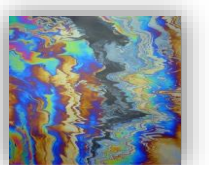
INVESTIGATE



REMEDIATE

REGENERATE

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

WALKOVER SURVEY
AND DESK STUDY
AT
HIGH STREET,
LEEK,
STAFFORDSHIRE
FOR
MARCUS MACHINE & TOOLS LTD

DESK STUDY NO. M3157
MAY 2016

SUB SURFACE MIDLANDS LIMITED
28 Brook House
Brook Street Business Centre
Brook Street
Tipton
West Midlands
DY4 9DD
Tel: 0121 5208538, Fax: 0121 5203878
Email: midlands@subsurface.co.uk

CONTENTS

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

WALKOVER SURVEY AND DESK STUDY AT HIGH STREET, LEEK, STAFFORDSHIRE

CLIENT: MARCUS MACHINE & TOOLS LTD

---

1. INTRODUCTION

This report has been prepared in accordance with an emailed instruction, dated 30th March 2016, from the Client.

The brief was set out in our estimate, ref. EM4633 and dated 23rd March 2016, 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 High Street, Leek, Staffordshire, ST13 5DZ, as indicated in Figure 1. The approximate National Grid Reference of the centre of the site is 398258,356481.

As shown in Figure 2, the 0.12ha site generally consists of two L-shaped areas linked by a narrower area in the central western part of the site. The larger northern part of the site was previously occupied by a garage with a depot previously occupying the southern part, however at the time of the investigation the site had been cleared of any former buildings and structures. The ground level of the southern part of the site was approximately 2m lower than the north, due to the surrounding area sloping moderately from north to south.

The site is bound by High Street to the north, Strangman Street to the south, Royal Mail premises and shops to the east, and residential flats and works units to the west.

1.2 Purpose of the Desk Study

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.

1.3 Walkover Survey

The site walkover survey was undertaken on 20th April 2016. Photographs taken during the site walkover are appended.

In the northern part of the site, previously occupied by a garage, a generally level concrete ground surface was present throughout, with patches of weeds in places and slightly raised in the south east corner. The remains of steel uprights aligned from north to south were noted within the centre of the site, indicating a former wall. The site was bound by a 3m brick wall to the east and with steel railings to the north and west.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

In the southern part of the site, previously occupied by a depot, the level ground surface comprised concrete, mainly to the east and west, and gravel and wood chippings overgrown with weeds in other areas. The site was bound by an old brick-built works building to the west, presently occupied by a repair garage and cleaning works. The south of the eastern boundary was formed by a 2m brick wall, with a Royal Mail depot beyond. The north east section of this area was largely bound by a brick retaining wall to accommodate the approximate 2m rise in ground level from south to north.

In the central western part of the site, was located a small area which connected the north and south sections. The sloping ground level was formed by evidently tipped building rubble, largely comprised concrete and brick, overgrown with weeds in places. A large old metal storage tank and some general litter were present in this area. Partly buried stone steps with a steel handrail were also noted adjacent to the boundary wall.

There were no indications of contamination, spillages or significant issues in relation to contamination on the site.

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
1878-1879	1:10,560
1898	1:10,560
1923	1:10,560
1938	1:10,560
1946-1951	1:10,560
1955	1:10,560
1966	1:10,560
1976	1:10,000
1992	1:10,000
2002	1:10,000
2010	1:10,000
2014	1:10,000

TABLE 2 LARGE SCALE SURVEYS

Date	Scale
1879	1:500*
1979-1881	1:2,500
1899	1:2,500
1925	1:2,500
1937	1:2,500
1965	1:1,250**
1964-1968	1:2,500
1978***	1:1,250**
1990-1993	1:1,250**

* Published scale, the appended extract is reproduced at 1:1,000
** Published scale, the appended extract is reproduced at 1:2,000
*** Site partially shown

Extracts of the above surveys are appended.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

