WALKOVER SURVEY AND DESK STUDY AT 1877 MAUDLAND BANK, PRESTON

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1. INTRODUCTION

This report has been prepared in accordance an email, dated 30th January 2017, from the Architect on behalf of the Client.

The brief was set out in our estimate, ref. E1983 and dated 24th January 2017, and comprises a walkover survey and a desk study report including a historical, geological, and environmental appraisal together with a conceptual ground model.

1.1 Site Location and Description

The site is located at 75 – 79 Maudland Bank, Preston, PR1 2YJ, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is 353233 429833.

The area of investigation comprises a disused club and associated parking. Bordering to the south is a railway line in a deep cutting, to the west Maudland Bank, to the east a play area and section of old canal in a deep cutting, and to the north residential properties.

1.2 Proposed Development and Purpose of the Desk Study

We understand that it is proposed to develop the site with a 4 to 5 storey student accommodation block.

The purpose of the desk study is to obtain information regarding the site's 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.

1.3 Walkover Survey

The walkover survey was undertaken on 31st January 2017. 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.

At the time of the walkover survey the area of investigation comprised a single storey brick building previously used as a club with associated car parking. Bordering to the north were residential properties, to the south a railway line at a lower level in a deep cutting, to the east a play area and a section of old canal in a deep cutting going beneath the railway line, and to the west Maudland Bank.

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No access to the club was available at the time of the survey, which comprised the southern half of the site. The northern half of the site comprised a bituminous macadam surface area utilised as a car park and containing fly tipping associated with the club; beer barrels and a pool table. To the east of the club was a lean to which also contained club associated waste and had become overgrown. To the south of the club were concrete flags with had become overgrown.

At the time of the survey there was no standing water or visible evidence of contamination, with the vegetation on and around site appearing healthy.

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
1849	1:10,560
1892	1:10,560
1909 – 1910	1:10,560
1929	1:10,560
1938	1:10,560
1955 – 1958	1:10,560
1965 – 1968	1:10,000
1973*	1:10,000
1974 – 1977	1:10,000
1982 – 1987	1:10,000
1990	1:10,000
2002	1:10,000
2010	1:10,000
2014	1:10,000

TABLE 2 LARGE SCALE SURVEYS

Date	Scale
1849	1:1,056
1891 – 1892	1:2,500
1912	1:2,500
1931	1:2,500
1938	1:2,500
1957 – 1959	1:2,500
1960	1:2,500
1966	1:2,500
1966 – 1971	1:1,250
1972 – 1974	1:1,250
1980 – 1981	1:1,250
1986 – 1989	1:1,250
1993	1:1,250

* Site area not covered by survey.

Extracts of the above surveys are appended.

TABLE 3 HISTORICAL APPRAISAL

Date	On site	Beyond site boundary
1849	Site developed with residential properties in the centre of site and a park/garden in the north. Maudland Road crosses the site in the south.	Maudland Bank bordering to the west, undeveloped land to the south and east, residential property to the north. Lancaster Canal 10m to the east, reservoirs 40m to the north east and 50m to the north. Warehouse 60m to the north east, Moss Mill 40m to the north east. Train station 50m to the south, engine house 80m to the south west, tank 120m to the south west.

