

Report for Hartley Engineering Limited

Proposed Residential Development  
Land Adjacent to 43, Barnsley Road,  
Brierley,  
South Yorkshire S72 9JT

Environmental Risk Assessment  
(Phase I/II Report)

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## Executive Summary

<b>Current Site Status</b>	The proposed development site is centred at O.S. National Grid Reference SE 405 111 and lies to the south of Barnsley Road (A628) in the village of Brierley, South Yorkshire and to the rear of Hartley Vehicle Services being approximately rectangular in shape some 30m x 50m in plan, with a reserved unadopted access road to the highway. Site has been used in the past by Hartley Vehicle Services since c1953 for the parking of vehicles and from c1975 for the ad-hoc storage of vehicles, plant and equipment, many being partly dismantled. Hartley Vehicle Services has operated from the garage building fronting the highway since c1953.
<b>Information Sources</b>	Information has been obtained from the client, local authority, Ordnance Survey and British Geological Survey records.
<b>Geology</b>	Reference has been made to the British Geological Survey geological maps which indicate that the site is underlain by a sandstone stratum of carboniferous age locally known as Brierley rock, no superficial deposits are present.
<b>Hydrogeology</b>	No hydrogeological assessment has been undertaken.
<b>Environmental Sensitivity</b>	As far as can be ascertained there are no statutory environmental designations affecting the subject site.
<b>Key Historical Uses</b>	A review of available historical OS plans and other information indicates that the site is undeveloped and has only been used for the parking of lorries since c1953 and later the storage of vehicles, plant and equipment from c1975. At no time has the site been used for the bulk storage of any fuel or batteries associated with Hartley Vehicle Services.
<b>Review of Third-Party Reports</b>	As far as can be ascertained there are no third-party environmental reports relating to the subject site.
<b>Environmental Risk</b>	The pollutant linkages assessment combined with the historical use of the site indicates that in its present state the site represents an overall <b>MODERATE</b> risk to human health, controlled waters and site structures.
<b>Initial Ground Investigation</b>	10 Trial pits were advanced to depths of up to 0.55m on the 18 <sup>th</sup> August 2019. The investigation encountered a range of materials ranging from made ground comprising ash, red shale, limestone fill and tarmac overlying sandy silty loam soils covering the natural clays and the underlying sandstone rock. Visual and olfactory evidence of hydrocarbon contamination was evident in TP2/1 and TP3.
<b>Initial Analytical Results</b>	12 soil samples were recovered from selected locations, the soil samples were analysed for a range of determinands including: metals, phenols, gasoline, diesel and mineral range organics (C8-C40). The initial soil analysis confirmed elevated levels of TPH of up to 4,800 mg/kg together with elevated levels of metal contamination principally chrome up to 290mg/l, copper up to 340 mg/kg and zinc up to 2000mg/l.
<b>Groundwater</b>	Groundwater was not encountered during the investigation. It is considered that the elevated levels of contaminants encountered within the site are located within the fill materials and have not penetrated into the underlying soil so as to potentially affect the underlying groundwater. The available Envirocheck report states that the site is located within an area of a secondary aquifer of high vulnerability. Therefore, it is considered that there is a low risk of the elevated levels contaminants encountered within the site to potentially leach into any groundwater.
<b>Hydrology</b>	There are no significant watercourses within the vicinity of the site.
<b>Conclusions &amp; Recommendations</b>	The site has the potential to be designated as contaminated land as defined in Part IIA of the EPA if valid pollutant linkages can be established as part of a detailed quantitative risk assessment (DQRA). It is considered that a DQRA is not required to be undertaken as the elevated levels of metals and TPH are considered to be associated with the storage of vehicles, plant and equipment and are present within the fill material above the natural clays and underlying sandstone rock. Subject to planning consent for the proposed development, it is recommended that a Remediation Method Statement be prepared and submitted to the local authority for approval based on the findings of this Phase I/II report with the object of breaking any pollution pathways/linkages by removing off site any material found to contain elevated levels of metals and/or TPH in any proposed garden and/or landscaped areas. These areas shall be appropriately restored with suitable imported certificated clean soil materials. By undertaking the recommendations, the site will be deemed a <b>LOW</b> risk to site occupiers and the environment.

