is to carry out a Preliminary Risk Assessment to consider contamination, landfill gas and geotechnical issues.

SITE DESCRIPTION

The site is rectangular, 170 x 45m, located to the northeast of Sawley, in Sawley, Clitheroe, and at OS Grid Reference 377744, 446 175. Inspected on 19/11/22 by Mr D Lord, there at two derelict chicken sheds, one at the northwest (building 1) and one at the north middle (building 2), these have concrete floor slabs, concrete block dwarf walls and wood cladding above, with suspected asbestos containing material (ACM) in various places (sheet cement roof, rainwater pipes and cladding inside the building). There is building material, including probable ACM, on the ground around the buildings perimeter.

On the northeast of the site are two former chicken sheds (building 3 at the northeast corner, building 4 the southeast corner), both are collapsed with building 4 having previously suffered from a fire. This has left building material, including suspected ACM strewn across the northeast of the site.

There are concrete aprons between buildings 1 and 2, between buildings 2 and 3, and to the southwest of building 4. The remainder of the site is overgrown, unsurfaced, areas.

A heating oil tank is on a concrete apron at the rear of building 2, the original location is not known.

To the northwest, northeast and southeast are fields, to the southwest is vacant land with the road beyond and to the west is a house with gardens. A track forms the northwest boundary and a stream (Hollins Syke) flows southwest along the northwest side of the track/

The area slopes down to the southwest.

TREES

There are deciduous trees along the northeast, southeast and southwest boundaries, and along the northwest side of the track. This is not an accurate arboricultural survey.

PROPOSED DEVELOPMENT

It is proposed to build two detached houses, one at the northeast and one at the southwest, each with associated gardens.

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NOT INCLUDED IN THE REPORT

- Arboricultural or Invasive Plant Survey (Japanese Knotweed etc.).
- Asbestos Survey
- Mining Risk Assessment.
- Flood Risk Assessment.
- Underground Services Survey.

General comments may be made where they are applicable to the environmental and geotechnical risk assessment. These do not constitute a detailed risk assessment.

DATA SOURCES

The following data sources have been viewed in compiling this report.

- BGS, Geology Map, 1:50000 scale, Solid and Drift Edition
- BGS, on-shore boreholes scans
- Landmark Envirocheck Report, 17/11/22.
- Ordnance Survey, Historical Maps, 1:10000 and 1:2500 scale
- Walkover Survey, 19/11/22.

This report is referred to as a Preliminary Risk Assessment (PRA), alternative names are ‘Phase I’ Report (Phase II being the intrusive work involving boreholes etc.) or a Desk Study.

ENVIRONMENTAL DATA

A Landmark Envirocheck report and geological maps have been reviewed, the following is a summary of the combined data. The Envirocheck report indicated none of the following within 250 metres:

- Contaminated land register entries
- Substantiated pollution incidents
- Water abstraction points or source protection zones
- Landfill sites
- Hazardous substances sites, Trade, commercial, manufacturing or fuel stations listings.
- Sensitive land uses (other than Area of Outstanding Natural Beauty on site)

Geology of Site

The geological map indicates that the underlying solid rocks are the Chatburn Limestone Formation.

Surface drift is shown as River Terrace Deposits (sand and gravel). Natural subsidence hazards are shown as

Surface Water (Hydrology)

Hollins Syke flows southwest, 5m to the northwest, flowing to the River Ribble 100m southwest.

The nearest discharge consents are 153m west, sewage discharges/storm and emergency overflow, to a tributary of the River Ribble*

There are the following pollution incidents to surface water listed within 150m:

- On-site, minor incident in 1995, no pollution found*
- 130m south, minor incident, unknown oils to stream/river*

The area slopes down to the southwest, the flow of surface water is expected to be in this direction.

* not relevant due to distance/severity/significance

Flooding (General)

Flooding can occur for many reasons other than those dealt with by the EA maps. These include:

- burst pipes, blocked drains, sewers and culverts
- inadequate drainage, cloudbursts/flash flooding overwhelming drainage systems

Statements in this report such as ‘clear of flooding/flood plain’ and ‘flooding – no further action’ are references to the EA river and sea flood maps and are no guarantee that flooding will not occur.

Groundwater Flooding

The site is shown to have limited potential for groundwater flooding to occur.

Flooding from Rivers

The site is shown to be clear of flooding from rivers.

Surface Water Flooding

The northwest boundary is shown to be at risk of 1 in 1000 year surface water flowing.

Groundwater (Hydrogeology)

The solid rocks and superficial (drift deposits) under the site are indicated as Secondary A aquifers.