TABLE 3 HISTORICAL APPRAISAL

Date	On site	Beyond site boundary
1878-1881	At the time of the earliest survey the site had been developed with a mixture of non-specified buildings, intervening yard and/ or courtyard areas and gardens, largely indicative of a residential area. The map depicts a row of adjoining buildings in the southern half, several adjoining buildings at the central western boundary, and a number of smaller buildings in adjacent areas. Gardens are shown approximately comprising the northern third and southern fifth of the site.	The site is located in the west of Leek with commercial, residential and possible works buildings in areas adjacent to the north, east and south of the site. Some 20m to the east is shown St. Edward Street densely lined with predominantly commercial buildings. In addition a grave yard is shown 90m to the north east. The area adjacent to the west of the site is undeveloped however, a number of works are depicted further west. These include several silk mills, the nearest 100m to the north west, and a dye works and saw mill, some 180m and 210m to the west, respectively. Additional silk mills are also shown 135m to the north and 245m to the south east of the site.
1898-1899	By this time the row of buildings in the south of the site had been largely demolished.	Terrace housing and a school are shown some 80m west of the site. A saw mill and timber yard are shown 180m to the south.
1923-1925	The north west of the site has been developed with a non-specified building, possibly works.	By this time the north and south of the site are delineated by High Street and Strangman Street. Several new adjoining buildings delineate the western boundary including a theatre to the north. Field Street is shown 20m to the west with new buildings, including possible works and terraced housing, beyond.
1937-1955	The survey shows redevelopment within the southern half of the site, with two adjoining probable works buildings, later indicated as a depot.	Additional buildings are shown adjacent to the east of the site. New housing is shown 70m to the south.
1964-1968	By this time a large works building, indicated as a garage, extends over most of the northern section of the site. There are no indications shown at this time or later surveys to indicate the present of a service station with fuel tanks on the site, and we consider it most likely that the works comprise a repair garage. The southern building is indicated as a Depot.	A coal yard is indicated adjacent to the south of the western boundary, and a post office and telephone exchange to the east. A number of garages are shown with the nearest 25m to the south west and 55m to the west, and a probable service station depicted 75m to the south west. In addition a mill is shown some 10m to the south, a warehouse 50m to the south west, and non-specific works some 35m to the north, 85m to the south west and 95m to the north east.
1976-1978	No significant changes are noted at this time.	A former works building adjacent to the east of the site has been demolished.
1990-2002	The depot building in the southern part of the site has been demolished.	The area 10m to the north of the site, beyond High Street, has been largely redeveloped as a car park. In addition a shopping complex is indicated 90m to the east. Electrical substations are shown 50m to the north and 80m to the west of the site.
2010-2014	By this time the site had been cleared of former buildings.	No significant changes are noted at this time.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

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 some would be expected.

Drift

According to the GeoInsight report there are no drift deposits beneath the site, however a thin layer of residual soil is likely to be present.

Bedrock

The bedrock underlying the site is indicated to be Triassic sandstones and conglomerates of the Chester Pebble Beds Formation.

The report records no faults within 500m of the site.

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 Area 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 Building Research Establishment (BRE) publication BR211, no radon protection measures are required.

Ground Workings

The survey indicates there is one historical surface ground working feature within 250m of the site; an unspecified pit some 187m to 197m to the north.

Mining, Extraction & Natural Cavities

According to the GeoInsight report there are no records of historical, coal or non-coal mining within 1km of the site.

In addition the site is not in an area affected by non-coal mining, natural cavities, brine or gypsum extraction, tin mining or clay mining.

Natural Ground Subsidence

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

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

Railways and Tunnels

The report shows are no records of historical or active railway or railway tunnel features within 250m of the site.

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:

Historical Land Use

According to the survey there are seventeen historical records of potentially contaminative land use within 250m of the site boundary which includes mills 85m and 122m to the west, and 161m to the north west, a sawmill 184m to the south, and a firestation 195m to the east.

The report shows five records of historical records indicative of tanks or troughs within 250m of the site, which are dated from 1879 with the nearest some 18m and 25m to the east. The report also indicates there are five electrical substations within 250m of the site, with the nearest located 51m to the north and 81m to the west.

The report indicates there are thirteen garage or motor vehicle repair sites within 250m of the site, which include garages on site, 27m and 56m to the south west, 31m and 54m to the west, 125m to the south, and 127m to the north.

According to the survey there are two records of potentially infilled land within 250m of the site for an unspecified pit some 187m to the north.

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 nine Part B (formerly LAPC/ LAPPC) Authorisations related to air pollution within 500m of the site boundary, with the nearest some 76m to the west.

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.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

Discharges

According to the environmental data report there are two licensed discharge consents within 500m of the site boundary, located 229m to the east and 466m to the north east.

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 500m of the site boundary.

Pollution Incidents

The environmental data report indicates that there has been one pollution incident within 250m of the site boundary, occurring 99m to the north in 2002 with no significant impact.

