Peak Associates Environmental
Consultants Ltd
Gordon Manley Building
Lancaster Environment Centre
Lancaster University
Lancaster
LA1 4YQ

INVESTOR IN PEOPLE

PEAK ASSOCIATES
ENVIRONMENTAL CONSULTANTS LTD

Phase 1 Investigation For A Proposed Development At Shallcross Foundry, Elnor Lane, Whaley Bridge, Derbyshire, SK23 7JN

On Behalf of Mr Chris Morris

Jo Matthew BSc (Hons) MSc
Date: June 2013
Report QA No. 13055
QA Auditor: Paul Palgrave Bsc (Hons) ARSM MSc C. Geol FGS

Contents

Appendices

Appendix 1: Site Location Plan

Appendix 2: Key Site Features Plan

Appendix 3: Site Photographs

Appendix 4: Historical Ordnance Survey Plans

Appendix 5: Landmark EnviroCheck Report

1.0 INTRODUCTION

This report describes a Phase 1 Investigation undertaken on behalf of Mr Chris Morris (The 'Client') at Shallcross Foundry, Elnor Lane, Whaley Bridge, Derbyshire, SK23 7JN.

It is understood that the Client intends to redevelop the site for residential use. This report is intended to support the planning application for the new development.

The key objectives of this desk study are to identify any potentially significant constraints to redevelopment of the site due to the environmental setting and condition of the site and the surrounding area.

This report is based upon observations made on site during a walkover undertaken on 25 June 2013 and upon archival research including the analysis of historical maps, geological and hydrological data and other relevant Third Party environmental information that Peak Associates have taken to be correct, and no liability can be accepted for any inaccuracies contained within the Third Party information referenced.

This report has been produced on behalf of the Client, and no responsibility is accepted to any Third Party for all or any part. This report should not be relied upon or transferred to any other parties without the express written authorisation of Peak Associates. If any unauthorised Third Party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care or skill.

2.0 SITE DESCRIPTION

The site comprises an irregular shaped plot of land of 0.66 hectares, located at Shallcross Foundry, Elnor Lane, Whaley Bridge, Derbyshire, SK23 7JN (NGR 401600 380190), as shown on Plan 1 (Appendix 1). Plan 2 (Appendix 2) shows the locations of key features observed on site and Plan 3 is an enlarge plan showing the details of the main foundry building. A selection of photographs of key features observed on site is presented in Appendix 3.

The site comprises an entrance drive, surfaced with asphalt, which leads through the site, the main foundry building and three ancillary buildings, and various external areas.

The site lies on a north facing slope of a hillside, which slopes down to Randal Carr Brook. Mr Morris reported that part of the hillside was 'gouged out' and levelled to form the site, the majority of which is level. Beyond the levelled areas, the site slopes up to the south and down to the north. The slopes are at various gradients, the steepest of which are towards the west. Retaining walls support the hillside adjacent to the main foundry building, and below the office building.

<u>Main Foundry Building</u>

The building is of mainly brick and stone construction and has evidently been extended and added to at various times, with some construction in breeze blocks. The majority of the roof appears to comprise corrugated asbestos-cement sheets. The building is in poor repair, and the roof leaks in places.

The interior of the building does not appear to have changed significantly since foundry operations ceased in 2007. The walls comprise exposed bricks, with rusty rolled steel supports internally. The building is separated into different rooms. The floors were uneven and covered with a thick layer of foundry sand, mainly stained black, and the floors appeared to be surfaced with bricks, although this was difficult to ascertain through the sand. Mr Morris reported that the floors were concrete-surfaced, although this was not confirmed at the site visit. There were several pits inside the building, the depth of which were unclear, as they were filled with discarded machinery and materials, bricks and rubble, although they appeared to be between approximately 0.5 and 1.5m deep

Much of the machinery and fittings from the foundry were present in the building, scattered across the building. Abandoned pipework was visible around the walls. There were also a number of 205 litre drums, of metal construction and very rusty, containing solvents (isopropanol) and sealants (Permasil), one of which, located near the eastern entrance to the building, was observed to be rusted through and leaking.