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## **1.0 INTRODUCTION**

### **1.1 Instruction**

JWA Contract Consultants Limited (JWA) has been instructed by Ms Louise Hartley of Hartley Engineering, the 'Client', to prepare an Environmental Risk Assessment Report (Phase I/II) for land adjacent to 43, Barnsley Road, Brierley, South Yorkshire S72 9JT relating to the proposed submission of a full planning application for the construction of three detached residential dwellings. The proposed development site has been used in the past for the ad-hoc storage of vehicles, plant and equipment associated with Hartley Vehicle Services since c1975. Hartley Vehicle Services has operated on the site since c1953 and initially used part of the site for the parking of lorries and at no time has any bulk storage of fuels or batteries taken place on the site. Hartley Vehicle Services will continue to operate in the adjacent premises and the business will be unaffected by the proposed development. An outline planning was submitted for a different development proposal in 2017 which was withdrawn.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by JWA during our investigations. The conclusions drawn by JWA could therefore differ if the information is found to be inaccurate, incomplete or misleading.

Except as otherwise requested by the Client, JWA is not obliged and disclaims any obligation to update the report for events taking place after:

- The date on which this assessment was undertaken and;
- The date on which the final report is delivered.

JWA gives no warranties or guarantees as to the completeness or accuracy of information provided by others.

JWA makes no representation whatsoever concerning the legal significance of its findings or to other legal matters referred to in the following report.

### **1.2 Objectives**

The purpose of the report is to fully consider the environmental risks and liabilities associated with the existing site and its proposed redevelopment. The report focuses on the environmental issues associated with the use of the site by Hartley Engineering and/or Hartley Vehicle Services. The environmental assessment considers any likely contamination of soil and/or groundwater on the site.

### **1.3 Limitations**

This investigation is limited to the information made available to JWA, a site walkover survey, an intrusive ground investigation, a review of regulatory data and enquiries made of relevant statutory authorities.

The risk assessment is based on both no change of use and the proposed redevelopment of the site.

Assessments and interpretation are made in line with legislation and guidelines in force at the time of writing, representing best practice at that time.

## 1.4 Guidance

This report has been prepared in accordance with:

- CLR11 – Model Procedures
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003)
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002
- DEFRA and Environment Agency CLR publications, supported by the TOX guides and SGV guides, 2009
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002
- Planning Policy Statement 23

And any other protocols advised by DEFRA and the EA and guidance prepared by BSI, CERTA, BURA, and other industry advisory bodies including BS5930 and BS10175.

## 1.5 Judicial Precedents and Legislation

The following non-exhaustive list of legislative framework documents as amended, has been considered in the compilation of this report.

- Rylands v Fletcher - Private Nuisance, Escape
- Health and Safety Etc. at Work Act
- The Environment Protection Act 1990
- The Building Regulations 1991, Part C of Schedule 1
- The Water Resources Act 1991
- The Controlled Waste Regulations 1992
- The Radioactive Substances Act 1993
- The Environment Act 1995
- Special Waste Regulations 1996
- The Pollution Prevention and Control (England and Wales) Regulations 2000
- The Contaminated Land (England) Act 2000
- The Environment Act 1995 (Commencement No.16 and Saving Provision) (England) Order 2000
- The Contaminated Land (England) (Amendment) Regulations 2001
- The Landfill Regulations (England and Wales) Regulations 2002
- The Landfill (England and Wales) (Amendment) Regulations 2004
- The Contaminated Land (England) Regulations 2006
- Environmental Damage (Prevention and Remediation) Regulations 2009

Neither the list of guidance documents nor the list of judicial precedents and legislation should be considered exclusive or comprehensive. There are numerous other individual items of legislation regulating contaminated land. JWA makes every effort to ensure that all are adhered to in the preparation and presentation of this report.

## 1.6 Technical Competence

John Whitham has worked for a number of consultants within the geo-environmental sector for over 40 years prior to establishing JWA Contract Consultants Ltd

JWA are specialist environmental and waste management consultants working in the contaminated land market. Most of the workload undertaken by JWA is within the construction and property development market dealing with brownfield re-development and associated environmental issues.

Established in 1998, JWA is at the forefront of environmental asset management providing expertise in Environmental Risk Assessments, Environmental Site Investigations, and the preparation, implementation and verification of Remediation Strategies.

The technical protocols as described in the report and are strictly adhered to by quality control checks in the field and in the laboratory. JWA only use UKAS and MCERTS accredited laboratories for all methods used to derive determinand concentrations.

## 1.7 Scope of Work

The report comprises a Phase I/II Environmental Risk Assessment of the site including:

- background information on past and present uses of the site in the context of its environmental setting;
- background information on the geology, hydrogeology and hydrological significance of the site;
- an assessment of the nature and potential hazards and physical constraints of the site;
- identify receptors (targets), potential sources of contamination and plausible pathways and features of immediate concern;
- make informed decisions regarding intrusive investigations.

