

Seddon Construction

Desk Study Report

For

Former Hope & Anchor Pub,

off Leek Road, Cellarhead,

Stoke-on-Trent

May 2013

REPORT NO: 13SEC001/DS

- Desk Studies and Site Walkovers
 Intrusive Contaminated Land Investigations
- > Geotechnical Appraisals and Ground Investigations
- > Landfill Gas Assessments and Remedial Design
- > Remediation Design and Implementation
- Remediation Project Management and Supervision
 Site Abnormal Assessments (Foundations and Contaminated Land)
- > Ecological Surveys (Bats, Badgers, Newts, Japanese Knotweed etc)

GEOTECHNICAL - CONTAMINATED LAND - ECOLOGY - FLOOD RISK

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1 EXECUTIVE SUMMARY

Action

Site Location: The site is located to the rear of the former Hope and Anchor Pub, off Leek Road, Cellarhead, Stoke-on-Trent (coordinates for centre of site 395750, 347510). The site area is 0.61 hectares.

Site Description:

On Site - The site is irregular in shape and is located to the rear (east) of the former Hope and Anchor Public House which is located on the junction of Cellarhead Road and Leek Road

The site comprises the former car park and hardstanding areas immediately surrounding the former pub itself, the pub buildings are not within this proposed development area. It is understood that the pub buildings are to be renovated possibly into a residential dwelling; however no formal planning permission is currently available on the Staffordshire county council website.

The area immediately east of the pub are 2 no walls and a concrete which may be indicative of a former building in this locality however this area is largely overgrown with various flagstones and other debris contained within.

The remainder of the site is predominantly tarmac hardstanding and grassed open areas lined with hedgerows.

The site level at its highest in the southeast corner of site and slopes gently to the roads to the north and west; the car park level is generally approximately 0.5m-1.0m above the road level, the hardstanding areas immediately east of the former pub building are at road levels.

Surrounding Area- The surrounding land use is predominantly farmland, fields and residential in all directions.

Proposed Development:

The proposed development comprises the construction of residential properties with associated gardens, hardstanding and infrastructure.

Site History:

On Site

- 1880- Hope and Anchor pub shown immediately west of site, site is generally undeveloped with some pitting outbuildings associated with the pub to the north west of site
- 1925- Possible earthworks/unlabelled pit shown towards the east of site- no longer shown from the map of 1970
- 1989-1990- The subject site is shown as per the current site layout (car park and outside space associated with the pub)

Surrounding Area

- 1880- Well 20m west (associated with pub)
- 1880- Brick field shown 180m west of site- labelled as old brickworks from 1925 and the area is regenerated as a school circa 1991
- > 1925- Various earthworks shown 20m east, 10m south and 40m west of site
- > 1970- Buildings across Leek Road from the pub labelled as an abbatoir on this map only
- > 1970- Garage shown 70m east of site- redeveloped into houses within the last 5 years

Published Geology:

The BGS map shows the geology beneath the following:

> Bedrock – Hawksmoor Formation- Interbedded Sandstone and Conglomerate



Hydrogeology and Hydrology:

- > The bedrock deposits of interbedded Sandstone and Conglomerate are classed as a Principal Aquifer (High Permeability).
- > The site lies within a Groundwater Source Protection Zone 3 as defined by the Environment Agency.
- > The site lies within a flood risk Zone 1, Extent of Extreme Flooding from Rivers or Seas without Defences as defined by the Environment Agency.
- The nearest surface water feature is a unnamed series of land drains/steams 141m northeast of site.
- There are no licensed groundwater/surface water abstractions within 500m of the site

Radon Protection:

The property is not in a radon affected area with less than 1% of properties above the action level. Therefore no Radon protection measures are necessary.

Summary of Environmental Data:

\triangleright	Existing/former land uses on site- pub outbuildings/car park on site- Potential localised heavy				
	metals, TPH/PAH and asbestos risk within made ground associated with the former land uses on	Potential			
	site- intrusive ground investigation will be required to confirm				
		risk			

 \geq Existing/former land uses on site- Unlabelled pit SE of site- Potential ground gas/contamination risk associated with the unknown nature of material used to infill this pit.

