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IS105-02/AES/FL/GP

For the attention of: Mrs Geraldine Horner
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PHASE 1 DESK STUDY REPORT
For
COMPTON MILL,
PROSPECT PLACE, LEEK

This report was carried out in accordance with JPB Quality Management procedures.

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1.0 INTRODUCTION

1.1 Further to the written instruction dated 27 August 2008 from Gladman Homes, Johnson Poole and Bloomer Limited (JPB) is pleased to present a Phase 1 Desk Study Report on the site known as Compton Mill, Prospect Place, Leek.

1.2 This report has been written for Gladman Homes and is required to assist in highlighting any potential environmental and / or ground related risks and liabilities associated with ownership of the site, from its past and current uses. Information is also provided relating to the on site ground conditions, together with any issues which could lead to potential environmental risks or financial liabilities and affect the land value or impact upon potential redevelopment options.

1.3 At the time of writing, it is understood that Gladman Homes is intending to purchase the site for redevelopment into a three to four storey residential retirement apartment block with possible under croft or basement parking, together with some amenity space.

1.4 This report is based on desktop research which has included a search of JPB's own archive of geological maps and memoirs, historical Ordnance Survey (OS) plans and other published information as detailed in Appendix A. The historic OS plans are presented in Appendix B.

1.5 A site walkover inspection was conducted on 25 September 2008 as part of this commission, and a GroundSure Report has been purchased for the site. Relevant information from the GroundSure Report is referred to in this report and a copy of the complete data set can be provided upon request. Copies of the relevant extracts are presented in Appendix C.

1.6 Based on the information held within JPB's archive and available from the British Geological Survey, The Coal Authority Gazetteer and the Law Society's Guidance Notes (2006), it was not deemed necessary to purchase a Coal Authority Coal Mining Report for this site.

1.7 Researches into the appropriate service location plans were not required as part of this commission.

1.8 In reading this report, the information discussed in Section 9.0 – General, of this Phase 1 Desk Study Report should be consulted and noted.

2.0 SITE DESCRIPTION AND SITE HISTORY

2.1 Site Description

General

2.1.1 The site is located off Prospect Place in Leek town centre, Staffordshire. The centre of the site is at approximate National Grid Reference SJ 984 562 and the general location of the site is shown on JPB Drawing IS105/02. The site boundaries are shown on JPB Drawing IS105/02.

2.1.2 The site occupies an area of approximately 0.4 hectares (ha) and is roughly square shaped in plan. The nearest bench mark to the site is located on London Street and indicates a level of 196.15m Above Ordnance Datum (AOD). Whilst the site itself is generally flat, the immediate surrounds of the site generally slope fairly steeply from east to west. This regional topography corresponds with the flow direction of the majority of watercourses, as indicated in Section 4 below.

2.1.3 A site walkover and detailed inspection was undertaken on 25 September 2008. The following represents the findings at the time of the walkover.

Site Layout

2.1.4 With the exception of the far southwestern and northeastern corners of the site, the site was completely covered with a number of buildings, all adjoining in some form and of different ages and construction. The far northeastern area of the site was covered with hardcore and used for vehicle parking and access into the units. In the southwestern area of the site, there was a tarmac covered level car parking area, which extended approximately 4m beneath the adjacent building.

2.1.5 The majority of the structure on site comprised a main warehouse unit, which occupied two floors and was of brick and breeze block construction, with concrete floors and a north lights pitched roof, constructed of possible asbestos containing material. The main access into the building was off Compton Road, where a flight of steps led up to the main entrance and ground floor. At the time of the walkover, the building was occupied by Compton Mill Antiques Fabrics and Reproductions, where antiques were stored throughout the ground floor space and the majority of the first floor level. The remainder of the first floor comprised open space, with the potential for additional storage.

2.1.6 A fabric shop and a vacant room occupied the second floor in its eastern and western halves respectively. Access onto a flat roofed area, fronting Compton Road, could be made via a small door in the vacant room.

2.1.7 On the landing of the central stairwell which accessed all floors, a door was noted at height, accessed by a metal ladder. Anecdotal information on site suggested that this door provided access to a Braithwaite style water tank. Further information suggested that a boiler room, possibly fed by the water stored in this tank was formerly present on site, but has since been removed.