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1891	Maudland Road no longer present in the south of site, redeveloped with residential properties.	Reservoir to the north east infilled and redeveloped with building associated with Moss Mill. Railway lines bordering to the south. Station to the south demolished and redeveloped with railway lines. Goods station 90m to the south west. Engine shed to the south west redeveloped as cattle pens with associated tank no longer depicted. Saw mill 80m and 230m to the south, soap works 120m to the south, engine shed 170m to the south west, Croft Street Mill 230m to the south west, steam laundry and cleaning works 200m to the south west, tanks 160m to the west, Fylde Road Mill 190m to the north west, reservoir 180m to the north west, tramway 150m to the north east, Maudland Maltkilns 110m to the south east, Canal Works 150m to the south east, coal yard 200m to the south east. Warehouse to the north east no longer depicted.
1912	No significant change	Saw mill 230m to the south demolished and left undeveloped, Maudland Maltkilns and Canal Works to the south east no longer depicted.
1931	No significant change	Saw mill 80m to the south redeveloped as Durex Works, steam laundry and cleaning works to the south west redeveloped as saw mill. Reservoir to the north infilled. Station Wagon Works 130m to the south east. Moss Mill to the north east redeveloped as Hanover Mill.
1938	No significant change	Tramway to the north east dismantled. Station Wagon Works to the south east no longer depicted.
1957	No significant change	Works 90m, 120m, 190m, 190m, and 220m to the south east, 40m and 100m to the north east, warehouse 240m to the north west, garage 190m to the south east. Croft Street Mill to the south west, Fylde Road Mill to the north west, and saw mill to the south west redeveloped as works. Reservoir to the north west infilled.
1966	No significant change	Hanover Mill to the north east redeveloped as Footware Factory. Works 220m and 230m to the south west and 100, to the north east redeveloped as warehouses. Works 190m to the north west redeveloped as Footware Factory. Works 120m to the south demolished and redeveloped as a vehicle depot. Works 90m, 120m, 190m, 190m, and 220m to the south east demolished and redeveloped as Harris College. Warehouse 50m and

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		110m to the north east, depot 40m to the north east, garage 120m to the north east. Pond 70m to the south east. Engine shed to the south west demolished.
1972	No significant change	Works 40m to the north east redeveloped as tyre depot, warehouse 100m to the north east redeveloped as electrical works. Durex Works to the south partially demolished and redeveloped as Felt Warehouse. Warehouses to the south west redeveloped as haulage depot. Footware Factory to the north east partially demolished and redeveloped as clothing factory. Depot 80m and 100m to the north east. Pond 70m to the south east infilled.
1980 - 1971	Residential properties on site demolished and a club developed in the south of the site	Felt Warehouse to the south demolished and left undeveloped. Lancaster Canal to the east infilled with a small basin left remaining adjacent to the south east corner. Terrace houses to the north and west demolished and the area redeveloped with a predominantly semi-detached houses. Maudland House care home constructed across Maudland Bank to the west.
1986	No significant change	Railway line bordering to the south dismantled with only one line remaining. Goods station to the south east redeveloped as warehouse. Vehicle depot to the south redeveloped as a caravan site
1993 – 2014	No significant change	No significant change other than the continued development of the university to the south.

In the period between the 2014 Ordnance Survey and the Walkover Survey 31st January 2017, 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

Made Ground

According to the GeoInsight report there are no records of artificial ground in the immediate vicinity of the site; however, the site is developed and therefore some would be expected.

Drift

According to the GeoInsight report the drift strata beneath the site are expected to be glaciofluvial ice contact deposits and comprise gravel, sand, and silt which typically exhibit moderate to very high permeability.

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Bedrock

The bedrock beneath the site is anticipated to belong to the Sherwood Sandstone Group of Ladinian age and comprises sandstone. The strata are not shown to be displaced by a geological fault.

Radon

The GeoInsight report contains information from the Radiation Protection Division of the Health Protection Agency (HPA). The HPA indicate that the site is not in a Radon Affected Areas as less than 1% of surrounding properties are above the Action Level. The Action Level is 200 Becquerels/ m^3.

Also the GeoInsight report indicates that for new properties or extensions to existing properties, in accordance with the Buildings Research Establishment (BRE) publication BR211, no radon protection measures are required.

Ground Workings

The survey states there are twenty eight historical surface ground working features within 250m of the site. These are canals, unspecified pits, cuttings, water bodies, ponds, and reservoirs; the most proximal a canal, unspecified pit, and cuttings within the site boundary. The report shows five historical underground working features within 250m of the site. These are tunnels with the most proximal some 65m to the north east. The survey also indicates there are no current ground workings within 250m of the site.

Mining, Extraction & Natural Cavities

According to the GeoInsight report there are no historical mining records within 1km of the site. In addition, the report states that the site is not within a Coal Mining area as defined by the Coal Authority; although it is within 1km of a Johnson Poole and Bloomer Mining area.

The site is not within 1km of areas affected by non-coal mining, rock salt or brine extraction, natural cavities, gypsum extraction, tin mining or clay mining.