The report contains following elements:

- a review of existing data;
- a site walkover survey;
- an interpretative review of historical uses of the site;
- an interpretative review of regulatory information;
- an interpretation of the environmental setting of the site (geology, hydrology, hydrogeology etc.);
- a qualitative environmental risk-based assessment;
- a description of the intrusive ground investigation undertaken;
- a description of the preliminary analytical work undertaken;
- an interpretation of the intrusive ground investigation and analytical work and
- conclusions and recommendations based on the interpretation.

## 2.0 THE SITE

### 2.1 Site Location

The proposed development site is located in the village of Brierley, South Yorkshire and is centred at OS National Grid Reference SE 405 111. The location of the site is shown in **Figure 1** below.

**Figure 1: Site Location Plan**



### 2.2 Site Description

The site comprises land to the rear of the Hartley Vehicle Services garage and is presently used for the ad-hoc storage of vehicles, plant and equipment. Part of the site was used for the parking of lorries from c1953 by Hartley Vehicle Services and later from c1975 for the storage of vehicles, plant and equipment by Hartley Vehicle Services. The site is shown on the various revisions of the OS maps as undeveloped. The site is bounded to the north by the existing garage building operated by Hartley Vehicle Services, the business of which is not affected by the proposed development, all other boundaries abut onto residential gardens or undeveloped land.

### 2.3 Proposed Development

It is proposed to construct three detached residential dwellings on the site with the addition of an unadopted private drive connecting to the main highway.

The layout of the proposed development is shown in **Appendix I**.

## 2.4 Site Reconnaissance Visit

A site reconnaissance visit was undertaken by JWA on 24 June 2019. The site is situated to the rear of properties 41 and 43, Barnsley Road, Brierley. The site is orientated in an NNW to SSW alignment, and is part of the garden to properties 41 and 43, Barnsley Road. The northern boundary of the site is formed by the existing rear yards and outbuildings of the property 39, Barnsley Road. The site is bounded to the NW by the garage and workshop building comprising 43, Barnsley Road, operated by Hartley Vehicle Services. A new vehicle access is proposed for the development site via an unadopted private drive located between property 43 and the adjacent garage/workshop. The eastern boundary of the site comprises an unkept hedge being the residential garden of property 39. The southern boundary is again bounded by unkept hedge with open land beyond. The western boundary comprises a mix of fence and hedge to the rear of the residential properties numbered 2, 3, 4, 5, 6, 7 and 8 Regina Crescent.

Within the site, a lawned area exists towards the NE corner of the site for the benefit of number 41. The remaining parts of the site comprise a mixture of out buildings together with the storage of vehicles and equipment in various stages of being dismantled or abandoned.

Photographs taken during the site walkover are presented as **Appendix II**.

### 3.0 SITE DEVELOPMENT HISTORY

#### 3.1 Historical Ordnance Survey Maps

All readily available historical Ordnance Survey (OS) mapping for the site and its surrounding area have been obtained and reviewed. The key points of the site development history and the potential environmental impact to soil and groundwater at the site are summarised in **Table 1**. Copies of historical maps are presented in **Appendix III**.

**Table 1 – Key Points of Site Development History**

Dates	Scale	Detail	
		<i>On Site:</i>	<i>Surrounding Area:</i>
1854	1:10560	The site is shown as open fields.	The Brierley Quarry (Sandstone) is shown 217m SW of the site.
1893/4	1:2500/ 1:10560	The site is shown as open fields with trees.	Brierley Quarry is shown but not named SW of the site. Providence Terrance is shown NW of the site.
1906/7	1:2500/ 1:10560	The site is shown as open fields without trees.	The unnamed quarry is now labelled 'Old Quarry'. Further development is shown to have taken place at Providence Terrance with the addition of a range of smaller building where the existing garage of the Hartley Vehicle Services is located.
1919	1:2500	No material changes from the 1906/7 edition.	The 'Old Quarry' is now not named. Additional development is shown to have taken place at Providence Terrance with the addition of smaller out buildings to rear of the terraced properties.
1933	1:10560	No material changes from the 1906/7 edition.	No material changes from the 1919 edition.
1938	1:10560	No material changes from the 1906/7 edition.	No material changes from the 1919 edition.
1948	1:10560	No material changes from the 1906/7 edition.	No material changes from the 1919 edition.
1955/6	1:10000	No material changes from the 1906/7 edition.	No material changes from the 1919 edition.
1962	1:2500	Two new boundaries are shown to exist within the site parallel with each other and the SW boundary dividing the site into three approximately equal strips of land.	The quarry is now not shown, A larger building is shown in the vicinity of Hartley Vehicle Services. Regina Crescent is shown to have been developed.
1966/7	1:10000	No material changes from the 1919 edition.	No material changes from the 1962 edition.
1974	1:10000	This an almost blank sheet with no mapping details shown of the site.	This is an almost blank sheet with no mapping details shown of the site.