2.1.8 A small garage, occupied by a carpenter's workshop, was noted in the northeastern area of the building, fronting the hardcore parking area, . The building was of mid 1920s brick and breeze block construction with a tiled pitched roof and concrete floor. A number of small structures of breeze block construction were noted externally and situated adjacent to the walls of the garage and the main building. It is considered likely that these had previously supported the storage of containers or tanks. An external (disused) lift shaft of metal construction was also noted in this area.

2.1.9 Within the northern end of the main building, and occupying the ground floor of that area was a carpenter's workshop, which was rectangular in plan. A further carpentry workshop was located in a rectangular shaped basement area, accessed by a flight of steps in the eastern area of the ground floor. The basement area was aligned in the same position as the eastern most edge of the building and the main site boundary.

2.1.10 A small hatch was noted at the top of the steps that led down to the carpentry workshop, which allowed access into a confined space that was occupied by a large storage tank, also presumed to be a Braithwaite style tank. No lighting was available in this area; however, large gaskets and valves were evident at the base of the tank. A small amount of water was also noted within the bunding surrounding the tank.

2.1.11 A second lift shaft of more recent construction was located externally in the southeastern corner of the site , which allowed movement of goods into the first floor. In this area, a further large storage tank in the Braithwaite style was present, supported on a brick and breeze block constructed bund with many pipes and gaskets noted. No evidence of staining was apparent.

Site Boundaries and Surroundings

2.1.12 Cornhill Street was located immediately along the northern site boundary, whilst beyond Cornhill Street there were a number of commercial premises. Immediately to the east of the site, there was open derelict land with 'Masons of Leek', a fabric manufacturer, and a former mill beyond. This was separated by a chain link fence approximately 2m high in the northeast of the site.

2.1.13 Duke Street, which was lined with residential terraced houses along its southern side, was located to the south of the site. To the north of Duke Street and also adjacent to the site was an electricity substation. Prospect Place and Compton Road were situated beyond the western boundary of the site, whilst a church, various commercial properties and residential terraced houses were also noted further to the west.

2.1.14 An original mill building dating to the mid 1920s was noted on the western side of the site. It is understood that the façade of this building, fronting Prospect Place, will be retained as a feature in the redevelopment. A further small basement was present beneath this part of the building. Large fire hydrant pipes and valves together with substantial cables along the ceiling were noted.

Site Access

2.1.14 Pedestrian access into the buildings could be gained off Cornhill Street in the north and Compton Road in the west. Access appeared to be fairly open, as a result of the operational businesses occupying the site. Vehicular access was made into the car parking area in the southwest off Compton Road.

Ecological Observations

2.1.15 An ecological survey has not been conducted as part of this commission, however; no specific ecological issues were noted at the time of the site walkover. No Japanese Knotweed, or any other controlled invasive plant was noted on site.

Services

2.1.16 Overhead telecom cables were noted leading to the northwestern and western areas of the building, from telegraph poles in Compton Road and Prospect Place.

2.1.17 Anecdotal information suggested that the water main for the fire hydrant were present in the small basement beneath the façade that is to remain on site. Large cables were also noted at ceiling height in the basement.

2.1.18 Various manholes were noted in the car parking area in the southwest of the site, adjacent to the tank in the southeast and also in the ground floor of the carpenter's workshop.

2.1.19 An electricity substation was located directly off the south of the site, adjacent to Duke Street. It is likely that underground cabling connecting to the sub station is present in this area.

2.1.20 A search has been undertaken to determine the proximity of underground oil / fuel pipelines. The search determined that the site is **not** in the zone of interest of the following pipeline operators:

- Coryton Energy Co Ltd (Gas Pipeline)
- Esso Petroleum Company Limited
- Mainline Pipelines Limited
- NPower CHP Pipelines
- Total Pipeline Operations
- ConocoPhillips (UK) Limited
- Manchester Jetline Limited
- Shell UK Limited
- Centrica Energy
- BPA
- Government Pipelines and Storage System
- Premier Transmission Ltd (SNIP)
- Sabic UK Petrochemicals (formerly Huntsman)
- Ineos TSEP (formerly BP TSEP)
- BP Exploration Purbeck/Southampton Pipeline
- E-on UK Plc (Gas Pipelines Only)
- ConocoPhillips Limited Humber Refinery
- Scottish Power Generation Limited
- Marchwood Power Limited (Gas Pipeline)
- National Grid (National Gas and Electricity Transmission Networks)

2.2 Site History

2.2.1 The history of the site has been traced back to 1877 using past editions of Country Series (CS) and Ordnance Survey (OS) plans. Points of interest from selected plans are summarised below, with the relevant plans reproduced in Appendix B.

