TANK ROW, BARNSLEY

PHASE 1 (DESK STUDY) REPORT

Prepared by

SILKSTONE ENVIRONMENTAL LTD.

On behalf of

C SOAR & SONS

NOVEMBER 2008

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EXECUTIVE SUMMARY

Silkstone Environmental Ltd (SEL) has carried out this investigation on the instructions of Peter Thompson Architects (PTA) on behalf of C Soar and Sons (CSS). The purpose of the work was to carry out a Phase 1 desk study for a proposed industrial development / yard extension at CSS site at Tank Row, near Barnsley.

The site is to the west of CCS existing works on Tank Row, approximately 2.5 kilometres (km) east of Barnsley town centre. It is a triangle, right angled at the north east corner, approximately 70 metres (m) by 40 m orientated north to south. The ground level in the area generally falls from west to east. The site is wooded with predominantly deciduous trees. A steel palisade fence forms the boundary along the south west and east sides, whilst along the north boundary are a row of wooden posts preventing vehicle access.

Since the early 1890s (1892 map) the site has been occupied by a railway on an embankment. An underpass is shown passing below the railway at the centre of the site, it is not clear if this was just for foot traffic or vehicles. The site remained this way until around 1972, when the railway is shown as disused, the site is shown empty in 1993. More recently, 2000 to present, the site is shown wooded.

The surrounding area was developed similar to the site, railways on embankments were present around the area. Hope Glass Works was present about 40m to the south west of the site from around 1892 and is removed from the 1960 map onwards. To the east of the site a small industrial development was established in the early 1990s. Tank Row, is shown along the north boundary from 1993 onwards.

In the qualitative risk assessment a moderate risk has been given and implies that remedial action may be necessary at the site, although until a contamination ground investigation is carried out this cannot be confirmed.

It is recommended that an environmental investigation is undertaken comprising dynamic window sampling to investigate the shallow soils. The window samples should pass through all made ground into underlying natural soils and should be to a depth that soils could be affected by any contamination that may be known of or present.

As potential areas of landfill are known to be located adjacent to the site, it is recommended that ground gas monitoring wells be installed in the window sample holes, followed by monitoring for landfill gas concentrations.

Report completed on 27 November 2008

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1 INTRODUCTION

1.1 Brief

Silkstone Environmental Ltd (SEL) has carried out this investigation on the instructions of Peter Thompson Architects (PTA) on behalf of C Soar and Sons (CSS). The purpose of the work was to carry out a Phase 1 desk study for a proposed industrial development / yard extension at CSS site at Tank Row, near Barnsley.

1.2 Outline of Report

In Section 2 the desk study report includes a site description and review of the readily available information relating to the site (historical maps, environmental database search, geology and hydrogeology). It presents, in Section 3, an appraisal of environmental aspects in an initial environmental risk assessment and initial conceptual model. Finally there are recommendations on the requirement for further investigation, including intrusive ground investigation work.

1.3 Legislative and Regulatory Context

If land proposed to be developed is suspected to be contaminated either historically or by its current use, an investigation will be requested by the Local Authority under the Town and Country Planning Act (1990) and Planning Policy Statement 23 to determine the level of risk and if remediation is necessary. Under this regime investigations are carried out to determine if the current condition of the site is suitable for its proposed use.

1.4 Guidance and Information Sources Used Within This Report

This report has been produced in line with relevant guidance and best practice. The ground investigation has been carried out in general accordance with the recommendations of BS5930: 1999 *Code of Practice for Site Investigations* and BS10175 *Investigation of Potentially Contaminated Sites: Code of Practice (2001).*

2 PHASE 1 (DESK STUDY)

2.1 Objectives of Phase 1 (Desk Study) Investigation

The objectives of the Phase 1 Investigation are as follows:

- To provide information on historic and current uses of the site and surrounding area.
- To identify any potentially contaminative uses of the site and potential sources of contamination.
- To identify any potential receptors (humans, controlled waters, buildings, ecological and plants), and likely pathways for contamination to reach these receptors.
- To review the geology, hydrogeology and hydrology of the site to aid in development of the conceptual site model and to identify any geotechnical constraints to any potential intrusive works which may be necessary.
- To characterise the site and produce a conceptual site model to determine if there are any potential pollutant linkages.