Dates	Scale	Detail	
		<i>On Site:</i>	<i>Surrounding Area:</i>
<b>1978/85</b>	1:2500	The new boundaries as shown on the 1962 edition are not shown, only a similar but central boundary in the northern half of the site.	No material changes from the 1962 edition.
<b>1981/4</b>	1:10000	No material changes from the 1906/7 edition.	Additional buildings are shown to be present adjacent the NE boundary of the site. Additional buildings are shown in the vicinity of Hartley Vehicle Services.
<b>1978/88</b>	1:2500	No boundaries are now shown within the site. A soft edge is shown, possibly indicating the extent of the vehicle hard standing at that time.	No material changes to the 1962 edition. Some of the smaller out buildings have been removed in the vicinity of Hartley Vehicle Services.
<b>1982</b>	1:2500	This is shown as an almost blank sheet in the with no mapping details shown of the site.	This is shown as an almost blank sheet with no mapping details shown of the site.
<b>1989</b>	1:10000	No material changes from the 1906/7 edition	No material changes from the 1981/4 edition.
<b>1990/3</b>	1:2500/ 1:10000	No 1:10000 mapping details are shown for the site.	No 1:10000 mapping details are shown for the site.
<b>2000</b>	1:10000	No material changes from the 1906/7 edition.	An additional building is show in close proximity to the NE boundary.
<b>2019</b>	1:10000	This is a low-resolution Street View map. It is not possible to interpretation this map.	This is a low-resolution Street View map. It is not possible to interpretation this map.

The historical review suggests that the site has not been previously developed.

The main risks of site contamination are therefore associated with onsite sources principally arising from the use of parts of the site for vehicle parking, and the subsequent storage of vehicles, plant and equipment.

### 3.2 Aerial Photographs

A recent aerial photograph has been reviewed and is provided as Figure 2 below.

**Figure 2: – Aerial Photograph**



### 3.3 Previous Investigation Reports

No previous ground investigation reports have been made available to JWA.

## 4.0 REGULATORY REVIEW

### 4.1 Envirocheck report No. 207872276\_1\_1

The factors that could influence the environmental status of a site are described in **Table 2** below. A full listing of these factors including pollution incidents and other environmental information is presented in **Appendix IV**.

**Table 2 Key Points of Regulatory Review**

Feature	N° and distance from site boundary	Closest to site*	Comments
BGS groundwater flooding susceptibility	Limited potential within 30m of site	30m – details not known.	This gives rise to a <b>LOW RISK</b> of a pollution incident occurring which may impact on the site.
Discharge Consents	None within 500m of the site.	593m - mixed farming sewage effluent.	Not considered to be of concern to the site
Pollution Control Incidents to Controlled Waters	None within 500m of the site.	846m – Significant incident associated with pig land run-off.	Not considered to be of concern to the site.
River Quality	None within 500m of the site.	395m – Grimethorpe Dyke, flow less than 0.31 cumecs.	Not considered to be of concern to the site.
Water Abstraction	None within 1km of the site.	1804m – Brierley Town Council, ornamental fishing lake.	Not considered to be of concern to the site
Groundwater Vulnerability Map	Site is overlying a secondary bedrock aquifer with high vulnerability.		The contaminants encountered on site, may potentially pose a <b>MODERATE RISK</b> to the secondary bedrock aquifer.
OS water network lines	1 within 500m of the site	372m – inland river, Don and Rother catchment	Not considered to a concern to the site.
Historical landfill sites and licensed waste management facilities	None within 500m of the site.	627m – located at 39 Brierley Road Shafton, a mixed metal recycling facility operated by P J Plant and Equipment Ltd.	Not considered to be of concern to the site.
BGS recorded mineral sites	1 within 217m of the site.	Sandstone quarry	Not considered to be of concern to the site.
Potential for collapsible ground stability hazards	Very low.		Not considered to be of concern to the site.
Potential for running sand ground stability hazard	Very low.		Not considered to be of concern to the site.
Potential for shrinking or swelling clay ground stability hazard	Very low		Not considered to be of concern to the site

Feature	N° and distance from site boundary	Closest to site*	Comments
Radon Potential	The site is in a lower probability radon area with less than 1% of homes being estimated at or above the action level. No radon protection measures are necessary in the construction of new dwellings or extensions.		Not considered to be of concern to the site.

\*All directions and distances pertain to the site boundary and are approximate.

