PROPOSED RESIDENTIAL DEVELOPMENT
RED HOUSE FARM, LOWER OUTWOODS ROAD,
BURTON UPON TRENT

PHASE I ENVIRONMENTAL RISK ASSESSMENT

SEPTEMBER 2012

REPORT REF: 20200/JW/09-12/3260
## EXECUTIVE SUMMARY – Phase I Environmental Risk Assessment

<table>
<thead>
<tr>
<th>Site Location</th>
<th>The development site is located at Red House Farm, Burton upon Trent which is located to the south of Lower Outwoods Road and to the north of Reservoir Road. The site is located to the west of Burton Town Centre and is centred with National Grid reference 422761, 324428.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Site Description</td>
<td>The site is currently occupied by Red House Farm which is an operational turf farm and Turkey Processing Unit. The development area comprises of turfed fields and includes industrial buildings, and a number of hedgerows and trees.</td>
</tr>
</tbody>
</table>
| Proposed Development | The site covers an area of 13.38ha and a description of the development proposals is provided below;  

“Outline planning application (all matters reserved) for the erection of up to 250 dwellings, associated structural landscaping including woodland planting, public open space, access, drainage, associated infrastructure, earthworks and other ancillary and enabling works including the demolition of all existing buildings”.

| Site Walkover Findings | Red House Farm currently operates as a Turkey Processing Unit and a turf and soil supplier.  

Waste Materials  
Waste materials including stockpiled rubble, gravel and wood have been identified on the Red House Farm area of the site.  

Burnt Ground  
No areas of burnt ground were noted during the site walkover.  

Asbestos Containing Materials (ACMs)  
It is considered possible that ACM’s may be present within the buildings identified on site.  

Other Relevant Information  
A number of industrial buildings, farm vehicles, scrap vehicles and storage tanks were noted on site at the time of the site visit. There is a large Gas Oil Tank adjacent to the Turkey Processing Unit Reception building. Limited secondary containment present on site, however, there was no visual evidence of spillages.  

Existing overhead BT and electric cables are noted on site along with an condenser unit adjacent to the Turkey sheds. |
| Regulator Consultations | Environment Agency  
The EA website has been interrogated with reference to any relevant environmental issues in the local area.  

- The development area is located in Flood Zone 1.  
- There are eight historic landfill site located within 1km of the development area.  
- There are no air pollution sites located within 1 km of the site.  
- There is one registered pollution licence within 1km of the site. |

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**East Staffordshire Borough Council**

ESBC has confirmed the presence of a historic landfill site to the south of the site. This lies within land under the clients ownership but not within the application boundary. The following information is held on the landfill site;

- The site operated between 1920 and 1992 and accepted construction waste with no more than 1% timber, paper or similar.

No investigations have been undertaken by ESBC with regards to the site; therefore, it is acknowledged that the area may represent a risk due to ground gases or contamination.

### Site History

A review of the Historic Maps has determined the following site history;

#### Onsite

The earliest maps available from 1884 show the site to comprise of open fields with no evidence of any on site structures until 1955 when four buildings are identified. These were then shown to be extended on the 1970 map and labelled as Red House Farm. In addition the earliest maps show former field boundaries, a well, a pond and ditch, all of which are no longer present.

#### Offsite

Allotments are shown to the north east and east of the site boundary on the 1924 map. There are a number of offsite commercial and industrial uses including a Brickworks to the south of the site. This is labelled as an old Clay Pit in 1924 and then latterly becomes the landfill/refuse tip. The hospital identified to the north east of the site is shown to be extended in both 1975 and 2006. The 1970 - 1973 map also shows the construction of the A38 adjacent to the eastern site boundary. The existing two covered reservoirs to the east of the site appeared are shown on the 1884 and 1975 maps.

### Geology

The 1:50,000 British Geological Survey (BGS) map, sheet 140 (Ref. 4) shows the site is underlain with Mercia Mudstone and Till, Mid Pleistocene - Diamicton superficial deposits.

### Hydrogeology

The Groundwater Vulnerability Map of England (Ref. 3) indicates that the site is located above a non-aquifer with negligibly permeable soils.

### Radon

According to BR211 (2007) (Ref. 8), no radon protective measures are necessary in the construction of new premises at the site.

### Environmental Sensitivity

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>Very Low</td>
</tr>
<tr>
<td>Surface water</td>
<td>High</td>
</tr>
<tr>
<td>Ecology</td>
<td>Very Low</td>
</tr>
</tbody>
</table>

### Recommendations

It is recommended that a copy of this Phase I ERA is submitted to the Local Planning Authority to support any future planning application at the site. This will enable the contaminated land officer at East Staffordshire Borough Council to review the findings and give comment as consultee to the Local Planning Officer.