2.2 Site Location

The site is to the west of CCS existing works on Tank Row, approximately 2.5 kilometres (km) east of Barnsley town centre. The National Grid Reference for the site is 436935 406125, as shown on the Site Location Plan in Appendix 1.

2.3 Historical Land-Use

Information relating to historical land use of the site and surrounding area was gained from historical maps contained within the Envirocheck Report (Appendix 2). The information has been summarised within Table 1 including dates and scales of the map referred to. It is important to note that the date referred to indicates the date the feature appears on the map and not necessarily the date the actual feature was present.

Table 1: Historical Land Uses Of The Site And Surrounding Area

Date	Map Scale	Land use on the site	Potentially significant surrounding land use
1854	1:10,560	• Open Fields	• Adjacent, open fields • 150m N, River Dearne (generally orientated W to E) • 150m E, Dove Canal (generally orientated N to S) • 180m E, Grange Lane, orientated N – S. • 340m W, Oaks Quarry. • 500m SSE, Stairfoot road junction and some residential development.
1892	1:2,500	• A Railway line, part of the Stairfoot Curve, crosses the site in N-S direction on an embankment. • Underpass indicated, orientated generally E – W under the railway at centre of site.	• Beyond N boundary railways curves round to NW, beyond southern boundary railway curves round to W. • Adjacent to W, Railway on embankment, orientated NW – SE (Barnsley Coal Railway Extension). • 40m SW, Hope Glass Works. • 220m SW, Railway on embankment, orientated NWW - SEE. • 300m S, Brick works and kilns.
1894	1:10,560	• No Significant change.	• 250m S, Residential development. • 500m W, Old Oaks Colliery.
1906	1:10,560	• No Significant change.	• 175m E, Railway on embankment curved orientation from S – N then SW – NE. Joins Barnsley Coal Railway Extension at Stairfoot North Junction 170m SE of site. • 250m S and SW, further residential development around Stairfoot road junction, area named Hunningley.
1906	1:2,500	• Underpass is more clearly defined.	• No Significant change.
1931	1:2,500	• No Significant change.	• 40m W, Hope Glass Works shown as disused.
1938	1:10,560	• No Significant change.	• 500m W, Old Oaks Colliery now Barnsley Main Colliery.
1955	1:10,560	• No Significant change.	• No significant change.

Date	Map Scale	Land use on the site	Potentially significant surrounding land use
1960	1:1,250	• No Significant change.	• 40m W, Hope Glass Works no longer shown. • 90m SW, Works. • 150m W, Canal now named Sheffield and South Yorkshire Navigation Dearne and Dove Canal.
1962 1966	1:2,500 1:10,560	• No Significant change.	• No Significant change.
1972 1974 1983	1:1,250 1:10,000 1:1,250	• Railway shown as disused, embankment and underpass remain.	• Railways in the close area are shown as dismantled. • 150m W, canal no longer shown.
1982 1987	1:1,250 1:1,250	• No Significant change.	• No Significant change.
1984	1:10,000	• No Significant change.	• 60m W, area shown as refuse or slag heap.
1988	1:1,250	• No Significant change.	• Adjacent to N, Road orientated E – W. • NW corner, Entrance from road to plot along W boundary (no development shown.
1993	1:10,000	• Site shown empty.	• Adjacent to E, small industrial development.
1993	1:1,250	• No Significant change.	• Road adjacent to N now shown as Tank Row. • Adjacent to E (N end of boundary), scrap yard. • Adjacent E (S end of boundary) further industrial units.
2000	1:10,000	• Site shown as wooded.	• No significant change.
2008	1:10,000	• No Significant change.	• Adjacent to W, works. • 110m S, large commercial building.

Since the early 1890s (1892 map) the site has been occupied by a railway on an embankment. An underpass is shown passing below the railway at the centre of the site, it is not clear if this was just for foot traffic or vehicles. The site remained this way until around 1972, when the railway is shown as disused, the site is shown empty in 1993. More recently, 2000 to present, the site is shown wooded.

