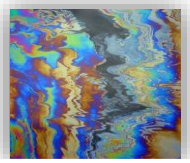
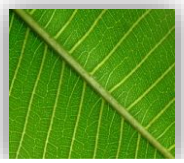
INVESTIGATE



REMEDIATE



REGENERATE

# T E C H N I C A L  R E P O R T

**WALKOVER SURVEY**
**AND DESK STUDY**
**AT**
**3 MILLSTONES INN**
**WEST BRADFORD**
**LANCASHIRE, BB7 4SX**
**FOR**
**MR. MATTHEW FROST**

**DESK STUDY NO. 5981**
**JANUARY 2015**

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**WALKOVER SURVEY AND DESK STUDY AT: 3 MILLSTONES INN, BB7 4SX**

**CLIENT: MR. MATTHEW FROST**

**ARCHITECT: 3D.G DESIGN**

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## 1. INTRODUCTION

This report has been prepared in accordance with an email dated December 16th 2014, from the Engineer on behalf of the Client.

The brief was set out in our estimate, ref. E9966 and dated December 11th 2014, and comprises a walkover survey and a desk study report including a historical, geological, mining and environmental appraisal together with a conceptual ground model.

### 1.1 Site Location and Description

The site is located on the south side of Waddington Road as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is SD742443.

As shown on Figure 2, the triangular shaped about 350m$^2$ hectare site is bounded to the north by Waddington Rd the west by the existing 3 Millstones Inn, and the east by open fields.

### 1.2 Proposed Development and Purpose of the Desk Study

We understand that it is proposed to erect a new two storey holiday let/hotel accommodation block comprising five en-suite bedrooms with a new drainage connection across the existing carpark to a point near to the existing building/highway.

The purpose of the desk study is to obtain information regarding the sites historical, geological and environmental setting in order to produce a conceptual ground model, to assess the ground conditions, to undertake a preliminary assessment of contamination sources, pathways and receptors relating to potential hazards that exist or will potentially exist on the site and to assess the need for ground investigation.

In addition a geological and mining appraisal was required to determine the geological structure, including the depth and thickness of coal and other mineral seam horizons, and to determine the potential for mineworkings in these horizons.

### 1.3 Walkover Survey

The walkover survey was undertaken on 22nd January 2015. Surface features observed were recorded on a plan of the site together with the positions and directions of photographs taken. The resulting Walkover Survey Plan and site photographs are appended.

The site comprises tarmacadam surfaced carpark in the east of the site raised from the road level (photos 1-4). Overhead telephone cables run east west across the car park (photo 2). The buildings on site occupy the western area and have a higher level garden than the car park (photo 5) accessed by a small flight of wooden stairs. This



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garden level is approximately 1m higher than the car park with a grassy bank (photo 6) acting as the divider. The garden has five benches and rises to a higher level still to the west over a grassy bank (photo 7). Fencing running east west is present in this small garden and bench area with a small shed and firewood stacked on its south side (photo 8). A yard in the north western corner is surfaced with gravel and some flag paving (photo 10). The western perimeter sandstone wall has higher ground and a garage on its western side. Small garden sheds align along the eastern sandstone boundary wall (photo 14). There is a central area of the building with a flat felted roof (photo 15). These building are surrounded by small walkways along their perimeter. The pub front is directly on Waddington Road with a 1m wide pavement along its front (photo 16). A sandstone wall joins along the north western edge of the building extending along Waddington Road (photo 17). A hatch to cellars is situated on the eastern edge of the building with a store of beer kegs (Photo 18). Trees are along the boundaries only (photo 2).