Groundwater flow is likely to follow the topography and move to the southwest.

Radon

The site is in a high probability radon area as 10 to 30% of homes in the area are above the radon action level. Full radon protection measures are required.

SITE HISTORY

Date	On Site	Off Site
1850 (1:10,560)	Undeveloped plot.	River 85m southwest. Old print works 175m north.
1886 (1:2,500)	Undeveloped plot.	Old print works demolished. Methodist chapel 140m northwest. Smithy 130m northwest.
1908 (1:2,500)	Undeveloped plot	Hollins Syke 5m north.
1930 (1:10,560)	Undeveloped plot.	Building immediately north and west of western corner.
1964 (1:10,000)	Undeveloped plot.	No relevant change
1971 (1:2,500)	3 chicken sheds and silos on northwest	Housing 10m west Garage 100m southwest
2003 (1:10,000)	Chicken shed and silo at southeast corner	No relevant change
2022 (1:10,000)	Silo on northeast of site not present.	No relevant change

DISCUSSION

Contamination

The site was undeveloped until circa 1970 when the, now derelict, chicken sheds were built. The southwest corner and south/middle have remained undeveloped. Suspected ACM was used in the construction of the buildings, and broken pieces are strewn around the northeast of the site and scattered around buildings 1 and 2. Although the concrete floor slabs, and concrete aprons, will have prevented possible fibres entering the ground beneath them where they are intact, there is potential for fibres to be present in surface soils where the concrete is broken in places and in unsurfaced areas.

A fire at the northeast has created potential for low levels of PAHs to be generated on site (exceeding residential thresholds). These may be present in shallow soils on the northeast of the site and, if water was used to extinguish the fire this can spread shallow contaminants further around the site.

A heating oil tank has been placed to the rear of building 2, the original location is not known, suggesting TPHs may be present in places.

There has been no use from which high levels of heavy metals and TPHs would be generated, although their presence at low levels (exceeding stringent residential thresholds) cannot be ruled out if made ground was imported to create level plateau for the buildings, and if machinery was use on site.

There have been no nearby land uses which will affect the site and no nearby pollution incidents.

The development will be houses with gardens, potential pollutant linkages are considered to be:

- Direct contact and ingestion of soil.
- From homegrown vegetables and soil attached to vegetables.
- Inhalation and ingestion of dust.
- Sulphate attack on buried concrete.

A high risk is considered possible from suspected ACM fibres, and a low risk from other contaminants.

Controlled Waters

There is an underlying Secondary A aquifer beneath sand and gravel. There are no nearby water abstraction points or source protection zone.

Hollins Syke flows southwest, 5m to the northwest, flowing to the River Ribble 100m southwest.

Although the gardens will allow rainwater to pass through the surface soils, other than possible ACM fibres, contamination is not expected at high levels, and it is anticipated there will be only a very low risk to controlled waters.

Landfill Gas/Ground Gas/Radon

There are no landfill sites or significant filled features within 250m of the site. There are no credible on or off-site landfill or ground gas sources and no landfill or ground gas risk to the development.

The site is, however, in a high probability radon area and full radon protection measures are required.

Flooding from Rivers

The Environment Agency maps show that this site is clear of flooding from rivers.

Groundwater and Surface Water Flooding

The northwest boundary is shown to be at risk of 1 in 1000 year surface water flowing.

The site is shown to be in an area with limited potential for groundwater flooding to occur.

Foundations

The geology map suggests the site is underlain by sand and gravel. This can provide variable conditions for foundations and a range of options may need to be considered.

INDUSTRY PROFILE

The site was formerly a poultry farm, with now derelict buildings, ACM strewn around the northeast of the site and scattered around remaining buildings. A fire at the northeast has potential to have generated PAHs on site and the presence of made ground cannot be ruled out at this stage.

Source of Contaminants	Possible Contaminants
Poultry farm, fire and made ground	Metals: copper, zinc, chromium, nickel, lead, cadmium, arsenic, Inorganic compounds: cyanide, sulphates Fuel: petrol, diesel, MTBE (TPHs) Polycyclic aromatic hydrocarbons (PAH) Asbestos

CONCEPTUAL MODEL

A conceptual model based on the source-pathway-receptor concept is included with this desk study to show the potential pollutant linkages with this site.