The surrounding area was developed similar to the site, railways on embankments were present around the area, assumed to be servicing the collieries and quarries in the general Barnsley area. These were generally dismantled in the early 1970s.

Hope Glass Works was present about 40m to the south west of the site from around 1892. The glass works is shown as disused from the 1931 map and is removed from the 1960 map onwards. On the site of the old glass works various works buildings

have been developed, whilst on the latest map (2008) the plot is occupied by three larges works buildings.

To the east of the site a small industrial development was established in the early 1990s (1993 map onwards), including the plot along the north end of the east boundary now known to be occupied by CSS.

Tank Row, is shown along the north boundary from 1993 onwards.

2.4 Site Description

The site is a triangle, right angled at the north east corner, approximately 70 metres (m) by 40 m orientated north to south, an area of approximately 0.6 hectares (Ha). The ground level in the area generally falls from west to east.

The site is wooded with predominantly deciduous trees. A steel palisade fence forms the boundary along the south west and east sides, along the north boundary are a row of wooden posts preventing vehicle access.

To the north the site is bound by Tank Row, a public highway, and a wooded area beyond. To the east, at the north end of the site, is CSS which comprises concrete hard standing and large brick and steel clad buildings, the boundary is formed by a large steel palisade fence. Along the remainder of the east boundary are other industrial units.

To the west / south west the site is bound by a plot of rough grass land and a large warehouse unit beyond.

2.4.1 Current Site Use and Condition (Walk Over Survey)

A series of photographs were taken during a site walk over undertaken on 19 November 2008, these are presented in Appendix 4.

The site is currently a deciduous wood with little undergrowth. The ground level is higher than that of the CSS yard to the east, this is believed to be in part due to the remnants of the former railway embankment and also the natural topography of the area. Ground levels on the rough grass land and warehouse unit to the west of the

site are similar to those on site, it is assumed that in this area the full height of the embankment has been removed.

The railway embankment, noted in the Section 2.3, is still present north of the site beyond Tank Row. A cutting has been formed into the embankment to enable the erection of a metal electricity pylon (see Photographic Records).

Similarly, to the south of the site there is evidence that the railway embankment has been left in place. The ground levels at the south corner of the site are significantly higher than those of the adjacent industrial estate, to the east.

2.4.2 Visual and Olfactory signs of contamination

There were no significant signs of contamination noticed on site other than in places the surface soil has an ashy content, believed to be associated with the former railway embankment.

2.5 Geology, Hydrogeology & Hydrology

2.5.1 Geology

Information relating to the geology of the site has been gained from various sources and has been summarised in Table 2.

Table 2: Geological summary

Maps /Publications Referenced	The Geological Survey Map of Great Britain, Sheet 87, Barnsley, Solid and Drift, 1:50,000 scale. Geological Survey of Great Britain, *Geology of the Country Around Barnsley*, 1947.
Drift Geology	None shown on site. Alluvium shown to the northeast of the site associated with the River Dearne.
Made Ground	None indicated on site, an area indicated some distance to the west.
Solid Geology	Middle Coal Measures of the Upper Carboniferous, comprising sandstones, siltstone and mudsones. Named sandstone on site is the Oaks Rock. The Oaks Rock is a brown, yellow or light yellow colour, fine grained, often flaggy, current-bedded sandstone.
Dip of Solid Strata	Generally northeast.
Faults	Fault indicated on, or close to, the site orientated NW to SE, with down throw to NE.
Ground Stability	No unstable ground indicated.
Coal Seams	A Coal Authority report for the site has been obtained and is included in Appendix 3.

2.5.2 Hydrogeology

The Environment Agency's Groundwater Vulnerability Map of South Pennines (Sheet 11, 1:100,000) shows the site to lie on a minor aquifer (variably permeable). These can be fractured or potentially fractured rocks, which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities for abstraction, they are important both for local supplies and in supplying base flow to rivers.

The soils on this site have been classified as having a high (urban) leaching potential (HU), as soil information for urban areas is based on fewer observations than elsewhere. Therefore a worst-case vulnerability classification is assumed (HU) until proved otherwise.