## 2. DESK STUDY

### 2.1 Historical Appraisal

The past history of the site has been interpreted from the study of old Ordnance Survey plans supplied by GroundSure, as follows:

TABLE 1 SMALL SCALE SURVEYS

| Date | Scale |
|---|---|
| 1847 | 1:10,560 |
| 1890 | 1:10,560 |
| 1910 | 1:10,560 |
| 1914 | 1:10,560 |
| 1930 | 1:10,560 |
| 1938 | 1:10,560 |
| 1955 | 1:10,560 |
| 1974 | 1:10,000 |
| 2002 | 1:10,000 |
| 2010 | 1:10,000 |
| 2014 | 1:10,000 |

TABLE 2 LARGE SCALE SURVEYS

| Date | Scale |
|---|---|
| 1884 | 1:2,500 |
| 1886 | 1:2,500 |
| 1908 | 1:2,500 |
| 1912 | 1:2,500 |
| 1970 | 1:2,500 |
| 1976 | 1:2,500 |
| 1988 | 1:1,250 |
| 1993 | 1:1,250 |

Extracts of the above surveys are appended.

TABLE 3 HISTORICAL APPRAISAL

| Date | On site | Beyond site boundary |
|---|---|---|
| 1847 | Buildings known as the Millstone Inn are shown in NW corner of site; remainder of site south of road is open fields. Site is located entirely on south side of the east west road. | Surroundings are small roads running in all directions through fields and pasture. Small buildings are present on the junctions of these roads within 150m of the site. Wast Bradford Brook runs east west 50m to the north of the site then bends to north south 85m to the NW of site. |



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| | | |
|---|---|---|
| | | Ultimately drains into the River Ribble 500m to the SE of the site boundary. Darkhouse Wood surrounds Bradford Brook 500m to the north west. |
| 1884 | No significant change. | Bradford Brook present with sluice and weirs 50m to the north. Sparsely built surrounding area with small buildings on roads. Quarry 250m to the NW, cotton mill 200m to SE on edge of river with weir and Mill pond with embankment present. |
| 1890 | No significant change. | No significant change. |
| 1908 | No significant change. | Quarry 250m to the NW partially infilled and planted with trees, now 'Old Quarry'. Erection of St. Catherine's Church 150m to the NE with graveyard. Small pond 200m to the south. |
| 1910 | No significant change. | Increase in small rectangular buildings throughout the area. Surroundings patchwork of fields still |
| 1912 - 1955 | No significant change. | No significant change. |
| 1970 | Small outhouse built in south of site. | Nine buildings adjacent to SW of the site listed as Barnsteads Farm. Road that site is on first listed as Waddington Road. 'Old Quarry' 250m to the north west now completely backfilled. Cotton Mill to the south east significantly expanded. |
| 1974 | No significant change. | Increase in small rectangular buildings in surrounding 500m. Area still predominantly open fields. Buildings centred around roads. |
| 1976 | Another small building built on the southern area of the site | No significant change. |
| 1988 | No significant change. | No significant change. |
| 1993 | No significant change. | Cotton Mill to the south east now demolished and undergoing residential developments present to 300m to the east. Burial Ground present 200m to NW on the edge of Bradford Brook. |
| 2002 - 2014 | No significant change. | No significant change. |

In the period between the 2014 Ordnance Survey and the Walkover Survey January 22nd 2015, we are not aware of any other significant changes to the site.

## 2.2 Geological Appraisal

The geological appraisal is based on the appended Groundsure GeoInsight Report (ref. CMAPS-CM-389440-4199-060115GEO).



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Made Ground

According to the GeoInsight report there are no records of artificial ground in the immediate vicinity of the site. However as the site has been developed some made ground might be expected.

Drift

According to the GeoInsight report the drift strata beneath the site is expected to be Alluvium comprising of clays, silts, sands and gravels which typically exhibit very low to high permeability.

Bedrock

The bedrock beneath the site is anticipated to belong to the Clitheroe Limestone Formation and Hodder Mudstone Formation. This lithology exhibits a low permeability. There is one inferred north trending fault 358m to the North which is not thought to have any impact on the site and are not thought to pose a risk from reactivation.