Natural Ground Subsidence

The report states that the site has a negligible hazard rating of natural subsidence due to shrink-swell clays, ground dissolution of soluble rocks, and collapsible deposits; and a very low hazard rating due to landslides, compressible deposits, and running sands.

Railways and Tunnels

According to the GroundSure report the site is within 250m of one underground railway line, or other railway tunnel. This is located 146m to the east and comprises a railway tunnel. The site is within 250m of one hundred and five historical railway and tunnel features, consisting of railway sidings, tunnels, and railways with the most proximal being railway sidings within the site boundary and dated to 1974. The report also indicates the site is within 250m of thirty active railways, with the closest located 14 metres to the south east of the site.

The survey indicates that the site is not within 5km of the High Speed 2 rail project and is not within 500m of the Crossrail rail project

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2.3 Environmental Appraisal

An environmental data search has been carried out by GroundSure and the results are given in the appended "EnviroInsight Report". A summary is as follows:

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 500 metres 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 500 metres 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 500 metres of the site boundary.

Part A(2) and Part B Authorisations

According to the environmental data report there are six Part A(2) or Part B (formerly LAPC/ LAPPC) Authorisations related to air pollution within 500 metres of the site boundary. The most proximal being a Part B Permit Type located 167m to the east.

Radioactive Substance Licences

The environmental data report indicates that there are five records of Category 3 or Category 4 Radioactive Substance Licenses within 500 metres of the site boundary. All located 276m to the south east and associated with the University of Central Lancashire.

Discharges

According to the environmental data report there are no licensed discharge consents within 500 metres of the site boundary.

Planning Hazardous Substances Consents and Enforcements

There are no records of Planning Hazardous Substances Consents and Enforcements within 500 metres 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 500 metres of the site boundary.

Pollution Incidents

The environmental data report indicates that there have been no pollution incidents within 250 metres of the site boundary.

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Contaminated Land

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

Registered Landfill Sites

According to the environmental data report there is one registered landfill site within 250 metres of the site boundary. This is a disused canal located within the site boundary and adjacent to the east which had its license issued in 1978 and was surrendered in 1994.

Unregistered Landfill Sites

The historical appraisal has identified four unregistered landfills in the form of ponds, reservoirs, and canals infilled with unknown material which may be a source of ground gas. The most proximal a canal 10m to the east infilled by 1980.

Other Waste Treatment, Transfer and Disposal Sites

According to the environmental data report there is one waste treatment, transfer and disposal sites within 250 metres of the site boundary. This is located 230m to the south west and comprises a waste metal transfer station.

Current Land Use

Current potentially contaminative industrial land uses are recorded by the environmental data report. Within the site boundary are no current potentially contaminative industrial land uses. Within 250 metres of the site boundary there are factories, depot, electricity sub station, industrial products, works, hire services, motoring, and tanks; the most proximal a factory some 54m to the north east.

Historical Land Use

According to the Enviroinsight Report there are one hundred and forty eight potentially contaminative uses identified within 250 metres of the site boundary. These included unspecified pits, railway sidings, cuttings, goods station, unspecified commercial / industrial, unspecified mills, unspecified shed, soap works, unspecified works, unspecified depot, tunnels, unspecified tanks, cotton spinning mill, railway building, canal yard, cotton mill, grave yard, dock yard, engine shed, flax spinning mill, basin, worsted spinning mill, croft mill, and sawmill; the most proximal unspecified pits, railway sidings, and cuttings within the site boundary.

There are nineteen historical tanks within 250 metres of the site boundary. These are tanks and unspecified tanks with the most proximal a tank 66m to the south. There are nine historical energy features within 250 metres of the site boundary. These are electricity substations with the most proximal some 109m to the north east. There are twelve historical garage and motor vehicle repair sites within 250 metres of the site boundary. These are vehicle repair depots and garages with the most proximal a vehicle repair depot 92m to the north west. There are forty potentially infilled land features within 250 metres of the site boundary. These are canals, cuttings, unspecified pits, water bodies, ponds, tunnels, grave yard, dock yard, and reservoirs with the most proximal canals, cuttings, and unspecified pits within the site boundary.

There are no historical petrol and fuel sites within 250 metres of the site boundary.