On Site

2.2.2 The earliest available CS plan dated 1879 to 1881 at 1:2,500 scale shows the site to have been occupied by a thin rectangular shaped building labelled as 'Compton Mills (silk)' in the centre of the site. A road is also shown, identified as South Street, trending from the southern site boundary towards the centre of the site. A number of terraced houses are shown adjacent to both sides of South Street and also arranged around the northwest and southwest site boundaries. In the north northeastern corner of the site, a feature which may denote to a pit or small quarry is shown with its edge sloping down towards the north. A similar feature is also apparent towards the western site boundary. A bench mark is located at the end of South Road and records the level as 636.4 feet above sea level.

2.2.3 By the publication of the 1899 1:2,500 scale CS plan, a number of houses are shown in the location of the former small pit feature in the north, and a mill building in the location to the west. The silk mill is labelled as 'Mill', and then labelled again as 'Compton Mills (silk)' by the 1923 1:10,560 scale plan. The 1925 edition shows the mill had also extended to the northeast and west. It should be noted that the 1923 and 1925 plans were based on the 1877 survey which may be the reason for the varied labelling. With the exception of the gradual increase in the number of small buildings on site, no further significant changes were noted until the mid 1960s.

2.2.4 The 1965 1:2,500 OS plan shows the site to have undergone significant change. South Street and its adjacent houses, together with a number of houses situated along the sites' northern and southwestern site boundaries and the original rectangular mill building are all no longer shown. The site is now shown to be occupied by one mill building towards the west of the site and two other large rectangular buildings in the north of the site, labelled as 'Mill'.

2.2.5 By the publication of the 1974 1:10,000 scale OS plan, there are no houses remaining on site and all of the mill buildings are shown to comprise a single building occupying the majority of the site and labelled as 'Warehouse'. No further significant changes are shown on subsequent editions, and the site appears on this plan as it currently exists.

Off Site

2.2.6 On the 1878 and 1879 1:10,560 scale CS plan, the site is shown within the town of Leek, which is dominated by the textile manufacturing industry, with numerous silk mills from approximately 500m north northeast, immediately northeast, 50m east, 110m southwest and from 350m northwest of site respectively. The surrounding land is also occupied by a number of brickworks, brick fields and clay pits, approximately 700m east northeast, 220m east southeast, 950m east and southeast of the site. A gravel pit is also shown approximately 200m to the east southeast and a sand pit approximately 100m southeast from site. Further features, similar in appearance to pits, are shown at various localities around the site, including the two on site.

2.2.7 This plan also shows a gasworks and iron foundry approximately 600m southwest of the site, adjacent to the Churnet Valley railway, which trends roughly south to northwest. The railway also runs through a tunnel approximately 720m west of the site. The River Churnet is shown approximately 910m northwest with a dye works located adjacent to it. A canal arm and wharf are also shown approximately 680m to the southwest of the site.

2.2.8 By the publication of the 1898 1:10,560 scale CS plan, the sand pit, gravel pit and brick field to the east southeast of the site are no longer shown, whilst the silk mill located approximately 50m east is no longer labelled.

2.2.9 The 1923 1:10,560 and 1925 1:2,500 scale CS plans show further labelled mills at approximately 30m and 70m to the northeast, 50m to the east northeast and 60m to the east. A dye works is recorded approximately 50m to the north of the site whilst an Iron and Brass foundry is located approximately 750m to the southwest of the site.

2.2.10 Expansion of Leek towards the west and northeast occurred gradually during the 1940s and is shown on the 1949 1:10,560 CS plan. The various brickworks and pits are no longer shown on this edition. By the publication of the 1965 1:1,250 scale OS plan, the silk mills are labelled as Mills and the dye works as Works. The 1974 1:10,000 scale OS plan shows the railway to have been dismantled and the Iron and Brass Foundry to have been replaced by houses. The canal branch and wharf are also no longer shown by this date.

2.2.11 The 1992 1:10,000 scale OS plan shows further residential expansion to the east and west. This plans shows the site and its surroundings as they appear on the latest edition and as they currently exist.

2.3 Additional Researches

2.3.1 From internet based searches, including British History Online and the Historical Directories search, additional information on Compton Silk Mills has been obtained.