As a geotechnical investigation is likely to be required at the site...
in order to determine the engineering capacity of the ground, it is recommended that limited environmental sampling (including soil samples, gas and surface water monitoring) is carried out at the same time to obtain sufficient data to further refine the conceptual model and environmental risks. The results of the additional testing should be provided in a Phase II Ground Investigation report.
1.0 INTRODUCTION

1.1 This Phase I Environmental Risk Assessment (ERA) has been prepared by Mewies Engineering Consultants Ltd (M-EC) for a proposed residential development at Red House Farm, Lower Outwoods Road, Burton upon Trent, Staffordshire. M-EC has produced this report for the benefit of Barwood Strategic Land II LLP. A site location plan is provided in Appendix A.

1.2 The site covers an area of 13.38ha and a description of the development proposals is provided below;

“Outline planning application (all matters reserved) for the erection of up to 250 dwellings, associated structural landscaping including woodland planting, public open space, access, drainage, associated infrastructure, earthworks and other ancillary and enabling works including the demolition of all existing buildings”

1.3 A Phase I ERA (also known as a desk study) is therefore required in order to further assess the ground conditions and support the planning application. This Phase I ERA will form the first stage of a phased contaminated land assessment to determine the potential sources of contamination before undertaking any further intrusive Phase II investigation works to assess the associated risks if considered necessary.

1.4 No third party liability or duty of care is extended. Third parties using information contained in this report do so at their own risk.

Scope of Works

1.5 The Phase I Environmental Risk Assessment comprises a desk study review of existing information on the site combined with a site walkover and an assessment of potential environmental liabilities. A detailed description of the methodology for undertaking a Phase I Environmental Risk Assessment is in Appendix B. The main aspects are summarised below:

- Review of available historical Ordnance Survey maps of the site and surrounding areas.

- Review of published geological, hydrogeological and hydrological records to assess the environmental setting of the site and surrounding areas.
• Review of available public information and up-to-date regulatory information from regulatory authorities to identify any potentially significant environmental issues at the site and surrounding areas.

• Review of any existing information and reports relating to the site and surrounding area, including any available plans.

• Site walkover to assess the potential for environmental liabilities associated with the site and surrounding area which may impact on the development potential.

• Development of a conceptual model and risk assessment to assess potential contaminative sources, pathways and receptors on the site or surrounding properties.

1.6 The report has been prepared using published information and information provided by the Client which was made available at the time of writing only. No liability is extended to any information which has become available since this time. Third parties using information contained in this report do so at their own risk.

**Land Quality Assessment Methodology**

1.7 Environmental regulators use the "source-pathway-target pollution linkage" concept when assessing the risk posed by a contaminated site and for a liability to arise each stage of the pollution linkage must be present. If there is no pollution linkage, then there is no risk. If a pollution linkage is established, the assessment will then consider the level of risk and whether any further works or actions are required to clarify, manage or mitigate the risk. The method of assessment is in accordance with available guidance from the Department of the Environment, Transport and the Regions (DETR) Statutory Guidance on Contaminated Land (Ref. 1) and Model Procedures (CLR11) produced by the Department for Environment, Food & Rural Affairs (DEFRA) and the Environment Agency (EA) (Ref. 2).

1.8 References to the word “contamination” in this report relate to the statutory definition of contaminated land under the Environmental Protection Act 1990: Part IIA Contaminated Land Statutory Guidance: Edition 2, May 2006 unless otherwise stated.
1.9 That definition is: “any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances on in or under the land that –

   a) Significant harm is being caused or there is a significant possibility of such harm being caused; or

   b) Significant pollution of water environment is being caused or there is significant possibility of such pollution being caused”.

**Report Structure**

1.10 Chapter 2 of the report provides information relating to the "source" of potential contamination through a study of current and historical land use, whilst the environmental setting information in Chapter 3 relates to the "target" and "pathway" stages. Chapter 4 assesses the findings of the conceptual model and risk assessment with conclusions set out in Chapter 5 and recommendations for further actions, if required, in Chapter 6. The report references are listed in Chapter 7.
2.0 LAND USE

Site Location

2.1 The development site is located at Red House Farm, Burton upon Trent which is located to the south of Lower Outwoods Road and to the north of Reservoir Road. The site is located to the west of Burton Town Centre and is centred with National Grid reference 422761, 324428.