Radon

The GeoInsight report contains information from the Radiation Protection Division of the Health Protection Agency (HPA). The HPA indicate that the site is in a Radon Affected Areas as between 3 and 5% of surrounding properties are above the Action Level. The Action Level is 200 Becquerels/ $m^3$.

In addition, the GeoInsight report indicates that for new properties or extensions to existing properties, in accordance with the Buildings Research Establishment (BRE) publication BR211, basic radon protection measures are required.

Ground Workings

The survey states there are two historical surface ground working features, they are 132m to the east and is listed as a pond. There are no historical underground working features within 250m of the site. The survey also indicates there are no current ground workings within 250m of the site.

Mining, Extraction & Natural Cavities

There are no records of active or historical coal mining within 1km of the site boundary. There is no data held by Johnson, Poole and Bloomer within 1km of the site boundary.

According to the GeoInsight Report the site could be in an area that was used for occasional and minor vein mineral mining. In our opinion, the risk to the site from this is very low and can be discounted.

The site is not within 1km of areas affected by non-coal mining (bar minor vein mining mentioned previously), rock salt or brine extraction, natural cavities, gypsum extraction, tin mining or clay mining. There is no suggestion that there are other underground cavities associated with non-coal mining activities, brine extraction, gypsum extraction, tin or clay mining.



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Natural Ground Subsidence

The report states that the site has a very low hazard rating of, landslides, ground dissolution of soluble rocks, natural subsidence from shrink-swell clays or running sands. The site has a neglible hazard rating relating to collapsible deposits and a moderate hazard rating for compressible deposits.

Railways and Tunnels

There are no active or historical rail tracks or tunnels within the site boundary or within 250m of it.

The site is not within 5km or 500m of the High Speed 2 rail project or Crossrail project respectively.

## 2.3 Environmental Appraisal

The environmental appraisal is based on the appended Groundsure EnviroInsight Report (ref. CMAPS-CM-389440-4199-060115EDR).

IPC/ IPPC/ Part 1(A) Authorisations

The environmental data report indicates that there are no IPC and no IPPC or Part 1(A) Authorisations within 500m of the site boundary.

Potentially Harmful Discharges

According to the environmental data report there are no records of potentially harmful discharges to public sewers or controlled waters within 500m of the site boundary.

List 1 and List 2 Dangerous Substances Inventory Sites

The environmental data report indicates that there are no records of List 1 or List 2 Dangerous Substances Inventory Sites within 500m of the site boundary.

Part A(2) and Part B Authorisations

According to the environmental data report there are no Part A(2) or Part B (formerly LAPC/ LAPPC) authorisations within 500m of the site boundary.

Radioactive Substance Licences

The environmental data report indicates that there are no records of Category 3 or Category 4 Radioactive Substance Licenses within 500m of the site boundary.

Discharges

According to the environmental data report there are two licensed discharge consents within 500m of the site boundary. These licenses are related to sewage discharges for storm sewer overflows and sewage pumping and are no longer active or revoked.



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Planning Hazardous Substances Consents and Enforcements

There are no records of Planning Hazardous Substances Consents and Enforcements within 500m of the site boundary according to the environmental data report.

Dangerous or Hazardous Sites

Records of COMAH and NIHHS indicate that there are no dangerous or hazardous sites within 500m of the site boundary.

Pollution Incidents

The environmental data report indicates that there have been five pollution incidents within 500m of the site boundary.

The environmental data report indicates that there have been five pollution incidents within 500 metres of the site boundary. The closest of these is 171m away to the SE ranging to 413m to the NE of the site. The contamination involved crude sewage, atmospheric and contaminated waters that are related to sewage works and fire and firefighting runoff in 2001 and 2003. In our opinion, the effect on the site from this would be neglible.

Contaminated Land

There are no sites determined as contaminated under Section 78R of the Environmental Protection Act (1990) within 500m of the site boundary.