The regulatory review suggests that the land uses surrounding the site present a **MODERATE RISK** with respect to potential environmental impacts to the site and its surrounding environment.

As far as can be ascertained no regulatory enforcement action has been taken by the relevant authorities regarding the site.

## 5.0 GEOLOGICAL SETTING

### 5.1 Geology

Reference has been made to the British Geological Survey records.

The geological records indicate that site is underlain by solid deposits of carboniferous age comprising a middle coal measure sandstone bedrock known locally as Brierley rock.

### 5.2 Hydrogeology

The Envirocheck report indicates that the site is located within an area of a secondary aquifer of high vulnerability, it is considered that there is potentially a **MODERATE RISK** of the elevated levels contaminants encountered within the site to possibly leach into any groundwater beneath the site.

### 5.3 Hydrology

There are no significant watercourses within 500m of the site.

A drain exists to the North West of the site which runs alongside Mackey Lane. This drain was part of the local sewage treatment works discharge which in turn discharged into Frickley Dike, the sewage treatment works closed in the 1970s.

### 5.4 Mining

The Envirocheck report confirms the area as having been affected by deep coal mining operations, there is no evidence to indicate the presence of shallow coal mining hazards. The now abandoned Brierley and Shafton collieries both lie within 1km of the site, however any ground subsidence relating to deep coal mining activities beneath the site will have long since ceased.

The Envirocheck report does not make reference to the possible presence of coal bed methane gas and associated carbon dioxide being emitted from beneath the site. It is considered that the presence of significant quantities of coal bed methane and/or carbon dioxide is a **LOW RISK**. A Coal Authority coal mining report has not been requested.

The site of the former Brierley sandstone quarry lies 217m to the SW of the site and has now been infilled. There are no records available to indicate the quarrying of the Brierley sandstone within the site.

## 5.5 Radon Gas

NRPB-W26, '*Radon Atlas of England and Wales*' identifies the site as being in an area where <1% of properties are above the action level for Radon Gas.

BRE211, '*Radon: guidance on protective measures for new dwellings*', identifies that if new dwellings are to be built, the site does not lie in an area where consideration should be given to a geological assessment to determine whether any radon protection measures might be necessary.

## 6.0 INITIAL CONCEPTUAL SITE MODEL

The environmental liabilities and risks have been evaluated in terms of any source – pathway – receptor relationship assessed in accordance with the approach as set out in the Environment Act 1995, The Contaminated Land (England) Regulations 2000 and DETR Circular 02/2000 Environment Protection Act 1990: Part IIA Contaminated Land. Under Section 57 of the 1995 Act, it is the responsibility of the Local Authority to determine whether land is contaminated. The regulations came into force on 1 April 2000. Contaminated Land is defined within the legislation framework as land which is in such condition by reason of substances in, on or under the land that:

- a) significant harm is being caused or there is a significant possibility of such harm being caused; or
- b) pollution of controlled waters is being caused or likely to be caused.

The potential for harm is based on the presence of three factors:

- Source: substances that are potential contaminants or pollutants that may cause harm;
- Pathway: a potential route by which contaminants can move from the source to the receptor; and
- Receptor: the target that may be harmed for example humans, water (both surface and groundwater), flora or fauna.

Where a source, pathway and receptor are all present then a pollutant linkage exists and there is potential for harm to be caused. Therefore, the presence of measurable concentrations of contaminants within the soils does not automatically determine that a contamination issue is present, since any contamination present must be evaluated in terms of pollution linkages and an unacceptable risk of harm. The pollution of controlled waters alone is sufficient to cause any land to be designated as contaminated.

The nature and importance of both pathways and receptors which are relevant to the site may vary according to the present and proposed uses of the site, the site characteristics and its surroundings.

The key principle, which underpins this approach, is the suitability for use criteria. This principle requires remedial action only where contamination is considered to pose unacceptable risks to human health or the environment and appropriate and cost-effective remediation techniques are available, taking into consideration the existing or proposed use of the site.

A contaminant is defined in the Contaminated Land Exposure Assessment model (CLEA) as a substance that has the potential to cause harm, while a risk is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.

The following sections discuss all the identified potential sources, pathways and receptors in the context of the site and plausible pollutant linkages which may represent a risk to human health and/or controlled waters from the data gained from the desk study. At this stage the assessment is qualitative and aimed to determine all pollutant linkages, irrespective of significance or allowing for uncertainty.

Three impact potentials exist for any given site, these are:

- The site impacting upon itself;
- The site impacting on its surroundings, and;
- The surroundings impacting on the site.

All three impacts need to be considered in a risk assessment.