Source	Receptors	Pathway	Potential/Likely Pollutant Linkage
Asbestos	End-users	Inhalation	Yes
	Off-site	Migration off-site	Yes
Inorganic contaminants	Householders	Direct contact, ingestion, from home grown vegetables, ingestion and inhalation of dust	Possible
	Groundwater	Leaching towards	No
	River/stream	Leaching towards	No
Sulphate	Building fabric	Concrete directly in contact with soil	Possible
Hydrocarbons	Householders	Direct contact, ingestion, from home grown vegetables, ingestion and inhalation of dust	Yes
	Service pipes	Seeping into drinking water pipes	Unlikely
	Groundwater	Leaching towards	No
	River/stream	Leaching towards	No
Hydrocarbon vapours	Householders	Inhalation of vapours indoors and outdoors	No
Landfill gas	End-users (inside)	Seeping into buildings, explosion, asphyxiation	No
Radon	End-users (inside)	Seeping into buildings	Yes

CONCLUSION

There is probable ACM strewn around the northeast of the site and scattered around the buildings. This should be cleared, and the buildings demolished, prior to investigations being carried out.

Contamination

The site history suggests, excluding suspected ACM fibres, it is unlikely that contamination will be present on the site at high levels. Low levels, exceeding stringent residential thresholds, may however, be present in the surface soils around the site, especially at the northeast.

An intrusive investigation is required, consisting of boreholes/trial holes and tests to confirm the presence/absence and extent of contamination on the site.

There are no specific point sources for contamination and the investigation will need to target proposed gardens and provide all round coverage.

Controlled Waters

A very low risk to controlled water is expected at worst. No further action is considered necessary at this stage, but an allowance should be made for carrying out leachate tests, and tests from the adjacent water course, subject to soil test results. This need for this should be reviewed following the soil tests.

Landfill Gas/Ground Gas/Radon

There are no credible on or off-site landfill or ground gas sources and no landfill or ground gas risk to the development. The site is, however, in a high probability radon area and full radon protection measures are required. The following are required:

- Ventilation of confined spaces within building.
- A well-constructed reinforced concrete ground bearing slab with sub-floor depressurisation
- Or, suspended floor with passively ventilated sub-floor void >150mm, constructed to allow a fan to be fitted in the future if required.
- Minimum penetration of ground slab by services.
- Also radon precautions should continue across the cavity.
- Visqueen radon barrier (red) or equivalent (joints to be lapped and sealed).

Each membrane should be used with the appropriate matching cavity tray (or cavity membrane), DPC and service duct ‘top hats’ are also recommended.

As the site is in a high probability radon area validation of the membrane is recommended as follows:

- Summary of gas risk assessment.
- Details of who carried out installation.
- Details of who carried out verification and inspection regime.
- Description of protection measures installed, including photographs.
- Details of non-conformances and how they were rectified.
- Completed gas measures inspection proforma.

Flooding

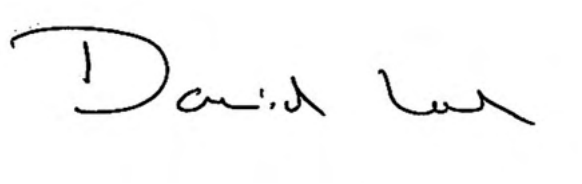
The EA maps indicate that the area is clear of flooding from rivers.

The northwest boundary is shown to be at risk of 1 in 1000 year surface water flowing. These maps are fairly crude and it is beyond the scope of this report to provide a comprehensive flood risk assessment. For greater confidence a detailed flood risk assessment should be obtained.

Foundations

A series of boreholes are required in the area of the proposed building to allow the most suitable foundations to be designed.

Yours faithfully
on behalf of Worms Eye Ltd



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ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE

LIST OF APPENDICES – PRELIMINARY RISK ASSESSMENT (Desk Study)