Qualitative Risk Assessment: The site poses a potential <u>Low-moderate</u> risk, therefore localised remedial action is anticipated; targeted ground investigation is required				
Geotechnical Risk: ➤ Localised deepening of proposed foundations due to existing/former foundations and former pit on site				

- Potential for existing services.
- Site level varies across the whole area- cut and fill exercises are likely to be required depending on proposed site levels



2 SITE DESCRIPTION

2.1 Introduction

This investigation was carried out on the instruction of Seddon Construction. The purpose of the work was to carry out a desk study to provide geotechnical and contamination risk information for the proposed construction of residential properties with associated gardens, hardstanding and infrastructure.



Hope and Anchor PH Proposed Site Plan @ 1:1500 Rev. B by John McCall Architects

2.2 Site Location

The site is located to the rear of the former Hope and Anchor Pub, off Leek Road, Cellarhead, Stoke-on-Trent (coordinates for centre of site 395750, 347510). The site area is 0.61 hectares. See Site Location Plan in Appendix A.



2.3 Site Description

2.3.1 On Site

Site was visited by a Geo-Environmental Engineer on 19th April 2013.

The site is irregular in shape and is located to the rear (east) of the former Hope and Anchor Public House which is located on the junction of Cellarhead Road and Leek Road.

The site comprises the former car park and hardstanding areas immediately surrounding the former pub itself, the pub buildings are not within this proposed development area. It is understood that the pub buildings are to be renovated possibly into a residential dwelling; however no formal planning permission is currently available on the Staffordshire county council website.

The area immediately east of the pub are 2 no walls and a concrete which may be indicative of a former building in this locality however this area is largely overgrown with various flagstones and other debris contained within.

The remainder of the site is predominantly tarmac hardstanding and grassed open areas lined with hedgerows.

The site level at its highest in the southeast corner of site and slopes gently to the roads to the north and west; the car park level is generally approximately 0.5m-1.0m above the road level, the hardstanding areas immediately east of the former pub building are at road levels.

2.3.2 Surrounding Area

The surrounding land use is predominantly farmland, fields and residential in all directions.



3 SITE HISTORY

3.1 Site History from Ordnance Survey Maps

A search of available historic maps was undertaken to establish the land use history of the site. Extracts of the maps discussed below can be found in Appendix B of this report. All maps are Ordinance Survey unless otherwise stated. All distances quoted on OS maps are taken from the site boundary, which is marked on the map.

3.2 Summary of Site History

3.2.1 On Site

Below is a summary of on-site changes;

Date	Site
1880	Hope and Anchor pub shown immediately west of site, site is generally undeveloped with some pitting outbuildings associated with the pub to the north west of site
1925	Possible earthworks/unlabelled pit shown towards the east of site- no longer shown from the map of 1970
1989-1990	The subject site is shown as per the current site layout (car park and outside space associated with the pub)

3.2.2 Surrounding Area

The following table below shows the changes in historical use surrounding the site:

Date	Site
1880	Well 20m west (associated with pub) Brick field shown 180m west of site- labelled as old brickworks from 1925 and the area is regenerated as a school circa 1991
1925	Various earthworks shown 20m east, 10m south and 40m west of site
1970	Buildings across Leek Road from the pub labelled as an abbatoir on this map only Garage shown 70m east of site- redeveloped into houses within the last 5 years



4 ENVIRONMENTAL DATA

The following section details both geological and environmental data available for the site and the surrounding area. Full details can be found in the Envirocheck Report by Landmark located in Appendix C.

4.1 Geology

The documented geology of the site is summarised on British Geological Survey map principally, with further site specific detailed below in maps:

Geology	Drift	Solid
1:50000- 123 Stoke-on-Trent	None Recorded	Hawksmoor Formation- Interbedded Sandstone and Conglomerate

4.2 Mining, Extraction and Natural Cavities

4.2.1 Natural Cavities and Extraction

There is one recorded mineral extractions or natural cavities within 500m of site, details are as follows

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Recorded Min	eral Sites				
10	BGS Recorded Mineral Sites 0 Site Name: Cellarhead Brick Works Location: , Cellarhead, Stoke-On-Trent, Staffordshire Source: British Geological Survey, National Geoscience Information Service Reference: 63241 Type: Opencast Status: Ceased Operator: Unknown Operator Operator: Unknown Operator Periodic Type: Carboniferous Geology: Pennine Lower Coal Measures Formation Commodity: Common Clay and Shale Positional Accuracy: Located by supplier to within 10m		A13NW (NW)	253	3	395505 347683

4.2.2 Coal Mining

The site required a Coal Authority Report and full details can be found in Appendix B, summary shown below;

Underground coal mining

Past- According to the records in our possession, the property is not within the zone of likely physical influence on the surface from past underground workings.