## **6.1 Migration Pathways**

The available pathways are determined by the proposed residential use of the site. The proposed development will allow direct contact between any contamination in the soil and end users. Infiltration of run off will be available in any landscaped areas.

Potential pathways by which human and environmental receptors may be impacted upon are identified as follows:

- Ingestion;
- Skin contact;
- Inhalation;
- Direct contact by buried structures, and
- Root uptake.

These pathways arise through direct contact with contaminated soils, contact with contaminated groundwater or inhalation of airborne dusts, fibres or gases.

## 6.2 Potential Receptors

The potential human receptors at the site are:

- Future occupiers of the site;
- Existing and future neighbouring occupiers, and
- Services personnel working in trenches.

The receptors are:

- Plastic water pipes, which may be attacked by organic compounds such as PAH and TPH, and
- Buried concrete, which may be affected by high levels of sulphate and/or low pH in site soils or groundwater.
- 

Potential water receptors include:

- Groundwater underlying the site which is designated a Minor Aquifer; and
- On and off-site drainage systems

An assessment of these pollutant linkages has been made and is presented below.

## 6.3 Preliminary Conceptual Site Model (CSM)

The preliminary CSM is formulated on the basis of potential sources of contamination identified on site, potential receptors that may be the recipient of contamination arising from those sources and any pathways that may exist, thus creating a source-pathway-receptor pollutant linkage.

The following pollutant linkages have been identified as being attributed to this CSM.

**Table 3 Pollutant Linkages associated with the site**

	Source	Pathway	Receptor
1	On-site elevated levels of chrome, copper, lead and zinc	Vertical and lateral migration of substances released into the site soils.	Future site users Underlying Minor Aquifer
2	On-site elevated levels of TPH	Vertical and lateral migration of substances released into the site soils.	Future site users Underlying Minor Aquifer

No significance or uncertainty is attributed to any pollutant linkage identified.

## 6.4 Hazard Assessment

The use of the site for the parking and storage of vehicles plant and equipment has create a potential risk to the environmental with potential for direct contact with future site users, further contamination of the site soils and any drainage systems, and further the possible contamination of the underlying minor aquifer.

## 6.5 Risk Evaluation

A simple matrix can provide a consistent basis for decision-making. It should of course be used with caution, recognising the over-simplification that it will normally

represent. The probability and consequences are defined according to parameters relevant to the site; the boundaries of risk acceptability (and tolerability, where relevant) indicated on the matrix provide in **Table 4** have been tailored to the known factors influencing the significance of the risk. Individual scenarios are mapped onto the matrix to provide a ready and consistent indication of their acceptability or tolerability.

**Table 4 – Risk Evaluation Matrix**

PROBABILITY	CONSEQUENCES			
	Severe	Medium	Mild	Negligible
High	Very High	Very High/High	Moderate/Low	Negligible
Medium	Very High/High	Moderate	Moderate/Low	Negligible
Slight	High/Moderate	Moderate/Low	Low	Negligible
Negligible	High/Moderate	Low	Low	Negligible

These attributes are evaluated qualitatively against individual hazard assessments to determine the likelihood of a given hazard occurring.

The following evaluation has therefore been made, based on observations made during the site walkover, the data obtained from external sources and the environmental setting of the site:

- The long-term parking of vehicles and subsequent storage of vehicles, plant and equipment.

The site is shown as undeveloped on the OS maps, however, since c1953 part of the site was used for the parking of vehicles associated with the then coal delivery business of Hartley Vehicle Services. Following the decline of the coal industry and the subsequent loss their contract with the then National Coal Board the site was used for the storage of vehicle plant and equipment. At no time was the site used for the bulk storage of fuels or batteries. These uses been attributed a **MILD** probability with a **MEDIUM** consequence resulting in a **MODERATE/LOW** risk.

## 6.7 Risk to Human Health

### 6.7.1 Contamination in the Soils

**MODERATE** risk present.

### 6.7.2 Contamination in the Surface and Groundwater

**MODERATE** risk present.

## 6.8 Risk to Controlled Waters

### 6.8.1 Contamination in the Soils

**MODERATE** risk present.

### 6.8.2 Contamination in the Surface and Ground Water

**MODERATE** risk present.

## 6.9 Risk to Buildings and Services

### 6.9.1 Contamination in the Soils

**LOW** risk present.

### 6.9.2 Contamination in the Surface and Ground Water

**LOW** risk present.

## 6.10 Risk Categorisation

The following ratings are set against the categories provided in **Table 5** below as defined by, the then, Department of the Environment.

The pollutant linkages assessment combined with the historical use of the site has indicated that the site represents a **MEDIUM/LOW** human health risk, a **LOW** risk to site structures and a **MEDIUM** risk-controlled waters risk.