2.5.3 Hydrology

The nearest surface water feature is indicated to be about 48m northwest of the site although there are no other details it is believed from the maps to be a surface drain or ditch.

The River Dearne is about 140m to the northeast and is classed as River Quality C.

An area northeast of the site, on the opposite side of Tank Row, is designated as a flood water storage area for the River Dearne. The area at risk of flooding from the river Dearne stretches close to the northeast corner of the site.

2.6 Coal Mining History

A Coal and Brine report has been obtained from the Coal Authority, (Appendix 3). In summary:

The site is in the zone of influence from workings of 10 seams of coal at 140m to 600m depth, last worked in 1983. Any ground movement from these coal workings should have stopped by now.

The site is not in an area expected to be influenced by present of future underground or opencast coal workings. There are mine entries within 20m of the site boundary.

2.7 Landfills and Licensed Waste Management Facilities

There are a total of three landfills and one waste management facility recorded within 100m of the site and these are summarised in the table below with comments:

Table 3: Summary of Landfills and Licensed Waste Management Facilities on Site

Envirocheck Map I.D.	Type of Landfill	Location and Comments
50	Historical Landfill Site	29m southwest of site: Licence Holder – Beaston Clark and Co Ltd. Last input date January 1985. Waste included inert, industrial and special waste.
63	Licensed Waste Management Facility	57m northeast of site – Operated by C Soar and Sons (the client): Metal recycling.
68	Local Authority Recorded Landfill Site	2m southwest of site (probably same site as 50): Waste types mot specified.
76	Registered Landfill Site	0m from site (probably same site as 50): Licence Holder – Beaston Clark and Co Ltd. Waste included – Nepheline Syenite, Refractory Linings / bricks, Sand, Slag, Boiler/ Flue Cleanings, Sodium Carbonate, Sweepings and Spillages.

2.8 Ground Gases

The site is known to have areas of landfill within close proximity of the boundary and there is therefore a potential risk from migrating landfill gas.

2.9 Other Potentially Significant Information Relating to the Site

Two pollution incidents to controlled water occurred north of the site, both category 2 significant incidents involving oils and mining water respectively.

A water abstraction license, from a borehole, is held by C Soar and Sons on the adjacent site to the east.

3 INITIAL RISK ASSESSMENT AND CONCEPTUAL MODEL

3.1 Potential Pollutant Linkages

The preliminary risk assessment process involves the identification of potential sources, pathways and receptors to determine the potential for a pollutant linkage to be present. A pollutant linkage can only be present if all three of the above are involved. There must be a source of contamination present, a receptor for the contamination to impact on and a pathway for the contamination to reach the receptor.

3.2 Potential Sources of Contamination

On Site

Potential sources of contamination and associated contaminants which may be present on site are shown in the table below.

Table 4: Potential Sources of Contamination On Site

Potential Sources	Potential Contaminants
Made Ground (Associated with former Railway embankment).	Various contaminants dependant on the nature and source of the fill materials. Potential contaminants (not exhaustive): PAHs, Hydrocarbons from fuel oil, waste oil and lubricating oil, Sulphates and Metals such as Cadmium, Chromium, Nickel, Copper, Lead, Mercury, Zinc and Arsenic.
Landfill waste (Unclear boundary of landfill to west).	Various potential soils and leachate contamination. Landfill gas migration.

Off Site

Table 5: Potential Sources of Contamination Off Site

Potential Sources	Potential Contaminants
Made Ground	Various contaminants dependant on the nature and source of the fill materials. Potential contaminants (not exhaustive): PAHs, Hydrocarbons from fuel oil, waste oil and lubricating oil, Sulphates and Metals such as Cadmium, Chromium, Nickel, Copper, Lead, Mercury, Zinc and Arsenic.
Landfill waste	Various potential soils and leachate contamination. Landfill gas migration.
Various Industrial Activities, predominantly to east	Potential contaminants (not exhaustive): PAHs, Hydrocarbons from fuel oil, waste oil and lubricating oil, Sulphates and Metals such as Cadmium, Chromium, Nickel, Copper, Lead, Mercury, Zinc and Arsenic.