Present- The property is not in the likely zone of influence of any present underground coal workings.

Future- The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings. However, reserves of coal exist in the local area which could be worked at some time in the future. No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.



Mine entries-There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

4.3 Environmental Permits, Incidents and Registers

There is one Local Authority Pollution Prevention and Control licence <250m from the site as follows:

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Pol	lution Prevention and Controls				
5	Name: Location: Authority: Permit Reference: Dated: Process Type: Description: Status: Positional Accuracy:	The Mount Garage Leek Road, Cellarhead, Werrington, Staffordshire, ST9 0DQ Staffordshire Moorlands District Council, Environmental Health Department PPC/SS/1/008 Not Supplied Local Authority Pollution Prevention and Control PG1/14 Petrol filling station Application Not Yet Authorised Manually positioned to the address or location	A13SW (SW)	238	2	395607 347257

There are no other significant Integrated Pollution Controls, Integrated Pollution Prevention and Control, or Pollution Incident to Controlled Waters or any other incidents within 250m of the site.

4.3.1 Discharge Consents

There is one Discharge Consent within 250m of the site as detailed below;

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consent Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s T L Godbehere Not Given Gate House, Harvester Farm, Cellarhead, STOKE-ON-TRENT, Staffordshire Environment Agency, Midlands Region Not Given 3/28/06/17/00/1 Not Supplied Not Supplied 14th July 1971 Not Supplied Sewage Effluent Groundwater Not Supplied Located by supplier to within 100m	A13NE (E)	201	1	396000 347600

4.4 Landfill and Other Waste Sites

There are no current or historic registered landfills or other waste sites within 500m of the subject site

4.5 Contemporary Trade Directory Entries

A Contemporary Trade Directory entry states that there is an active dairy 10m east of site, however this appears to be a residential dwelling. It may be that this was a dairy until fairly recently, hence the records have not been updated.



4.6 Hydrogeology and Hydrology

- > The bedrock deposits of interbedded Sandstone and Conglomerate are classed as a Principal Aquifer (High Permeability).
- The site lies within a Groundwater Source Protection Zone 3 as defined by the Environment Agency.
- The site lies within a flood risk Zone 1, Extent of Extreme Flooding from Rivers or Seas without Defences as defined by the Environment Agency.
- The nearest surface water feature is a unnamed series of land drains/steams 141m northeast of site.
- > There are no licensed groundwater/surface water abstractions within 500m of the site

4.7 Radon

The property is in a lower probability area, as less than 1% of homes are above the action level. Therefore no Radon protective measures are necessary in the construction of new dwellings or extensions.



5 SUMMARY OF ENVIRONMENTAL SENSITIVITY

The following section is a review of the environmentally sensitivity of the site as discussed in Sections 2-4. Significant potential risks are discussed in the following subsections and will then be evaluated as part of the Site Conceptual Model in Section 5.

Sources are defined as where pollution comes from, pathways are a route in which the pollution travels and receptors are anything affected by a pollutant. Further details on Source-Pathway-Receptor methodology can be found in Appendix D.

The table below focuses on significant site specific sources, pathways and receptors. More 'generic' pathways and receptors (such as site end uses) will be covered as part of the full Site Conceptual Model in Section 5.