Registered Landfill Sites

According to the environmental data report there are no registered landfill sites within 1000m of the site boundary. Historic landfill sites are listed as 441m to the South West at Waddington Brick Works, licenses held by Clitheroe Metropolitan Borough.

Unregistered Landfill Sites

The historical appraisal has identified no unregistered landfills in the form of quarries, pits and ponds infilled with unknown material which may be a source of ground gas.

Other Waste Treatment, Transfer and Disposal Sites

According to the environmental data, report there are was one licensed waste treatment, transfer and disposal sites a distance of 1004m to the south east and not thought to pose any risk or impact to the site.

Current Land Use

Current potentially contaminative industrial land uses are recorded by the environmental data report. Within 250m of the site boundary there is one potentially contaminative industrial site. This is an Electrical Sub Station 174m to the south east. A high pressure underground pipeline is within 500m of the site, 410m to the SE, owned and operated by Sabic UK Petrochemicals.



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Past Land Use

Past potentially contaminative land uses are identified in the historical appraisal.

Hydrogeology and Hydrology

Designation of aquifers in the environmental data report are in accordance with the Environment Agency's April 2010 Groundwater Protection Policy.

The superficial/ drift deposits comprise alluvium which are indicated to be an Secondary A aquifer.

The bedrock comprise limestone and mudstones which are indicated to be a Secondary A aquifer.

A Secondary A aquifer comprises permeable layers capable of supporting water supplies at a local scale and in some cases forming an important source of base flow to rivers.

According to the environmental data report there are four surface water abstraction licences within 1000m of the site boundary, seven groundwater abstraction licences within 2000m of the site boundary, and five potable water abstraction licences within 1000m of the site boundary. Groundwater abstraction licenses are a minimum 924m from the site boundary and are concerned with commercial drinking, cooking and sanitation.

There are no Source Protection Zones, set up to protect a water source within 500m of the site of boundary, present according to the environmental data report.

The environmental data report indicates that there is a watercourse about 24m to the north of the site boundary, the West Bradford Brook. Many other secondary rivers, culverts surround the site up to 500m away and a tertiary river is present 246m to the north.

There are no Flood Defences and/ or Flood Storage Areas present within the 250m of the site boundary according to the environmental data. A Zone 2 and Zone 3 Floodplain is 18m to the north and 43m to the east.

According to the environmental data report the British Geological Survey indicate that the site has a moderate susceptibility to groundwater flooding. There is also a potential for groundwater flooding at surface based on the underlying geological conditions. There is a moderate confidence in these ratings.

Environmental Sensitivity

According to the environmental data report the site is within a Nitrate Vulnerable Zone.

According to the environmental data report the site is not within 500m of a Designated Environmentally Sensitive Site. The site is not within 1000m of a site of Special Scientific Interest, National Nature Reserves, Special Area of Conservation, Special Protected Area, Ramsar Site or Ancient Woodland.

The site is within 2000m zone that includes areas of Special Scientific Interest, Ancient Woodland and a Local Nature Reserve. There areas are at least 500m from the sites boundary.



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The site is on the boundary of being within the Forest of Bowland, an Area of Outstanding Natural Beauty.

## 2.4 Conceptual Ground Model

A conceptual ground model of a site and its environs uses available information to form a preliminary assessment of contamination sources, pathways and receptors, and the significance of hazards that exist or will potentially exist on the site. Its purpose is to identify the relationships between sources of contamination, pathways and receptors to allow exposure scenarios to be determined and thereby aid in the design of any intrusive investigation. It also forms the basis of the risk assessment.

Sources

Potential sources of contamination identified in the desk study are:

- Possibility of general contaminants from past local construction activities and landscaping
- Possibility of fuel and oil spillage from sites now a car park.