Site Description

2.2 The site is currently occupied by Red House Farm which is an operational turf farm and Turkey Processing Unit. The development area comprises of turfed fields and includes industrial buildings, sporadic groups of trees and hedgerows.

2.3 The site is bound by open fields and residential properties along Lower Outwoods Road to the north and Reservoir Road to the south. Queens Hospital is situated close to the north east boundary and the Outwoods Reservoir (operated by South Staffordshire Water) is located to the east of the site.

2.4 A topographical survey has been undertaken at the site and this has determined an approximate level difference of 26.34 metres between the lowest point at the north east corner (69.29m AOD), and the highest point south of the approximate central point of the site (95.63m AOD).

Site Walkover & Inspection

2.5 A walkover of the site was carried out by M-EC on 29th May 2012. During this walkover, the following key observations were made with regard to the current and previous site activities. A selection of photographs of the site and surrounding area is provided in Appendix C.

Waste Materials

2.6 Waste materials including rubble, gravel and wood have been identified on the area of the site occupied by the Red House Farm, industrial buildings and storage yard area.

Burnt Ground

2.7 No areas of burnt ground were noted during the time of the site walkover.
Asbestos Containing Materials (ACMs)

2.8 It is considered a possibility that ACM’s could be found within the Red House Farm buildings.

Other Relevant Information

2.9 A number of industrial buildings, farm vehicles, scrap vehicles and storage tanks were noted on site at the time of the site visit. There is a large Gas Oil Tank adjacent to the Turkey Processing Unit Reception building. Limited secondary containment present on site, however, there was no visual evidence of spillages.

2.10 A grassed mound was also observed close to the industrial buildings. The composition of this mound is not known.

2.11 Existing overhead BT and electricity services are noted on site along with an condenser unit adjacent to the Turkey sheds.

Public Record Information

2.12 Information on potentially significant environmental issues and controls at the site and surrounding area may be held on public records by regulatory authorities. This information is sourced directly from the regulatory authorities and from the Envirocheck database (taken within a 1 km radius of the site centre). A copy of the Envirocheck report (Ref. 3) is enclosed in Appendix D. It should be noted that the Envirocheck report takes into consideration the entire site area under the client’s ownership (as shown on the Envirocheck maps), however only the area shown on the site location plan is proposed for development. A summary of the significant environmental issues and controls in the Envirocheck database are summarised in Table 1:

### Table 1: Publicly Recorded Information

<table>
<thead>
<tr>
<th>Public Record</th>
<th>On site or Off site</th>
<th>Features</th>
<th>Potential Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pollution Incidents to Controlled Waters</td>
<td>Off-site</td>
<td>There is one pollution incident to controlled waters located within 1000m of the site. The incident occurred 43m north of the site at a poultry yard, and was the result of poultry blood entering the watercourse. This was recorded in 1997 and was classified as a category 3 minor incident.</td>
<td>Range of contaminants incl pH, pathogens and other biological contaminants.</td>
</tr>
</tbody>
</table>
Prosecutions Relating to Controlled Waters  
- There are no prosecutions relating to pollution incidents to controlled waters.

Historic Landfill Sites  
Off-site  
There is one historic landfill site located directly south of the site. This was operated by George Hodges and Sons Ltd and is labelled as Shobnall Tip. The site received inert and industrial waste and was operational between 1920 and 1992.

Potential for Landfill gases (including methane and carbon dioxide)

Local Authority Pollution Prevention and Control  
- There are no LAPPC sites located within 500m of the site.

Contemporary Trade Directory Entries  
Off-site  
Twelve contemporary trade directories are located within 500m of the site. The closest active entry is 166m E of the site at the Queens Hospital located on Belvedere Road.

Regulator Consultations

2.13 The Environment Agency (EA) website has been interrogated in order to establish whether there are any records of any breaches of environmental regulations, pollution incidents, environmental conditions or general environmental concerns associated with the site. East Staffordshire Borough Council has also been contacted in order to obtain a local authority land contamination search for the site. Table 2 below summarises the information.

Table 2: Regulatory Responses

<table>
<thead>
<tr>
<th>Consultees</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment Agency (EA)</td>
<td>The EA website has been interrogated with reference to any relevant environmental issues in the local area. A copy of the information found is enclosed in Appendix E.</td>
</tr>
<tr>
<td></td>
<td>• The development area is within Flood Zone 1.</td>
</tr>
<tr>
<td></td>
<td>• There are eight historic landfill sites located within 1km of the development area.</td>
</tr>
<tr>
<td></td>
<td>• There are no air pollution sites located within 1km of the site.</td>
</tr>
<tr>
<td></td>
<td>• There is one registered pollution licence within 1km of the site.</td>
</tr>
<tr>
<td>East Staffordshire Borough Council (ESBC)</td>
<td>ESBC has confirmed the presence of a historic landfill site to the south of the site. This lies within land under the clients ownership but not within the area initially assigned for development. The following information is held on the landfill site;</td>
</tr>
<tr>
<td></td>
<td>• The site operated between 1920 and 1992 and accepted construction waste with no more than 1% timber, paper or similar.</td>
</tr>
</tbody>
</table>
No investigations have been undertaken by ESBC with regards to the site; therefore, it is acknowledged that the area may represent a risk due to ground gases or contamination.