3.3 Potential Pathways and Receptors

3.3.1 Human Health

Chronic Risks

Potential exposure pathways are based on those in the Conceptual Exposure Model for human health which is detailed in Contaminated Land Report 10.

The chronic risks to human health take into account those risks to end users of the site. The proposed end use of the site was not known at the time of writing and therefore it is recommended that, in lieu of other information, a residential scenario with plant uptake be used for assessment. The potential pathways used in the assessment are below.

- Ingestion of soil
- Ingestion of dust
- Ingestion of soil and dust on home grown vegetables
- Dermal contact with soil
- Dermal contact with dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive building dust
- Inhalation of vapours outside
- Inhalation of vapours inside
- Migration of contaminants through soil/groundwater

Acute Risks

Acute risks are considered with respect to construction workers/engineers on site.

NB: During any intrusive ground works appropriate health and safety measures should be adopted to protect site workers from any potential risks associated with contamination in the ground. This should include the use of any personal protective equipment necessary and a general awareness of any possible risks to safety and human health on site.

3.3.2 Controlled Waters

Groundwater

The site is expected to be underlain by Coal Measures strata, which is classed by the Environment Agency as a minor aquifer. Contaminants which may be present in soil

on site may have the potential to leach from soil and therefore impact upon the groundwater of the underlying minor aquifer.

The site is not within a Source Protection Zone for the protection of drinking water supplies and there are no abstractions which are specifically classed as being for drinking water.

Surface Water

The nearest surface water feature is believed to be a drainage ditch, about 48m northwest of the site. Contaminants which may be present in soil on site may have the potential to be transferred via surface runoff to impact on the surface watercourses.

3.3.3 Buildings and Structures

It is understood that the development is to be a large concrete yard area, no buildings are proposed, therefore buildings have not been considered as a potential receptor.

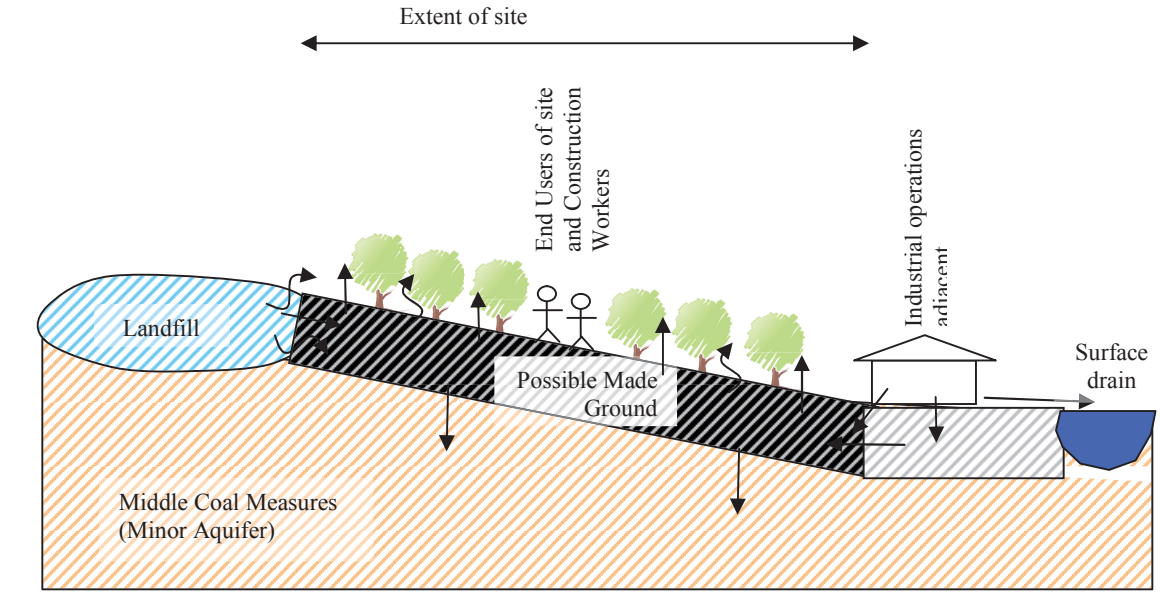
3.4 Initial Conceptual Site Model

Based on all the information gained in previous sections of this report the Conceptual Site Model (CSM) identifies the potential pollutant linkages which may exist on the site. Contaminants may be present within soil on site and may have the potential to impact on various receptors including human health of site-end-users, controlled waters and buildings.