Mr Morris reported that the binders that were used for sand casting were sodium silicate or sand mixed with clay. Reportedly, phenols were not used.

An electrical substation is located at the western corner of the building, reportedly installed in the mid-1990s.

Office Building

The office building is located opposite (to the north of) the foundry building, and is of brick construction. As the with main foundry building, all the fixtures and fittings remain, including office furniture and equipment. The building is in a poor state of repair, with broken windows, peeling paint and mould.

The lower floor was constructed at the edge of a steep slope, with the upper floor hanging out over the slope.

Cores Building

The cores building is of brick construction with a suspected corrugated asbestos cement roof, and is a single storey building. It was previously used to produce the cores required for the casting process, but is currently used for storage. Although the building is full of construction equipment and scaffolding, it was apparent that it had a solid concrete floor and the equipment was stored in a mainly orderly fashion.

Adjacent to the cored building is a small shed, which contains waste materials and equipment. At the time of the site walkover, there was a skip adjacent to the shed, filled with waste materials.

Across the drive from the cores building is a flat platform, which is reportedly the base for a former modular space unit, used as a 'brew shed' for the foundry workers.

Pattern Shop

The pattern shop is of brick construction, rendered and pebble-dashed. Its roof is of suspected corrugated asbestos cement sheeting. The internal floors are of solid concrete construction and it appears to be in current use as storage space.

External Areas

The external areas occupy approximately 75% of the site.

The asphalt surfaced drive enters the site off Elnor Lane. The asphalt becomes broken as it passes the main foundry building, and is essentially gravel-surfaced (rather than asphalt) by the time it reaches the pattern shop. The drive extends through to Mr Morris's house, beyond the eastern boundary of the site.

The remainder of the site comprises mown grassed areas, on the parts of the site that were levelled during construction of the foundry, and areas adjacent to the northern and southern site boundaries, which comprise wild vegetation on the slopes of the hillside.

The grassed area to the south of the main foundry building is raised above the level of the building, and the slope supported by a retaining wall. Evidence of foundry waste was observed on the ground, where some vegetation distress was also observed.

A public footpath passes through the site, entering via the entrance drive, following the drive to the pattern shop, where it continues to the east of the pattern shop, from where it exits the site at the gate.

Further waste materials, including a 205 litre drum, were located adjacent to the pattern shop.

A stockpile of rubble was located at the north eastern site boundary.

Mr Morris reported that the former foundry tip was located at the eastern end of the site, including the land on which his house was constructed. Mr Morris provided a report (ADAS, 1996) of laboratory results from soil samples taken from the tip area. The samples were reportedly taken from four locations at equally spaced intervals between the last foundry building and Mr Morris's house, at depths of approximately 0.15-0.25 m below ground level. The concentrations of contaminants tested are shown to be within generic screening levels.

3.0 SITE HISTORY

A review of the site history has been undertaken in order to identify any previous potentially significantly contaminative uses, located either on-site, or in the surrounding area.

Potential on-site contamination sources may present a risk to future users of the site, and also off-site receptors, potentially including controlled waters.

Neighbouring potentially contaminative activities may present a risk to the site through on site migration of contamination, or through the deposition of waste materials on the site.

The history of the site is recorded over selected periods by inspected maps, copies of which are presented in Appendix 4. The account presented below in Table 3.1 is restricted by specific time periods represented by these maps only.

Table 3.1 Summary of historical mapping.

Dates	**On Site Use**	**Off-Site Uses**	**Potential For Contamination To Affect The Site**
1882	There is a depression shown in the centre of the site, with small buildings to the north west, probably associated with Shallcross Mill.	The site is situated in a rural setting. Shallcross Mill is located adjacent to the north, with the mill pond at the northern site boundary and a tank located at the north western site boundary. There is a railway line located 100m to the north east, running from south east to north west and a local 'Shallcross Plane' line 150m to the south west, running northwards to join the main line. A quarry is located 50m south of the site. The village of Horwich End is located approximately 500m to the north west. Randal Carr Brook flows from east to west, 20m north of the site, at its nearest, and feeds the mill pond. Another stream flows from south to north adjacent to the site's western boundary and joins Randal Carr Brook north of the site.	Ground contamination associated with Shallcross Mill and the associated tank may be present.
1885-90	No changes noted.	No changes noted.	None additional anticipated.
1898	The depression in the centre of the site is labelled 'Old Quarry'.	Shallcross Mill is now labelled Shallcross Saw Mill. Shallcross (railway) Yard has been developed 250m north west, while the local train line to the west has been dismantled. The north train line now labelled as Stockport & Buxton line of the London & North Western Railway.	Ground contamination related to the saw mill may be present.
1910-13	No changes noted.	Urban expansion has occurred to the north west.	None additional anticipated.