Contaminated Land

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

Landfill Sites

According to the environmental data report there are no registered landfill sites within 250m of the site boundary.

Other Waste Treatment, Transfer or Disposal Sites

According to the environmental data report there are no waste treatment, transfer or disposal sites within 500m of the site boundary.

Current Land Use

There are thirty-one sites with current potentially contaminative industrial land use within 250m of the site as recorded by the environmental data report. These include vehicle repair garages 4m and 61m to the west, a warehouse 66m to the south west, and a water pumping station 162m to the west. In addition the survey indicates petrol stations are located 156m to the south and 207m to the south west.

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 Environment Agency have designated the bedrock underlying the site as a Principal aquifer which 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.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

The environmental data report indicates there are three groundwater abstraction licenses and two surface water abstraction licenses within 1km of the site, with the nearest located 509m to the north and 667m to the north west, respectively. In addition there is one potable water abstraction license record within 2km of the site, for a site located 1190m to the north.

The site is located within a Source Protection Zone 3, set up to protect a water source total catchment area, according to the environmental data report.

The environmental data report indicates there are no Detailed River Network entries within 500m of the site and no surface water features within 250m of the site.

There are no Floodplains, Flood Defences and/ or Flood Storage Areas present within the 250m of the site boundary according to the environmental data.

According to the environmental data report the British Geological Survey reports that the site is within 50m of areas susceptible to groundwater flooding associated with the underlying aquifer. However the report indicates there is limited potential for groundwater flooding and they have low confidence in the accuracy of the information.

Environmental Sensitivity

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

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

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 waste materials, together with the sites past use a repair garage and depot.
- Hydrocarbon contamination due to spillage and leakage of oils and fuels from vehicles, machinery and storage associated with former land use including garage.
- Ground gases from areas of infill on site and in surrounding area.

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 demolition and by end users of the site in garden areas.
- 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 any proposed gardens or landscaped areas.
- Migration of contaminants to the underlying aquifer.
- Consumption by end users of the site of contaminated fruit and vegetables grown in any proposed garden areas.
- Accumulation of ground gases in enclosed spaces.

Receptors

Potential receptors for the proposed development are:

- Site workers during the demolition and construction phases.
- The end users of the site.
- Controlled waters including the underlying aquifer.
- Plants grown in any proposed garden or 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:

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

TABLE 4 CONCEPTUAL GROUND MODEL

Potential Source	**Nature of Hazard**	**Contaminants Associated with the Source**	**Pathway**	**Receptor**	**Preliminary Risk Rating**
Made Ground (present on site) and contamination associated with sites past use as a repair garage and depot	Contaminants in Made Ground	Gen. Contaminants Arsenic Cadmium Chromium Lead Mercury Nickel Selenium Boron Copper Zinc Cyanide Sulphide Sulphate pH Phenols Polynuclear Aromatic Hydrocarbons (PAH) Total Petroleum Hydrocarbons (TPH)	Ingestion of soil Ingestion of dust Ingestion of contaminated vegetable produce 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
Asbestos in Made Ground	Asbestos	Asbestos fibres	Inhalation of fibres	Site Operatives End Users	Moderate
Machinery/ Vehicles/ Storage associated with former land use including garage	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)	Ingestion of soil Ingestion of dust Ingestion of contaminated vegetable produce 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
Made ground on site and areas of infill in surrounding areas	Ground Gas (Asphyxiation, fire and explosion)	Methane Carbon Dioxide	Inhalation of gas Ignition of gas	Site Operatives End Users	Very low

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk

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.

If any significant depth of made ground is found to be present on site, it may be necessary to install standpipes for ground gas monitoring over a period of time. This should be reviewed at the time of any investigation.

2.5 General

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

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 Mr Gurbinder Singh Mann at our Tipton office.

SUB SURFACE CONSULTANTS LIMITED
REPORT No. M3157
MAY 2016

T Plum B.Sc. (Hons.), MSc.
Geoenvironmental Engineer
For and on behalf of
Sub Surface Consultants Limited

C. A. Marsden B.Sc.(Hons.), C.Eng., M.I.C.E.
Director
For and on behalf of
Sub Surface Consultants Limited.

Sub Surface Midlands Limited
28 Brook House, Brook Street Business Centre, Brook Street, Tipton, West Midlands DY4 9DD
Tel: 0121 5208538 Fax: 0121 5203878 Email: midlands@subsurface.co.uk