Existing Site Plan

Photographs of Site

Proposed Site Plan

Landmark Summary Map

Landmark Envirocheck Report

Historical Maps

Conceptual Model

ABBREVIATIONS

Chemical	BAP	Benzo(a)pyrene
	BTEX	Benzene, toluene, ethylbenzene, xylene
	DAHA	Dibenzo(ah)anthracene
	MTBE	Methyl tertiaryt-butyl ether (additive to petrol)
	EPH	Extractable Petroleum Hydrocarbons (formerly Diesel Range Organics – DRO)
	NFD	No fibres detected (asbestos test)
	PAH	Polycyclic aromatic hydrocarbons
	PCB	Polychlorinated biphenyls
	PID	Photo ionisation detector
	PRO/GRO	Petrol range organics/gasoline range organics
	SVOC	Semi-volatile organic compounds
	TCE	Trichloroethylene
	TPH	Total petroleum hydrocarbons
	VOC	Volatile organic compounds
Other	AGS	Association of Geotechnical Specialists
	BGS	British Geological Survey
	BRE	Building Research Establishment
	CBR	California Bearing Ratio
	CIEH	Chartered Institute of Environmental Health
	CIRIA	Construction Industry Research and Information Association
	CLEA	Contaminated Land Exposure Assessment (Environment Agency)
	CLR 8	Contaminated Land Research Report 8 (Environment Agency)
	DWQ	Drinking water quality
	EA	Environment Agency
	EQS	Environmental quality standards
	ICRCL	Inter-departmental Commission for the Reclamation of Contaminated Land
	LQM	Land Quality Management Ltd (Land and Environmental Consultancy)
	NHBC	National House Builders Council
	SGV	Soil Guideline Values
	SPT	Standard penetration test
	TPHWG	TPH Working Group

1. This report should be considered in relation to the objectives agreed between Worms Eye and the Client, outlined in the introduction.

2. For the work, reliance has been placed on publicly available data, obtained from the sources identified in the report. The information is not exhaustive and further information may be available from other sources. When using the information it has been assumed it is correct, and no attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and guidelines, for land and groundwater contamination, enforced by the Local Authority and the Environment Agency.

4. During the site walkover, reasonable effort was made to obtain an overview of the site. However, no attempt was made to enter areas that are unsafe, a risk to health and safety, locked, barricaded, overgrown, or areas not made accessible.

5. Access, the presence of services and activities on the site, limited locations where sampling could be carried out and the techniques that could be used.

6. Assessments are based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. The conclusions and recommendations provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

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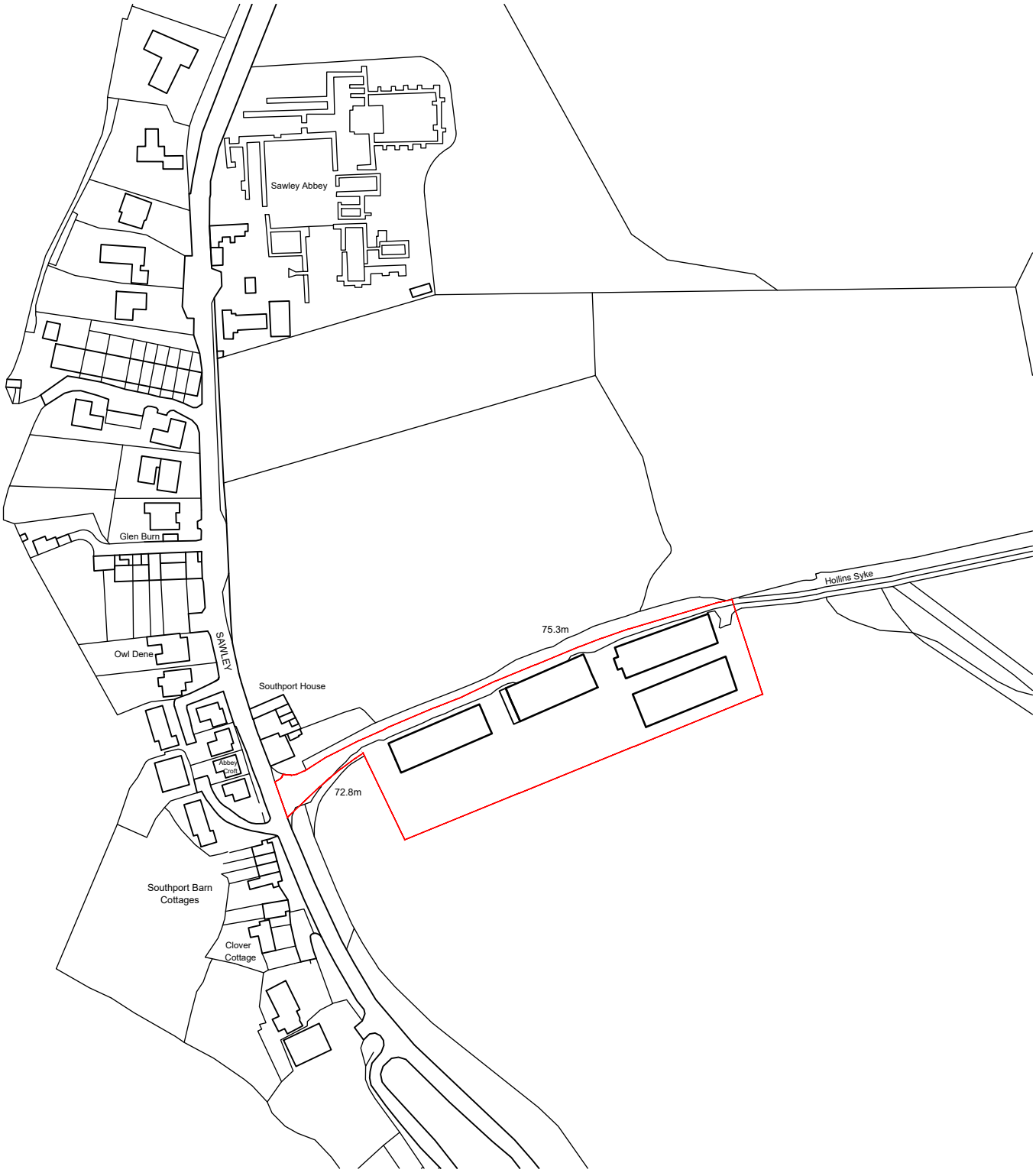
9. New information, revised practices, or changes in legislation, may necessitate the re-interpretation of the report, in whole or in part.