Dates	On Site Use	Off-Site Uses	Potential For Contamination To Affect The Site
1921	No changes noted.	Shallcross Saw Mill is no longer shown. The mill pond is shown as a reservoir and a second reservoir is located to its north. Mevril Springs Bleach works is located 125m NW.	Contamination from the Bleach works may be present.
1938	The 'Old Quarry' has been infilled. There is a large, building in the centre of the site, and residential properties adjacent to the southern site boundary.	A residential estate consisting of Elnor Avenue and Paddock Road has been developed adjacent to the west of the site.	The quarry has been infilled with unknown materials that have the potential to cause ground contamination or produce landfill gas. Contamination from unknown activities associated with the new building on site may be present.
1968 - 1972	The large building on site is labelled as Shallcross Iron Foundry.	Mevril Springs Bleach works is now a brick works.	Contaminants may be present associated with the on-site foundry, and the brick works.
1972-1987	No changes noted.	Urban expansion has taken place in the vicinity of the site. The brick works labelled 'Works'.	None additional anticipated.
1991	No changes noted.	The reservoirs to the north have been infilled and the land redeveloped with residential properties.	Unknown fill materials in the reservoirs have the potential to cause ground contamination or produce landfill gas.
1994	No changes noted.	No changes noted.	None additional anticipated.
2006	No changes noted.	The quarry to the south east of the site has been infilled.	Unknown fill materials in the quarry have the potential to cause ground contamination or produce landfill gas.
2013	No changes noted.	No changes noted.	None additional anticipated.

In summary, the Ordnance Survey historical mapping reveals that the site was occupied by a quarry since at least 1882, at which time Shallcross Mill, with an associated mill pond, was present adjacent to the northern site boundary.

In 1898, the adjacent industry was labelled Shallcross Saw Mill, but the mill building was not apparent in 1921 by which time a second reservoir was located to the north of the mill pond. In addition, at this time there was a bleach works approximately 125m to the north west.

By 1938 the old quarry on site had been infilled with unknown materials and residential properties were located adjacent to the southern site boundary. A building is shown on site.

By 1968 the building on site was labelled Shallcross Iron Foundry and the nearby bleach works was by this time a brick works.

The adjacent reservoirs were infilled (with unknown materials) by 1994 to make way for residential development.

In addition, Mr Morris reported that the foundry was founded by his grandfather in 1924 and was closed in 2007.

4.0 GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

An EnviroCheck report has been obtained for the site, a copy of which is presented in Appendix 5, which includes data relating to the geology, hydrogeology and hydrology, as summarised below.

There is no made ground recorded beneath the site. The superficial deposits beneath the site are shown to comprise Devensian Till, with alluvium and river terrace deposits in the northern part of the site.

The bedrock is shown to comprise the Carboniferous 'Woodhead Hill Rock' (sandstone) across the western half of the site and Pennine Middle Coal Measures Formation (Westphalian age) across the eastern half of the site.

There is extensive faulting in the area and there are two north west to south east trending faults within 500m of the site; one is located 275m south west of the site and the other is located 330m north east of the site.

The British Geological Survey (BGS) estimated background soil chemistry for the site, based on recorded background data. The estimated soil chemistry is presented in Table 5.0 below.

Table 5.0 BGS estimated background on site soil chemistry

Determinand	Estimated concentration (mg/kg)
Arsenic	<15-25
Cadmium	<1.8
Chromium	60-120
Nickel	<15
Lead	<150

Part of the site is within a Radon Affected Area, with up to 5% of properties above the action level. Basic Radon Protection Measures are reported as necessary for new properties.