2.3.2 Kelly's Directories record that Compton Mills, Leek was a sewing silk manufacturers owned by Henry Bermington & Son. In 1912 the company was exchanged with Trafford & White, which was a partnership with Herbert Trafford & Job White. The firm was renamed Job White & Sons Ltd in 1924. It became a public company in 1962 and by 1964 the firm, one of the largest manufacturers of knitted headwear in the country, employed 600 people, over half of which were employed at Compton Mill.

2.3.3 A number of photographs were taken during the Coronation of Queen Elizabeth II and these include photographic records of some of the activities at Compton Mill. The pictures show braiding, knitting, cutting headwear, packing and hank-dying in wooden dye banks, and are presented in Appendix D. This suggests that the processes at the mill were not limited to weaving.

2.3.4 The knitting department was transferred to Compton Mills from another company in 1962 and in 1964 Compton Mills were burnt down, but were later reopened in 1965. This coincides with the historic plans presented in Appendix B.

2.3.5 The firm was acquired by Wardle & Davenport Ltd. in 1970 and went into liquidation later the same year. The site is shown to be occupied by one large warehouse on the 1974 1:10,000 scale OS plan.

3.0 GEOLOGY, MINING & QUARRYING

3.1 Geology

3.1.1 It is anticipated that a layer of Made Ground may be present across the site, generally associated with the construction and demolition of on site buildings, and off site buildings and roads. Historic plans identify localised pit features in the northeast and west of the site, which may possibly have been infilled at a later date leading to an increase in thickness of Made Ground in this area.

3.1.2 The published British Geological Survey (BGS) bedrock and superficial map for the site (Buxton – Sheet 111, 1:50,000 scale) indicates the solid geology underlying the site to comprise the Chester Pebble Beds Formation of the Triassic aged Sherwood Sandstone Group. The Chester Pebble Beds consist of red pebbly sandstone with thick beds of conglomerate and are underlain unconformably by the Namurian Millstone Grit Group (Carboniferous). There are no superficial deposits recorded beneath the site.

3.1.3 The nearest fault is located approximately 300m southeast of the site, which trends northwest to southeast and downthrows the strata to the southwest.

3.1.4 An extract of the BGS plan is shown on JPB Drawing IS105/03.

3.2 Mining and Quarrying

3.2.1 Reference to the Coal Authority Gazetteer and the Law Society's Guidance Notes (2006)indicated that a coal mining search was not required for the site.

3.2.2 Consultation of the Department of the Environment (DOE) Review of Mining Instability in Great Britain (1991) indicates that the site is not within a mineral extraction area.

3.2.3 The historic plans provided with the GroundSure Report show possible pits in the northeast and west of the site, and also in the surrounding area on the 1879 to 1881 County Series plan. No further information regarding depth or type of pit is available. It is possible that sand and / or gravel may have been extracted from these pits, however; due to later developments in this area it is anticipated that they will have been infilled with unknown materials.

3.2.4 Three types of historic surface ground workings are recorded in the GroundSure reports as being located within 500m of the site. Sand pits were located approximately 100m and 175m to the southeast, brickfields and brickworks approximately 110m east and 190m southeast and gravel pits approximately 200m to the east of the site respectively. These ground workings were shown on the historic plans until the 1898 1:10,560 scale CS plan.

3.2.5 The GroundSure report also indicates five entries for historic underground tunnel workings at one location approximately 760m west from site. This is considered to represent the railway tunnel at that location, which was recorded on the earliest available historic plan dated 1877 at 1:10,560 scale.

3.2.6 The 2007/2008 Directory of Quarries and Quarry Equipment indicates that there are no active quarries within a 1km radius of the site.

3.2.7 Mining and quarrying activities are therefore considered to be **potentially significant** to the site and its future redevelopment, in relation to the two potential infilled pits on site.

3.3 Ground Stability Hazards and Surface Stability (Excluding Mining)

3.3.1 It is indicated in the GroundSure Report that on site there is a very low risk from landslide ground stability hazards. The remaining ground stability hazards are all recorded as negligible and indicate that no special action is required.

3.3.2 These ground stability hazards are generally regional designations and are likely to be attributed to the underlying geology, the surrounding topography of the site and therefore ground stability hazards are considered to be **not significant** to the future residential development of the site.