From the available information the initial conceptual model is presented in the table below and also visualised in a diagram:

Table 6: Initial Conceptual Site Model

Receptor	Potential Pollutant Linkage
Site users (Employees / labour)	Inhalation of soil gas, vapours or dust.
	Ingestion of, and dermal contact with, contaminated soil or dust.
Construction/ maintenance workers.	Inhalation of soil gas, odours or dust.
	Ingestion of, and skin contact with, contaminated soil.
Groundwater	Migration of soluble contaminants into groundwater on or off site.
	Migration of oils into groundwater on or off site.
Surface water	Migration of soluble contaminants and/or direct run-off of contaminants.



Migration of soluble contaminants, soil gases and vapours.

Dermal contact with contaminated soil or dust.

Migration of contamination (soluble and surface runoff).

3.5 Initial Environmental Risk Assessment

This section aims to expand the CSM to assess the level of risk for each potential pollutant linkage.

Table 7 shows classifications presented in CIRIA Report C552 which have been used in the assessment of risk:

Table 7: Risk Assessment from CIRIA C552

Probability	**Consequences**			
	Severe	**Moderate**	**Mild**	**Minor**
High	Very high	High	Moderate	Moderate / Low
Medium	High	Moderate	Moderate / Low	Low
Low	Moderate	Moderate / Low	Low	Very Low
Unlikely	Moderate / Low	Low	Very Low	Very Low

Table 8: Initial Environmental Risk Assessment

Receptor	Potential Pollutant Linkage	Estimated Degree of Risk to Receptor
Site users	Inhalation of soil gas, vapours or dust.	Moderate
	Ingestion of, and dermal contact with, contaminated soil or dust.	Moderate
Construction/ maintenance workers.	Inhalation of soil gas, odours or dust.	Low*
	Ingestion of, and skin contact with, contaminated soil.	Low*
Groundwater	Migration of soluble contaminants into groundwater on or off site.	Moderate
	Migration of oils into groundwater on or off site.	Moderate / Low
Surface water	Migration of soluble contaminants and/or direct run-off of contaminants.	Moderate / Low

*Assumes basic PPE is used.

In this qualitative risk assessment a **Moderate** risk implies that remedial action may be necessary at the site, although until a contamination ground investigation is carried out this cannot be confirmed.

3.6 Proposed Phase 2 Intrusive Investigation

The objectives of any investigation will be to:

- Clarify the 'Initial Contamination Conceptual Model'.
- Clarify the initial risk assessment.
- Provide data for the design of any remedial works that may be required.
- Benchmark the contamination status of the site.

To achieve these objectives it is recommended that an environmental investigation is undertaken comprising dynamic window sampling to investigate the shallow soils. The window samples should pass through all made ground into underlying natural soils and should be to a depth that soils could be affected by any contamination that may be known of or present.

As potential areas of landfill are known to be located adjacent to the site, it is recommended that ground gas monitoring wells be installed in the window sample holes, followed by monitoring for landfill gas concentrations. A minimum of four monitoring visits should be carried out in general accordance with CIRIA C665.

Samples of soil and groundwater for contamination testing should be taken from the made ground and from some of the underlying natural soils.

Where made ground is found to extend below the achievable depths of the window samples, say 5.0m, then it may be necessary to sink a number of boreholes to below the base of the made ground.

It should be noted that the historical maps indicate that the railway embankment had an underpass close to the centre of the site. Although it has been assessed during the site walk over that the majority of the embankment has been removed, there may be some remnants of the underpass buried on site. This should be borne in mind during earthworks planning.

APPENDIX 1: SITE LOCATION PLAN

APPENDIX 2: ENVIROCHECK REPORT

APPENDIX 3: COAL AUTHORITY REPORT

APPENDIX 4: PHOTOGRAPHIC RECORDS