The EnviroCheck mapping database shows five sites of historic surface workings recorded within 500m of the study site:

- Shallcross Saw Mill Quarry had three sites located on site, 75m south east and 150m north of the site, extracting sandstone from the Woodhead Hill Rock;

- Overleigh quarry was located 400m east of the site, extracting sandstone from the Pennine Lower Coal Measures formation;
- Lee Head Pit was located 420m south east of the site, extracting minerals from the Woodhead Hill Rock.

There are an additional six more sites of historic surface workings recorded within 1000m of the site.

One historical underground working is recorded within 500m of the study site: Shallcross Hall Colliery (400m west of the site) extracted coal at depth from the Pennine Lower Coal Measures Formation.

The site is located in an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority.

The site is shown to lie within an area where non-coal historic mining is highly unlikely to have been undertaken.

The site is not located in a Brine Compensation Area.

In relation to natural subsidence on site there is reportedly no hazard, very low, low or moderate risk of subsidence associated with shrink-swell of clays, collapsible deposits, compressible deposits, landslides, running sands or of ground dissolution of soluble rocks.

The bedrock deposits beneath the site and the superficial deposits beneath the southern half of the site are classified as Secondary A aquifers, comprising permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The superficial deposits beneath the southern half of the site are classified as unproductive strata. These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

There are six groundwater abstraction licences within 1000m of the site:

- G Shuker (general agriculture), 530m to the south;
- J&M Hallam (general agriculture), 590m to the south east;
- G Shuker (general agriculture), 670m to the south;
- HD Sharman (general agriculture), 720m to the east;
- HD Sharman (general agriculture), 770m to the north east; and
- G Shuker (general agriculture), 925m to the south east.

There are a further 12 groundwater abstractions licences within 2000m of the site.

The site is not located within a Source Protection Zone (SPZ) for a public water supply.

There are two surface water abstraction licences within 1000m of the site, both registered to Edward Hall & Bros Ltd (manufacturing) to abstract from the River Goyt and points 620m to the west and 850m south west of the site.

There are a further four surface water abstraction licences within 2000m of the site.

The nearest surface water feature is a small stream adjacent to the western site boundary, which flows into Randal Carr Brook, located, at its nearest, 20m to the north west and flowing from east to west. The river quality is recorded as Grade C (fairly good).

5.0 KEY ENVIRONMENTAL CONSIDERATIONS

The EnviroCheck report obtained for the site contains a summary of statutory data held in public registers, identifying potential sources of contamination surrounding the site, and also environmentally sensitive sites/receptors within the vicinity of the site. A copy of the EnviroCheck report is presented in Appendix 5, and the salient information is summarised below.

Environmental Permits, Incidents and Registers

There is one IPPC authorisation within 1000m of the site: Clover Chemcials, located 675m to the north west.

There are three LAPPC authorisations within 1000m of the site, the nearest of which is Morris F & Son Ltd (Iron, steel and non-ferrous metal foundry processes – authorisation revoked), on site.

There are no other IPC or IPPC authorisations, LAPPC Controls or Enforcement Notices or any other environmental permits and/or authorisations within 1000m of the site.

There are no COMAH sites or NIHHS sites within 1000m of the site, and no sites have been determined as contaminated land under the Part IIA EPA 1990 within this area.

Landfills and Other Waste Sites

There are two historical landfill sites within 1000m of the site, the nearest of which is located 870m to the south.

There are two registered waste management facilities/ landfill sites within 1000m of the site, all of which are more than 900m from the site.

There are two Registered Waste Transfer Sites located within 1000m of the site, located 490m to the north west and 975m to the south.

There are no Registered Treatment or Disposal sites situated within 1000m of the site.

Pollution Incidents

There are six Environment Agency recorded pollution incidents to controlled waters within 500m of the site. These incidents occurred between 1992 and 1996.

Current Land Uses

There are no currently active potentially contaminative industrial sites within 500m of the site.

There is one currently active petrol station within 1000 m of the site, which is situated 575m to the north west.

Flooding

The site is not located on an Environment Agency indicative floodplain. The site is not within 250m of any flood defences and is not an area used for flood storage.