3.4 Radon

3.4.1 Citing the BGS and Health Protection Agency, the GroundSure Report indicates that less than 1% of homes are above the residential action level of 200 Bqm^{-3} for radon gas and no radon protective measures are considered necessary in the construction of new dwellings or extensions.

3.4.2 Radon gas is considered to be **not significant** to the proposed future residential redevelopment of the site.

4.0 ENVIRONMENTAL SETTING

4.1 General

4.1.1 In reading the following sections, reference to the sensitivity plans reproduced from the GroundSure Report presented in Appendix C should be made.

4.2 Hydrogeology

4.2.1 The relevant groundwater vulnerability map for the site, Derbyshire and North Staffordshire (Sheet 17, 1:100,000 scale), provides the following classification of the aquifer at the site and its environs:

Table 4.1: Aquifer and Leachability Classification

Strata	Aquifer	Soil Leachability
Chester Pebble Beds	Major [1]	High (U)[2]

[1] **Major Aquifer:** Highly permeable formations usually with a known or probable presence of significant fracturing. This may be highly productive and able to support large abstractions for public supply or other purposes.

[2] **High (U):** Soils with little ability to attenuate diffuse source pollutants. Non-adsorbed diffuse source pollutants and liquid discharges have the potential to move rapidly to underlying strata or to shallow groundwater. Soil information for urban areas and restored mineral workings is based on fewer observations than elsewhere and therefore, a worst case vulnerability classification is assumed for these areas and for current mineral workings. All are given a designation HU until proved otherwise.

4.2.2 Information obtained from the Environment Agency (EA) website indicates that the site is located within the Total Catchment (Zone 3) of a groundwater Source Protection Zone (SPZ) for a potable water supply abstraction located approximately 1.4km to the north.

4.2.3 From information supplied in the GroundSure Report, there are no discharge consents or recorded pollution incidents affecting groundwaters within a 1km radius of the site.

4.2.4 There are two licences for groundwater abstractions within 1km of the site. The first is located approximately 690m to the northeast from a borehole for process water and the second is located approximately 785m to the northwest from a well for general farming. It should be noted that not all groundwater abstractions are required to be licensed and therefore private abstractions may exist.

4.2.5 The site is located within a Nitrate Vulnerable Zone, which indicates that waters are already impacted by, or are sensitive to, nitrate pollution.

4.2.6 The Water Framework Directive (WFD) is European Legislation to ensure waters are managed to achieve good quality water across Europe. In the UK, the WFD is governed by the EA who is responsible for making plans to protect and improve lakes, rivers, groundwaters and coastal water habitats. Risk assessments of these water bodies are based on point and diffuse sources of pollution, water abstraction and flow regulation, physical and morphological alteration to water bodies and alien sources. Information from the EA website indicates that the groundwaters underlying the site and its surrounding area are **at risk** of failing to meet the objectives set out in the WFD; this appears to be a regional status.

4.2.7 The EA manage water resources through the Catchment Abstraction Management Strategies (CAMS) which manages how much groundwater is removed. This could affect heavy industrial or agricultural users of water, as the EA may need to suspend licences to maintain water levels for personal use. The site is within a CAMS area.

4.2.8 On the basis of the available researched information, groundwaters underlying the site are considered to be of **moderate to high sensitivity**.

4.3 Hydrology

4.3.1 The nearest surface water features have been identified from the current OS Plan, GroundSure Report and site walkover inspection. Details of distance and bearing from the site and flow direction, where available, are presented in Table 4.2.

Table 4.2: Location of Surface Water Features

Surface Water Feature	Distance and Bearing from Site	Flow Direction
Unnamed Drainage Channels	310m SE	NE to S
	550m NE	E to W
(Lady o' th' Dale Well)	600m SE	E to W
Pond	750m SSE	N/A
Fish Pond	800m N	N/A
Unnamed Drainage Channels	890m S	E to W
	920m N	E to W
River Churnet	990m NW	E to W

4.3.2 The General Quality Assessment scheme (GQA) is the EA's national method for classifying water quality in rivers and streams. A monitoring station is located approximately 1km northwest of the site on the River Churnet and in 2006 the chemical quality of the river was classified as Grade B (good).

4.3.3 Information within the GroundSure Report indicates that there are no discharge consents or recorded pollution incidents to surface waters within 1km of the site. There is one recorded surface water abstraction licence within 1km of the site, which is located approximately 950m to the northwest of the site for milling and water power.