Pathways

Potential pathways between sources and receptors for the proposed development are:

- Direct contact with contaminated soil and inhalation of dust by site workers during construction and demolition and by end users of the site in garden areas and soft landscaping.
- Inhalation of vapours by site workers during construction and demolition and by the end users of the site in enclosed spaces.
- Uptake of contaminated groundwater by plants grown in the gardens and landscaped areas.
- Migration of contaminants to the underlying aquifer.

Receptors

Potential receptors for the proposed development are:

- Site workers during the construction phases.
- The residents who will be the end users of the site.
- Controlled waters including the underlying aquifer.
- Plants grown in the garden landscaped areas (if present).

Conclusions

An appraisal of the sources, pathways and receptors has been considered and we have produced a conceptual ground model based upon the available information, as follows:



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TABLE 3 CONCEPTUAL GROUND MODEL

| **Potential Source** | **Nature of Hazard** | **Contaminants Associated with the Source** | **Pathway** | **Receptor** | **Preliminary Risk Rating** |
|---|---|---|---|---|---|
| Made Ground | Contaminants in Made Ground | Gen. Contaminants<br>Arsenic<br>Cadmium<br>Chromium<br>Lead<br>Mercury<br>Nickel<br>Selenium<br>Boron<br>Copper<br>Zinc<br>Cyanide<br>Sulphide<br>Sulphate<br>pH<br>Phenols<br>Polynuclear Aromatic Hydrocarbons (PAH)<br>Total Petroleum Hydrocarbons (TPH) | Ingestion of soil<br>Ingestion of dust<br>Dermal contact<br>Inhalation of dust<br>Inhalation of vapours | Site Operatives<br>End Users | Low |
| | | | Uptake via contaminated groundwater | Vegetation | Low |
| | | | Vertical and lateral movement of mobile contaminants to surface water and groundwater | Controlled Waters | Low |
| | | | Direct contact | Structures and Services | Low |
| Asbestos on/ in ground | Asbestos fibres | Asbestos fibres | Inhalation of fibres | Site Operatives<br>End Users | Low |
| Tanks/ Machinery/ Vehicles using car park area | Fuel/ oil spillage and/or leakage from machinery and/or fuel/oil tanks and/or vehicles | Total Petroleum Hydrocarbons (TPH)<br>Benzene/ Toluene/ Ethylbenzene/ Xylene (BTEX)<br>Chlorinated Solvents | Ingestion of soil<br>Ingestion of dust<br>Ingestion of contaminated vegetable produce<br>Dermal contact<br>Inhalation of dust<br>Inhalation of vapours | Site Operatives<br>End Users | Moderate |
| | | | Uptake via contaminated groundwater | Vegetation | Moderate |
| | | | Vertical and lateral movement of mobile contaminants to surface water and groundwater | Controlled Waters | Moderate |
| | | | Direct contact | Structures and Services | Moderate |
| Radioactive minerals | Ground Gas (Carcinogen) | Radon Gas | Inhalation of gas | End Users | Moderate |



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The conceptual ground model indicates that a nominal intrusive ground investigation is required to assess the ground conditions The ground investigation should also obtain soil and, where possible, water samples for contamination analysis.

Should fibres or friable asbestos material be found on site during the investigation it should also be sampled and analysed.

## 2.5 General

No consideration has been given to flora and fauna as this was outside our brief.

We recommend that when developing a “brownfield site” a phased investigation is undertaken in order that each phase informs the next. A typical phased investigation comprises the following:

- Phase I: walkover survey and desk study report
- Phase II: ground investigation with report(s)
- Phase III: remediation statement report
- Phase IV: validation with report(s).

An options appraisal might also be of benefit between the ground investigation and remediation statement.

This Phase I walkover survey and desk study report is to be followed by a Phase II ground investigation with report. It should be noted that dependent upon the findings a Phase III remediation statement and Phase IV validation with report may be required.

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact the undersigned or Miss Anna Marsden at our Preston Office.

SUB SURFACE CONSULTANTS LIMITED
REPORT No. 5981
JANUARY 2015

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