However, the overall risk to the site from its settings would be considered **MODERATE**.

**Table 5: DoE Risk Categorisations**

<b>RATING</b>	<b>DEFINITION</b>
Very High Risk	This is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
High Risk	<i>Harm</i> is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
Moderate Risk	It is possible that without appropriate remedial action <i>harm</i> could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
Low Risk	It is possible that <i>harm</i> could arise to a designated receptor from an identified hazard. It is likely that, at worst, if any harm was realised any effect would be mild.
Negligible Risk	The presence of an identified hazard does not give rise to the potential to cause <i>harm</i> to a designated receptor.
No Potential Risk	There is no potential risk if no pollution linkage has been established.

The site has the potential to be designated as contaminated land as defined in Part IIA of the EPA if other valid pollutant linkages are established with any contaminant sources.

## **7.0 ENVIRONMENTAL LIABILITY ASSESSMENT**

### **7.1 Statutory Liability**

Having regard to the historical of the site, the potential for the site to be designated as contaminated land under Part IIA of the EPA is considered low. However, potential sources of contamination may affect this opinion if a valid pollutant pathway is established.

### **7.2 Third Party Liability**

Due to the setting of the site within its environs, no third-party liabilities are considered to exist in conjunction with the use of this site.

### **7.3 Development Implications**

Subject to planning approval, the proposed development may only be undertaken following the implementation of remediation works to be carried out in accordance with an approved Remediation Method Statement.

## **8.0 INTRUSIVE GROUND INVESTIGATION SCOPE OF WORKS**

An initial intrusive investigation was carried out on 18 August 2019. The investigation was designed to evaluate the prevailing ground conditions beneath the site. The investigation was based on the review of the historical plans of the site, and the available regulatory data. The trial pit locations were positioned to provide full coverage of the site. The positions of the trial pit locations are shown on the Trial Pit Location Plan provided as **Appendix V**.

The intrusive investigation comprised:

The excavation of 10 No. trial pits (TP1 to TP10 inclusive) to a maximum depth of 0.55m below the existing ground level.

UKAS and MCERTS accredited environmental analysis of soil samples extracted from the trial pits was undertaken for soil total analysis from 12 No. selected locations.

Prior to any intrusive works, the locations of buried services were checked by reference to the site owner. All site work was undertaken in accordance with BS 5930 'Code of Practice for Site Investigation' (1999). An environmental engineer logged and recovered all soil samples from the trial pits.

### **8.2 Ground Conditions**

The intrusive investigation demonstrated that the ground conditions beneath the site comprise made ground of various types and thicknesses overlying natural deposits of sandy silty loam, clays and sandstone bedrock. A full description of the materials encountered are presented in the trial pit logs is provided in **Appendix VI**.

#### **8.2.1 Made Ground**

Made ground was encountered in the trial pits at depths of up to 0.55m.

## 8.2.2 Sandy, Silty Loam and Clay

TP1 encountered soil beneath the lawned area of the site to a depth of 0.20m.

In the remaining trial pits sandy, silty loam and clay was encountered beneath the made ground at depths ranging from 0.28m to 0.55m.

## 8.2.3 Sandstone Bedrock

No sandstone bedrock was encountered.

## 8.3 Groundwater

No groundwater or perched water was observed in any of the trial pits.

## 8.4 Contamination Observations

The soil samples were inspected by the laboratory for visual or olfactory evidence of contamination. Evidence of contamination was noted at in TP2/1 and TP3. These observations are summarised in Table 6 below as noted in the laboratory test results in **Appendix VII**.

**Table 6: Visual and Olfactory Evidence of Contamination**

Investigation Location	Depth	Physical Evidence of Contamination
TP2/1	0.05m	Made Ground– dark brown gravelly sand with frequent hydrocarbons
TP3	0.35m	Made Ground – dark brown gravelly sand with frequent hydrocarbons.

## 9.0 ENVIRONMENTL RESULTS

### 9.1 CLEA Soil Guideline Values (2009)

Where appropriate the analytical test results have been assessed using the new CLEA Soil Guideline Values (2009) published by the Department for Environment, Food and Rural Affairs and in-house derived screening criteria calculated using CLEA and SNIFFER models.

CLEA screening criteria for allotments has been used to assess the laboratory soils analysis based on the proposed use of the site as a leisure facility.