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Past potentially contaminative land uses are identified in the historical appraisal and include, in addition to the above, warehouses, mills, train stations, tanks, railway lines, tramway, goods station, engine house, cattle pens, saw mills, soap works, engine shed, steam laundry and cleaning works, maltkilns, canal works, coal yard, garages, depot, footware factory, tyre depot, and a vehicle depot.

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 glaciofluvial ice contact deposits which are indicated to be a Secondary A Aquifer.

The bedrock comprise Sherwood Sandstone Group which are indicated to be a Principal Aquifer.

A Principal Aquifer comprises strata of high intergranular and/ or fracture permeability, usually providing a high level of water storage and may support water supply and/ or river base flow on a strategic scale.

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 no surface water abstraction licences within 1000 metres of the site boundary, three groundwater abstraction licences within 1000 metres of the site boundary; the most proximal some 252m to the south west, and no potable water abstraction licences within 1000 metres of the site boundary.

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

The GroundSure survey indicates that the groundwater vulnerability and soil leaching potential of the site is classified as Major Aquifer with a High Leaching Potential.

The environmental data report indicates that there are no watercourses within 250 metres of the site boundary.

There are no Floodplains, Flood Defences and/ or Flood Storage Areas present within the 250 metres of the site boundary according to the environmental data. The report also indicates that the highest risk of flooding onsite from rivers and seas is very low.

According to the environmental data report the British Geological Survey indicate that the site has a potential below surface susceptibility to clearwater groundwater flooding. The British Geological Survey confidence rating in this result is low.

Environmental Sensitivity

According to the environmental data report the site is not within 500 metres of a Designated Environmentally Sensitive Site.

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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:

- General contaminants in made ground derived from past building and demolition processes and materials.
- Hydrocarbon contamination from spillage and leakage of oils and fuels associated with vehicles and machinery and bordering railway line.
- Landfill gases from infilled canal, reservoirs, and pond within 250m
- Possibility of general contaminants from past construction activities and landscaping
- Possible migration of landfill gases from any areas of significant infill and made ground on site

Pathways

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

- Direct contact with and ingestion of contaminated soil and inhalation of dust by site workers during construction and by end users of the site in any 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 landscaped areas.
- Migration of contaminants to the underlying aquifer.
- Accumulation of landfill gases in enclosed spaces.

Receptors

Potential receptors for the proposed development are:

- Site workers during the demolition and construction phases.
- The residents who will be the end users of the site.
- Controlled waters including the underlying aquifer.
- Plants grown in the landscaped areas.

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 4 CONCEPTUAL GROUND MODEL

Potential Source	**Nature of Hazard**	**Contaminants Associated with the Source**	**Pathway**	**Receptor**	**Preliminary Risk Rating**
Made Ground from past construction and demolition materials Bordering railway line	Contaminants in Made Ground	<u>Gen. Contaminants</u> Arsenic Cadmium Chromium Lead Mercury Nickel Selenium Boron Copper Zinc Cyanide Sulphide Sulphate pH Phenols Polynuclear Aromatic Hydrocarbons (PAH) Total Petroleum Hydrocarbons (TPH) Asbestos	Ingestion of soil Ingestion of dust Dermal contact Inhalation of dust Inhalation of vapours	Site Operatives 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
Tanks/ Machinery/ Vehicles Bordering railway line	Fuel/ oil spillage and/or leakage from machinery and/or fuel/oil tanks and/or vehicles	Total Petroleum Hydrocarbons (TPH) Benzene/ Toluene/ Ethylbenzene/ Xylene (BTEX) Chlorinated Solvents	Ingestion of soil Ingestion of dust Dermal contact Inhalation of dust Inhalation of vapours	Site Operatives 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
Infilled canal 10m to the east, and infilled reservoirs and pond within 250m	Ground Gas (Asphyxiation, fire and explosion)	Methane Carbon Dioxide	Inhalation of gas Ignition of gas	Site Operatives End Users	Moderate

The conceptual ground model indicates that 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.

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In addition the conceptual ground model indicates that ground gases may be present and hence gas standpipes should be installed and monitored over an extended period of time to allow for an assessment to be made.

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 Miss Anna Marsden at our Preston office.

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