4.3.4 The site is located within a Nitrate Vulnerable Zone, which indicates that waters are already impacted by, or are sensitive to, nitrate pollution.

4.3.5 Information from the EA website indicates that the surface waters in the vicinity of the site and its surrounding area are **at risk** of failing to meet the objectives set out in the WFD; this appears to be a regional status.

4.3.6 Based on the researched information, surface waters in the proximity of the site are considered to be of **moderate sensitivity**.

4.3.7 Information provided by the EA indicates that the site is not at risk from flooding from standard or extreme flood events from rivers without defences. Therefore, flooding at the site is considered to be **not significant** to any future redevelopment.

4.4 Landfill and Waste Management Sites

4.4.1 Information from the GroundSure Report and consultation of the EA website indicates that within 1km of the site there is/are;

- One operational landfill site located approximately 995m north from the site. This site is recorded as Fowlchurch Landfill, is recorded as accepting difficult wastes and is operational as far as known.

- Four historic landfill sites, where the nearest three are also recorded as non-operational landfill sites. These are located approximately 660m to the northeast at British Trimmings (authorised to take industrial and commercial waste), approximately 670m to the west at the rear of Station Garage (inert waste), Croda Leek Limited approximately 820m to the southwest (inert, industrial and commercial waste) and approximately 885m to the northeast at the land between Weston Street and Prince Street (unknown waste).

- Four EA REGIS waste sites, all located at Fowlchurch Road transfer station from approximately 920m north to 990m north for household, commercial and industrial waste.

4.4.2 Recorded / registered landfill and waste sites are considered **not significant** to the subject site due to their significant distances from the site.

4.4.3 However; due to the presence on site of two possible former pits that may have been infilled with unknown materials, and former sand, gravel and clay pits within 250m of the site, infilled land on and off site is considered to be **potentially significant** to the site and its future residential redevelopment. This is due to the potential for contaminated and / or biodegradable infill materials resulting in the generation of ground gases and leachate.

4.5 Control of Major Accident Hazards (COMAH)

4.5.1 The Control of Major Accident Hazards (COMAH) amendments came in to force on the 30 June 2005 replacing the previous COMAH 1999 regulations. The amendments aim to prevent and mitigate the effects on people and the environment of those major incidents involving dangerous substances such as natural gas, oil or explosives (not exhaustive).

4.5.2 The GroundSure report indicated that there are no COMAH sites located within a 1km radius of the site and are therefore **not considered to be significant** to the site or its future residential development.

4.6 Summary of Additional Environmental Information

4.6.1 In addition to the information above, within a 1km radius of the site there are six sites with Local Authority Pollution Prevention and Control (LAPPC) permits. The nearest active permit is located approximately 230m to the west, at Premier Garage.

4.6.2 Searches made of the GroundSure report and the MAGIC website have not revealed any environmentally sensitive or important sites (e.g. SSSI) within 1km of the site.

4.6.3 The above are therefore considered to be **not significant** to the site or its future residential redevelopment.

5.0 QUALITATIVE RISK ASSESSMENT AND CONCEPTUAL SITE MODEL

5.1 In the UK, the currently adopted method of assessment of potential contamination risk is to consider contamination in terms of **source, pathway and receptor,** thus deriving a conceptual model for the site. This method is broadly termed as a 'risk assessment' approach. The first stage in such an assessment is to identify whether a potential source exists due to the presence of contaminated soil, groundwater or ground gas beneath the site or neighbouring sites. The next step is to identify how such sources of contamination might be transferred, via a specific pathway to identified receptors, either on, or in the vicinity of the site. Consequently, the possible risk posed can be considered.

5.2 Based on the researches undertaken using historical plans of the site, site walkover inspection and other information sources (detailed in Appendix A), the following are considered to be **potential historic and present on site** sources of contamination.

- Made Ground materials consisting of construction and/or demolition wastes - heavy metals, hydrocarbons and asbestos;
- Possible infilled pits in the northeastern and western areas of the site (infill unknown) - ground gases and leachate migration;
- Contaminants arising from processes on site such as textile dying and potential manufacture of artificial silk - heavy metals, solvents, inorganic and organic compounds;
- Contaminants arising from maintenance of machinery in various mill processes - hydrocarbons fuels and oils;
- Spills and leakages of process materials - heavy metals, solvents, inorganic and organic compounds;
- Possible asbestos containing materials within the Made Ground following demolition and within the fabric of the building.