CLEA guidance quotes soil guidance values (SGVs) for use as generic criteria for assessing risks to human health from exposure to contaminated soil for four exposure pathway scenarios. Because all the soil on a site cannot be tested the original CLEA model required an estimate to be made of the true mean concentration of the site based on statistical analysis of the sample set. The Mean Value Test calculates the 95<sup>th</sup> percentile upper confidence limit of the mean, which is a statistical estimate of the true mean concentration with a 95% certainty that the true mean is below the given value. The Maximum Value Test determines whether the highest value in the sample set should be assumed to be part of the same underlying population as the other samples or should be treated as an outlier. Provided the Mean Value Test is below the SGV and the sample set passes the Maximum Value Test then individual exceedances of the SGV are considered not to be significant as the mean exposure will be below the target exposure value.

## **9.2 Dutch Values (2008)**

Where insufficient toxicological or chemical data is available in the public domain to enable a scientifically robust screening value using the SNIFFER or CLEA models' reference has been made to the Dutch Ministry of Housing, Spatial Planning and the Environment circular as amended by the Soil Remediation Circular 2006 which came into force on 1 October 2008 on the intervention levels for soil remediation. Although these values have no formal status in the United Kingdom, they do offer a broad means of assessing contamination levels. The Dutch Levels are based on a framework comprising two threshold values of increasing concentration. These are defined as the target level, which is a reference below which soil is not considered contaminated and the intervention level, which is a threshold above which there is serious contamination. The Dutch Levels are multifunctional and are therefore appropriate for use for the proposed development. Target levels are based on background soil concentrations in the Netherlands and are therefore not strictly relevant to UK soils, however they are commonly used as screening values in the UK and it is therefore considered appropriate to use them in this assessment.

The phytotoxic metals copper and zinc are relatively non-toxic to humans and have therefore been compared with threshold trigger values taken from the 2008 Dutch guidelines which now supersede ICRCL 59/83 guidance document to assess risk to plants in landscape areas.

### 9.3 Analysis Results

Table 7 below summaries the priority contaminant values which are excess of accepted criteria, the full list of results for the laboratory soil analysis undertaken are shown in **Appendix VII**.

**Table 7: Soil Total Analysis Results Exceedance Summary**

	SGV 2009 Allotments	Dutch 2008 Intervention	EPH (DRO) (C10-C40)												
				TP01	TP2	TP2/1	TP3	TP4	TP5	TP6	TP7	TP7/1	TP8	TP9	TP10
Depth (m)				0.15	0.05	0.45	Composite	0.50	0.00	0.20	0.15	0.60	0.10	Composite	0.25
Chromium (mg/kg)	78	-	-	29	16	14	22	14	78	15	11	31	130	15	12
Copper (mg/kg)	-	190	-	290	140	16	97	18	200	24	230	26	340	86	74
Lead (mg/kg)	-	530	-	440	140	28	240	25	210	41	340	25	1200	110	350
Zinc (mg/kg)	-	800	-	360	320	76	250	74	1700	110	890	94	2000	220	330
pH (pH value)	-	-	-	6.0	8.0	7.4	8.0	7.7	7.4	6.9	7.9	7.1	8.1	8.6	8.2
Total Petroleum Hydrocarbons (mg/kg)	-	-	1000	740	2300	29	750	53	4800	110	1400	24	2400	320	260

## 10.0 CONCLUSIONS AND RECOMMENDATIONS

### 10.1 Conclusions

In general, it is considered that the entire site has been covered in MOT Type 1 road stone fill which provided a hardstanding for the parking of lorries in the early period. Over the year's soils have built up over this hardstanding allowing mixed vegetation to take hold. During the site investigation it was found that this soil covering of the hardstanding varied in depth from a slight covering to up to 200mm. The impression gained from the site investigation is that the road stone is in good condition and well compacted, and would provide a suitable sub base to any access roadway, driveways to the properties and car parking areas.

### 10.2 Remediation Method Statement

It is recommended that the following 5-point Remediation Strategy be implemented:

- A surface soil/loam site strip should be carried out and removed prior to any development work or excavations undertaken. This will prevent any extension or cross contamination occurring onsite.
- Within the area of Trial Pit 3, this area shall be excavated for removal, together with any other locations identified during or post the site strip operation.
- Excavate the areas which will be designated as garden or landscaped down to the natural clay layer at approximately 400mm below existing ground level.
- Services to be laid on clean imported material and backfilled over and around the service, in particular MDPE water supply pipes, to a thickness of 150mm above the laid service.
- All material removed from site to be subject to WAC (Waste Acceptance Criteria) testing prior to removal to meet any waste receiving sites licencing requirements.

On completion of the Remediation Strategy the site can be deemed a **LOW RISK** in respect of the impact to the environment and to site users.

Signed: .....

John Whitham MMS MIEM MaPS  
Director  
JWA Contract Consultants Limited

22 September 2019