Source	Distance/ Direction	Details	Significant Risk
Existing/former land uses on site- pub outbuildings/car park	On site	Potential localised heavy metals, TPH/PAH and asbestos risk within made ground associated with the former land uses on site- intrusive ground investigation will be required to confirm	Possible
Existing/former land uses on site- Unlabelled pit	SE of site	Potential ground gas/contamination risk associated with the unknown nature of material used to infill this pit.	Yes
Former abattoir	10m west	Potential ground gas risk associated with the former abattoir- given that the abattoir is situated lower than the subject site, the risk of contamination migration from this source is lowered	Unlikely
Former dairy	10m east	Potential ground gas risk associated with the former dairy- given that the dairy is situated lower than the subject site, the risk of contamination migration from this source is lowered	Unlikely
Various infilled pits (including brick pits)	<250m from site	Potential ground gas/contamination risk associated with the unknown nature of material used to infill this pit.	Possible

5.1 Sources



6 INITIAL CONTAMINATION CONCEPTUAL MODEL

For details on how the conceptual model is evaluated please refer to Appendix D

This section of the report aims to identify land which could potentially be affected by contamination, such that it could affect the value or re-use of the land, or such that mitigation would be required for certain proposed end uses of the land.

Potential contamination sources and environmentally sensitive receptors have been discussed in Section 5 Potentially significant risks are evaluated as part of the subsequent sub-sections.

6.1 Source-Pathway-Receptor-Linkages

The risk assessment uses a 'Source-Pathway-Receptor' methodology for assessing whether a source of contamination could potentially lead to harmful consequences. This means that there needs to be a pollutant linkage from source to receptor for harm to be caused, this linkage consisting of: a source of pollution; a pathway for the pollutant to move along; a receptor that is affected by the pollutant.

The current potential risks to site arising from various Source-Pathway-Receptor linkages are assessed below. A risk may be considered significant if all three of the stages are present and therefore providing a pollution linkage. The various sources, pathways and receptors are considered separately. The assessment is based on the future use, which is understood to be residential with garden areas and hardstanding.





Type of Contamination	Potential Sources	Potential Pathway	Potential Receptors	Pollution Linkage	Comment	Estimated Level of Risk	
Ground Gas	Potential infilled ground on site and <250m	Inhalation of Vapours	Construction/ Maintenance Workers	Potentially Active	Potential ground gas risk associated with made ground and infilled ground on site, gas monitoring should be undertaken	Moderate	
	Potential made ground on site	Vapours Penetrating Unprotected Buildings	Future Site Users	Potentially Active	Potential ground gas risk associated with made ground on site, gas monitoring should be undertaken	Moderate	
			Current site Users	Potentially Active	Site is predominantly hardstanding therefore risk to current site users is negligible. PPE to minimise risk. Risk lowered in areas of hard- standing.	Low/ Moderate	
		Ingestion, inhalation, dermal contact	Construction workers	Potentially Active	Localised potential for Made Ground within the site. Ground Investigation to confirm. PPE to minimise risk. Risk lowered in areas of hard- standing.	Low	
Surface and near surface Contaminants within soils	Potential infilled ground on site and <250m from site Potential made ground on site	Potential infilled ground on site and <250m from site Potential made ground on site	ed ^e Ingestion, inhalation, dermal contact	Future site users	Potentially Active	Possible localised Made Ground. Future site users at risk within proposed garden areas, SI required to confirm.	Moderate
Within Sons				Adjacent land users	Potentially Active	Possible contamination from Made Ground, however the anticipated determinants are likely to be low mobility, ground investigation to confirm	Low
		Direct contact	Structures	Potentially Active	Significant contamination is not anticipated on site; however ground investigation is required to confirm this.	Low	
			Absorption in root zone	Plants	Potentially Active	Possible contamination from Made Ground, ground investigation to confirm	Low/ Moderate
Mobile Contaminants	Potential infilled ground on site	Leaching into groundwater	Groundwater	Potentially Active	Potential risk due to the unknown nature of the material used to infill the pit on site and the underlying Principal Aquifer- ground investigation to confirm	Low	
leachables e.g. from pollution sources	and <250m from site Potential made ground on site	e.g. from site	Off eite migration	Abstractions	Potentially Active	No current abstractions <500m from site therefore the risk level is low	Low
adjacent to site/on site		round on site in groundwater Controlled Potentially waters Active	Nearest controlled waters 150m from site therefore the risk level is low	Low			
Organic and Inorganic contaminants within soils / groundwater	Potential infilled ground on site and <250m from site Potential made ground on site	Potable water supply pipes	Utilities workers	Potentially Active	Possible contamination from Made Ground, ground investigation to confirm	Low	



6.2 Summary

In this qualitative risk assessment, a <u>Low-moderate</u> risk implies that localised remedial action is likely to be necessary at the site, however an intrusive ground investigation is required to confirm this.