5.3 The potential historical or current **off site** sources of contamination include the following;

- Made Ground likely to comprise construction and/or demolition waste from development of surrounding roads and buildings - heavy metals, hydrocarbons and asbestos;
- Contaminants arising from local mills and textile industry - heavy metals, solvents, inorganic and organic compounds;
- Metals, solvents and inorganic contaminants from silk mills and dye works and other industrial premises in the area;
- Infilled sand, gravel and clay pits with unknown materials - ground gases and leachates;
- Polychlorinated Biphenyls (PCBs) from the adjacent electricity substation.

5.4 It is understood that Gladman Homes are purchasing the site with the intention of redeveloping it for retirement apartments. Based upon this end use, the potential **receptors** from the identified potential sources of contamination are considered to include;

- Current site users;
- Future retirement apartment residents;

- Controlled waters (groundwaters and surface waters considered to be of moderate to high and moderate sensitivities respectively);
- Construction personnel during redevelopment;
- Adjacent site neighbours;
- Flora and fauna.

5.5 The **potential pathways** linking the identified potential contamination **sources** and the **receptors** are considered to be:

- Direct contact with any potentially contaminated soils and / or standing and surface waters;
- Surface water run-off via land;
- Leaching of elements and compounds from soils and their mobilisation within shallow groundwaters and surface waters;
- Dust and vapour inhalation;
- Migration of ground gases into buildings.

5.6 On the basis of the researched information, it is considered from the above that there are potentially complete **source - pathway - receptor linkages** at the site predominantly from the historic use of the site as a silk mill. Given that most of the site is likely to be covered with buildings and hardstanding upon redevelopment, the pathway of direct contact with contaminated soils and standing waters would be minimised in the final development, however; a potential risk may remain to construction workers during the construction phase. The risk to human health is currently considered to be **moderate** for a residential end use, until the contamination status of the site can be determined.

5.7 There is potential for ground gases, including methane and carbon dioxide on site, to be generated from the possible infilled pits on site. This risk is considered to be **low to moderate** to any proposed buildings, in particular any basement or low lying confined areas.

5.8 The current environmental risks to groundwater and surface waters receptors are considered to be **moderate.** The presence of hardstanding across the site upon redevelopment would reduce the potential for rainwater infiltration, mobilisation and migration of contamination.

6.0 GEOTECHNICAL AND OTHER CONSIDERATIONS

6.1 According to the BGS the site is underlain by the Chester Pebble Beds formation of the Triassic Sherwood Sandstone Group. The Chester Pebble Beds are of red pebbly sandstone with thick beds of conglomerate. Natural superficial deposits are not recorded on, or in the immediate vicinity of the site.

6.2 Made Ground materials in the form of construction and / or demolition rubble and unknown materials in the potentially infilled pits, may exist on site. The extent of infilling is currently unknown, and whether it was placed in an engineered manner. As a result, differential settlement may occur if varying depths of reworked materials or infilled materials are present on site, or if biodegradable components have degraded leaving voids. .

6.3 Given the site's past usage, there is a possibility that structures relating to previous buildings on site, for example cellars, basements and foundations, may be present beneath the surface. This could present possible hard spots to the foundations of future buildings or obstructions to the routing of buried services. Therefore, these features should be located and broken out before development.

6.4 An electricity substation was located directly off the site's southern boundary and pipes for fire hydrants were noted within the basement of the building located on the western site boundary. It is possible that some of the services extend beneath the footprint of the building and therefore all available building and service location plans should be obtained before the purchase of the site.

6.5 Potential asbestos containing materials were noted during the site visit in the form of asbestos cement, flash guards in fuse boxes and gaskets and lagging etc. Prior to demolition of the buildings a Type 3 asbestos survey should be undertaken.

6.6 It is understood that the redevelopment of the site into a 3 to 4 storey retirement apartment block may include a basement or undercroft car parking area. During the site walkover, the presence of a basement was confirmed in the east of the site and also beneath the building façade which is to remain in the redeveloped site, on the western site boundary. The presence of existing basements may be indicative that further excavation to create a larger underground area may be feasible.

6.7 Once the approximate building loads and depths to the base of the basement are available for the new development, the underlying strata would need to be physically investigated to determine its strength and maximum bearing capacities.