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Key

Application Boundary

ZARA MOON ARCHITECTS

RIBA | Chartered Practice

Project Name	Project No. / Stage
Abbey Gardens BB7 4LE	130.21 / Pre-Application
Location Plan **E00.01**	Scale: 1:1250 @ A4 Date: Mar 2022
Rev --	Drawn: RH

Notes

N

Key

- Application Boundary
- Root Protection Area
- Existing Trees
- Meaningful start on approval 3-2012-0797
- Approved holiday cabin outlines 1000sqm

ZMA ZARA MOON ARCHITECTS

RIBA Chartered Practice

Project Name	Abbey Gardens
Existing Site Plan	E01.01
Rev	--

Project No.	130.21
Stage	PreApplication
Scale	1:500 @ A1
Date	Mar 2022
Drawn	RH

Notes

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N

Key

- Application Boundary
- Domestic Curtilage
- Root Protection Area
- Demolished
- Existing Trees
- Proposed Trees / Planting

ZMA ZARA MOON ARCHITECTS

RIBA | Chartered Practice

Project Name		Project No.	Stage
Abbey Gardens		130.21	Planning Submission
Proposed Site Plan		Scale	1:500 @ A1
P01.01		Date	January 2022
Rev --		Drawn	RH

ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
19/11/22
Building 4

Looking South

Looking South

Looking Southwest

Looking East

ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
19/11/22
Building 4

Looking East

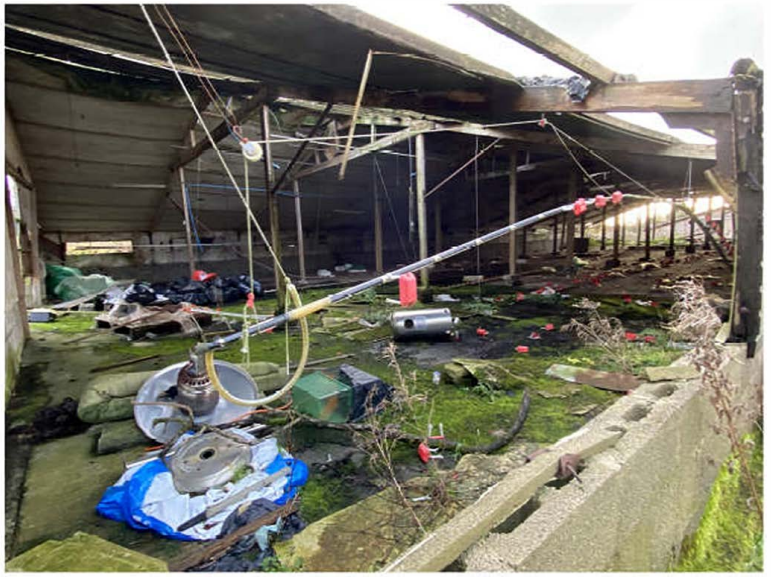
Looking Northeast

Looking East

Looking Northeast

ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
19/11/22
Building 2

Looking Southwest



Looking South

Looking Southwest

Looking Northeast

ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
19/11/22
Building 3

Suspected Asbestos

Looking Northeast

Looking Northwest

Looking Northwest

ABBEY GARDENS, SAWLEY, CLITHEROE, BB7 4LE
19/11/22
Building 1

Looking Southeast

Looking Northeast

Looking East

Looking Southwest