6.3 Geotechnical Constraints

- Localised deepening of proposed foundations due to existing/former foundations and former pit on site
- > Potential for existing services.
- Site level varies across the whole area- cut and fill exercises are likely to be required depending on proposed site levels



7 SCOPE OF GROUND INVESTIGATION

7.1 Objectives of the Ground Investigation

The objectives of the intrusive ground investigation will be to:

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

7.2 Proposed Ground Investigation Scope

On assessing the previous potential risks on site, we have compiled the following recommendations for further investigation.

- Machine excavated trial holes 3.00 5.00mbgl, breaker may be required within the existing reclamation yard area
- ➤ Four (4 No) small diameter boreholes to 3.00 5.00 mbgl
- Install four (4 No) gas monitoring wells if significant thickness of Made Ground with biogenic potential identified in the boreholes- followed by 6 ground gas monitoring visits over a period of at least 3 months with varying barometric pressures.
- Twelve (12 No) soil samples (made ground and natural) taken for chemical analysis to benchmark contamination levels across the site targeted to garden areas which will be the key pathway. Proposed testing will include but not be limited to the following; heavy metals suite (comprising; As, Cd (low level), Cr Vi, Pb, Hg, Se, Ni, Cu, Zn), Organic Matter, Sulphate, pH, speciated polycyclic aromatic hydrocarbons and TPH CWG and asbestos where deemed appropriate
- Should elevated determinant levels be encountered, additional leachate testing within soil and/or groundwater testing may be required.
- Where possible, further details of water monitoring and groundwater levels of existing boreholes on site should be obtained from the Environment Agency.

The scope of works should be agreed with the Local Authority prior to the intrusive ground investigation and as such may change. Additional geotechnical testing is likely to be required in the vicinity of the buildings to be retained, liaise with Structural Engineer for further advice.



8 REFERENCES

- 8.1 BS 5930:1999 +A2 Code of Practice for Site Investigation.
- **8.2** R & D Publication CLR 8 (March 2002) Assessment of Risks to Human Health from Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research. Environment Agency.
- **8.3** R & D Publication CLR 10 (March 2002) The Contaminated Land Exposure Assessment Model (CLEA): Technical basis and algorithms. Environment Agency.
- 8.4 Contaminated Land Risk Assessment; a Guide to Good Practice; CIRIA C552: 2001.
- **8.5** BRE 211 Radon: guidance on protective measures for new buildings (including supplementary advice for extensions, conversions and refurbishment) (2007 edition)
- 8.6 British Geological Survey Maps 1:50000- 123 Stoke-on-Trent
- **8.7** Assessment of risks to human health from land contamination: an overview of the development of guideline values and related research. EA, 2002
- **8.8** Contaminated Land Risk Assessment; A Guide to Good Practice; CIRIA C552: 2001.
- **8.9** Health and Safety in Construction, HSG150, HSE, 1996.
- **8.10** Baker W (1987), Investigation Strategy lecture at City of Birmingham Development Department Symposium on Methane Generating Sites, 9 December 1987, Industrial Research Laboratories, Birmingham
- 8.11 NHBC Standards, Chapter 4.2, 2003 Building Near Trees
- **8.12** 'Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present', Report Edition No.04 March 2007 NHBC – designed for use with low rise residential properties
- 8.13 CIRIA C665 'Assessing risks posed by hazardous ground gases for buildings' 2007 for high rise residential / flats
- 8.14 BS8485:2007 'Code of practice for the characterization and remediation from ground gas in affected developments'
- 8.15 BRE 414 'Protective measures for housing on gas-contaminated land' Roger Johnson, Parkman Environment 2001
- **8.16** BS 8500- 1:2006 'Concrete Complementary British Standard to BS EN 206-1 Part 1: Method of specifying and guidance for the specifier' November 2006
- 8.17 *Planning Policy 23: Planning and Pollution Control' Office of the Deputy Prime Minister 2004*
- 8.18 CLR11 'Model Procedures for the Management of Land Contamination' DEFRA 2004