Designated Environmentally Sensitive Sites

The not located within a designated environmentally sensitive site. However, South West Peak environmentally sensitive area is located, at its nearest, 300m south of the site.

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

6.1 Introduction

A **Site Conceptual Model** is a simplified representation of the ground conditions beneath the site that enables a quantitative risk assessment to be carried out. The Site Conceptual Model identifies the potential sources of contamination, the potential contaminant migration pathways and the potential receptors of contamination.

Sources of contamination include contaminating current or historical uses, activities, events or substances at the site or within the surrounding area that may impact on underlying soils or groundwater.

Contaminant Migration Pathways are the routes that contaminants follow from sources to receptors.

Receptors of contamination include human and non-human organisms, controlled waters (groundwater or surface water) and building materials (concrete or plastic) that experience adverse effects on exposure to contaminated materials.

A **Pollutant Linkage** occurs when a contaminant is able to travel from a source, via a pathway, to a receptor. Each element may exist in isolation and pose no environmental risk. It is only when all three elements are linked to each other that a pollutant linkage exists, and poses an environmental risk.

6.2 Potential Sources of Contamination

Potential on-site contamination sources may present risks to human health and/or controlled waters (groundwater and surface water) at the site and/or through cross boundary migration of contamination off the site.

Potential off-site contamination sources may present similar risks through cross boundary migration of contamination onto the site.

The following potentially significant sources of contamination have been identified on and off site:

- Contaminants, including metals, associated with the foundry process on site;
- Hydrocarbons potentially used on site including fuel oils and lubricating oils;
- Leaks and spills from chemicals stored on site, such as the drums of isopropanol;
- Asbestos from the roofing materials used on site;
- Contaminants and potentially landfill gas associated with the infilled quarry and former foundry tip on site;
- Contaminants associated with the electricity substation located on site.

Potential contaminants associated with the foundry process are summarised here:

- Metals and metalloids;
- Inorganic compounds (such as phosphates, sulphates, cyanides);
- Acids and alkalis;
- Fuels and oils;
- Solvents (including isopropanol, as seen on site);
- Asbestos
- Polychlorinated biphenyls.

Other potential sources of contamination identified on the historical maps are considered to be either too distant from the site or down gradient of the site and are therefore unlikely to have an impact on the site.

6.3 Potential Contaminant Migration Pathways

Contaminants within the ground and associated dust may be ingested directly (accidentally or on purpose), or through eating soil attached to home grown vegetables. Contaminants within impacted soil can also enter the body through direct skin contact. In addition, the consumption of home grown vegetables can lead to ingestion of contaminants taken up by the vegetables. Dust and vapours from contaminated soils can also be inhaled indoors and outdoors.

It is possible for contaminants to be leached from the soil and impact groundwater quality, particularly in the northern half of the site, where permeable alluvium and river terrace deposits are present. Contaminants within the shallow groundwater may also migrate down gradient and impact the groundwater beneath adjacent properties and also the quality of Randal Carr Brook.

Materials imported to site for use beneath hard standing areas can often be unsuitable for location within residential garden areas due to the presence of contaminants, but, subject to testing and meeting engineering specification, may be suitable for re-use beneath proposed pavement areas as engineering fill.

6.4 Potential Receptors of Contamination

The following potential human health and environmental receptors have been identified as:

- Future site users (residents);
- Construction workers;
- Residents in adjacent properties down gradient of the site;
- Shallow groundwater within the drift depositsl;
- Surface water within the brook located 20m to the north.
- Drinking water supply pipes.

7.0 DISCUSSION

7.1 Potential Geotechnical Issues

According to the geological maps, the northern half of the site is anticipated to be underlain by alluvium and river terrace deposits, resting upon sandstone bedrock. However, the hillside on which the site is located was excavated and levelled prior to development of the site. As the majority of the site is now level, it should be capable of supporting two to three storey structures on traditional foundations, subject to confirmation. A review of this should be undertaken once a development layout has been decided upon.