7.0 CONCLUSIONS

7.1 The site is located within the town of Leek, Staffordshire. Historically, Leek was a major textile and silk manufacturing area and the site itself has been used as a silk mill, together with several residential terraced houses until the mid 1970s, when the Mill was relabelled as a 'warehouse' occupying the majority of the site.

7.2 BGS plans indicate the site to be underlain by the Chester Pebble Beds Formation of the Triassic Sherwood Sandstone Group. Natural superficial deposits are absent, however; a layer of Made Ground is anticipated to be present across the site, consisting of construction / demolition / process waste to an unknown depth. Two potential pits were noted on the historic plans which may have been infilled with biodegradable or contaminated materials.

7.3 Overall, in consideration of the prevailing near surface geology, topography of the site and the absence of records of coal extraction; it is considered that deeper mining and mineral extraction are **not significant.** However, due to the presence of two infilled pits on site, and various sand, gravel and clay pits in the local area, surface / shallow mineral extraction is considered to be **potentially significant** to the redevelopment of the site.

7.4 Surface ground subsidence and stability hazards, radon gas, COMAH sites, environmentally sensitive or important sites and flooding are considered to be **not considered** to the site and its future redevelopment.

7.5 The underlying solid strata are classified as a Major Aquifer and the site is located within the Total Catchment of a groundwater Source Protection Zone for an abstraction 1.4km to the north. Groundwaters are therefore considered to be of **moderate to high sensitivity** to potential contamination arising from the site.

7.6 The identified surface waters surrounding the site, in the form of land drains, ponds and the River Churnet are considered to be of **moderate sensitivity** to potential contamination arising from the site.

7.7 All recorded historic and active landfill sites are located greater than 500m from the subject site and are therefore considered to be at a distance great enough as not to affect the site and are therefore considered **not significant** to the site. However; due to the presence on site of possible former pits that may have been infilled with unknown materials, and former sand, gravel and clay pits within 250m of the site, potential infilled land on and off site is considered to be **potentially significant** to the site and its future residential redevelopment. This is due to the potential for contaminated and / or biodegradable infill materials resulting in the generation of ground gases and leachate.

7.8 On the basis of the researched information indicating the former use of the site and the environmental setting, it is considered that from potential contamination there is a moderate risk to current site users and future site users and the environment.

8.0 RECOMMENDATIONS

8.1 Prior to the redevelopment of the site, it is recommended that a suitably designed ground investigation is conducted, in order to determine the on site specific ground conditions. In addition to determining the level and extent of any possible chemical contamination on site, the investigation should also aim to identify the composition and thickness of Made Ground on site, specifically in the areas of the potential former infilled pits. The investigation should also identify the depth to the Chester Pebble Beds, their physical properties and their competency, in order to aid with foundation design and asses the diggability of the bedrock for the basements in the proposed development. Specialist in situ and laboratory based geotechnical testing should be undertaken.

8.2 Such an investigation may also assist in locating any subsurface obstructions remaining from the historic use of the site. It is strongly recommended that all obstructions (e.g. underground structures, former foundations) are removed prior to construction works.

8.3 A programme of chemical testing is strongly recommended to establish the presence and concentrations of any contamination on site relating to the historic silk mill and manufacturing processes and material storage on and surrounding the site, in order to determine the actual risks posed to current and future on and off site users, and the local environment. A number of exploratory locations should also be installed with gas and groundwater monitoring equipment, in order to determine the presence and condition of any shallow underlying groundwater, and presence of ground gases.

8.4 Potential Asbestos Containing Materials (ACMs) were identified during the site visit and it should be noted that a Type 3 (fully intrusive) survey will be required by law prior to any major refurbishment or demolition works being undertaken on site. A scope and cost estimate has been provided by JPB under separate cover for this service.

9.0 GENERAL

9.1 Whilst confident in the findings of our report we are unable to give an assurance that they will be accepted by the authorities without question. We therefore advise that where appropriate our report and associated matters are submitted to approving bodies and approval obtained or sought before detailed design, site works or other irrevocable action is embarked upon.

9.2 The recommendations contained in this report do not constitute any form of specification for the undertaking of the works required.

9.3 The conclusions reached in this report are necessarily restricted to those that can be determined from the information consulted and may be subject to amendment in the light of additional information becoming available.

9.4 This report has been prepared for the sole use of the specified Client in the intended context stated above. It should not be relied upon or used for any other project or by any other party without the written authority from Johnson Poole and Bloomer Limited.

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