While the majority of the site is level, the northern and southern boundaries of the site are supported by retaining walls at the western end of the site, with the slope to the north becoming more gentle at the eastern end of the site. As the proposed layout of the site involves demolishing the existing buildings, and constructing new residences on roughly the areas where the old buildings had been, the underlying ground should be capable of supporting these new buildings, subject to confirmation. However, the integrity of the retaining walls, both to north and south, should be confirmed.

The removal of trees and/or severing roots can lead to swelling of clay soils as a result of re-hydration. Existing trees can remove groundwater and cause shrinkage of clay soils. The National House Building Council (NHBC) guidance enables the correct depth to be calculated for foundations affected by existing, former and proposed tree planting. Both new and also existing foundations can be affected.

If cohesive shrink-swell soils are shown to be present (i.e. boulder clay beneath a thin sand and gravel cover, or bedrock weathered to a clay for example), then it is advised that the tree heights and species are identified by a suitably experienced person. The plasticity index and hence volume change potential of the soils should also be determined from trial pits prior to foundation construction, in order to enable the appropriate depth of any foundations to be confirmed in accordance with the NBHC guidance.

Soils close to existing trees can be subject to potentially significant desiccation beyond the depths advised by NBHC calculation. It is advisable for an inspection of foundation excavations for potential signs of significant desiccation by a suitably qualified and experienced engineer before placing foundation concrete.

If foundations are taken to unweathered bedrock (or sand/non-shrinkable soils) then there should be no issues with shrinkage or swelling of the soils.

7.2 Contamination Issues

It is possible that ground contamination is present beneath the main foundry building, from the substances used on site. These include, metals associated with the foundry process, hydrocarbons (including fuels and lubricating oils), solvents and sealants.

Electricity substations installed in the 1950s and 60s, such as the substation on site, are associated with the use of PCBs (Polychlorinated Biphenyls). It is possible that leaks from the substation have impacted the underlying soils close to the sub-station.

Contaminants from the infilled quarry and former tip on site may be present. While soil samples from the former tip show that concentrations of metals are within their relevant generic guideline concentrations, the extent of the tip and the nature of its contents are unknown.

The roofs of the buildings on site are constructed from suspected asbestos cement sheeting. An asbestos survey should be undertaken by a qualified surveyor to confirm this, in order that the demolition of the building and removal of the materials be undertaken in an appropriate manner.

8.0 RECOMMENDATIONS

It is recommended that intrusive investigation be undertaken to assess for the potential presence of ground contamination at the site associated with the former foundry and former tip.

Investigation of the ground along the northern boundary of the site is recommended to assess the potential presence for cross boundary contaminants from the site onto adjacent land.

It is recommended that intrusive investigation be undertaken in the vicinity of the electrical substation to assess for the presence of PCBs in the near surface soils.

An appropriate intrusive investigation would include the following:

- Excavation of trial pits across the site and in particular in the area of the former tip to assess the nature of the infill of the former quarry and tip.
- Drilling of boreholes and installation of groundwater monitoring wells to assess for the presence of contaminants associated with the foundry and

electricity substation in soils and shallow groundwater and their potential to have impacted on site and off site receptors;
- Chemical analysis of an appropriate suite of contaminants likely to be present associated with former operations on site.

It is recommended that inspection of the sub-base beneath the existing hard standing be undertaken to assess its suitability for re-use beneath proposed pavement areas as capping or sub-base, subject to meeting the relevant engineering specification.

Geotechnical assessment of the ground conditions to enable foundation designs, including testing to establish the relative density of the granular deposits, measurement ground water levels, testing to determine suitability for soak-aways and assessment of the stability of excavations in relation to foundation and sewer construction is recommended.

Geotechnical assessment should also be made of the retaining walls and associated slopes to confirm their stability.

Liaison with the Local Authority Planning Officer and Environmental Health Officer is recommended prior to undertaking any intrusive investigations to discuss the findings of this report and the scope of the further investigations required.

.

APPENDIX 1
Site Location Plan

APPENDIX 2
Key Site Features

APPENDIX 3
Site Photographs

APPENDIX 4
Historical Ordnance Survey Plans

APPENDIX 5
EnviroCheck Report

APPENDIX 6
Information Extract In Relation To Nearby Development