**Site History**

2.14 The site history has been assessed by reviewing historical Ordnance Survey maps provided by Envirocheck (Ref. 3). Table 3 summarises the full history of the site and surrounding area with an indication of the potential contaminants. A copy of the historical maps is enclosed in Appendix F.

**Table 3: Site History (taken from Historical Mapping Data)**

<table>
<thead>
<tr>
<th>Maps Dated</th>
<th>On-site/ Off-site</th>
<th>Features</th>
<th>Potential Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1884</td>
<td>On-site</td>
<td>The site is shown to be made up of agricultural fields with isolated areas of trees and a pond toward the centre of the site. No structures are noted within the site boundary.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>A small number of houses are noted immediately to the north of the site in Lower Outwoods. A covered reservoir is noted adjacent to the south eastern site boundary along with a clay pit. A Brickworks is located to the south of the site on Shobnall Road. Development is also identified to the south east of the site within Burton. A brewery is also noted to the south of the site on Shobnall Road.</td>
<td>-</td>
</tr>
<tr>
<td>1902</td>
<td>On-site</td>
<td>A ditch is shown in the western part of the site, draining to the watercourse on the western boundary. A well is also shown close to the head of the ditch.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>Further residential development is noted to the immediately to the north of the site along Lower Outwoods Road and further residential and industrial/commercial development is also shown to the east including a hospital and a Union Workhouse.</td>
<td>-</td>
</tr>
<tr>
<td>1924</td>
<td>On-site</td>
<td>No significant changes from previous maps.</td>
<td>-</td>
</tr>
<tr>
<td>Maps Dated</td>
<td>On-site/Off-site</td>
<td>Features</td>
<td>Potential Contaminants</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>Additional residential and industrial/commercial development is shown within Lower Outwoods and Burton. Allotment gardens are also noted to the north east and east of the site and Outwood Hills farm is shown adjacent to the eastern site boundary along with Upper Outwoods Farm to the north. An Isolation Hospital, Burton upon Trent Poor Law Institution and a Mortuary are noted to the north of the site. Brickworks to the south of the site is now labelled as an Old Clay Pit with Allotment Gardens now noted in this area.</td>
<td>Contamination associated with allotments including made ground/shallow soils containing PAHs, and herbicides.</td>
</tr>
<tr>
<td>1937 - 1938</td>
<td>On-site</td>
<td>The ditch and well previously identified are no longer shown.</td>
<td>Backfilled ditch (ground gases – methane and carbon dioxide).</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>Minor residential/industrial/commercial development is noted in Lower Outwoods and Burton. A pumping station is now noted adjacent to the reservoir on eastern boundary.</td>
<td>-</td>
</tr>
<tr>
<td>1951 - 1965</td>
<td>On-site</td>
<td>Four building structures are noted within the site in the current position of Red House Farm, however these are not labelled. The pond previously identified is no longer shown.</td>
<td>Backfilled ditch (ground gases – methane and carbon dioxide).</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>Significant residential development is noted to the north east of the site in Lower Outwoods and Horninglow. A second covered reservoir is now located adjacent to eastern boundary. The clay pit to the south is now labelled as a refuse tip.</td>
<td>Potential for Landfill gases (including methane and carbon dioxide).</td>
</tr>
<tr>
<td>1970 - 1973</td>
<td>On-site</td>
<td>No significant changes from previous maps.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>A large residential extension is noted to the north of the site in Horninglow and adjacent to the south and east of the site the A38 dual carriageway is now shown.</td>
<td>-</td>
</tr>
<tr>
<td>1975</td>
<td>On-site</td>
<td>The previously identified structures are shown to be extended and are now labelled as Red House Farm.</td>
<td>Contamination associated with farm including made ground/shallow soils containing PAHs, and herbicides. Contamination associated with farm machinery/vehicles including pH, hydrocarbons and PAHs.</td>
</tr>
</tbody>
</table>
### Maps Dated

<table>
<thead>
<tr>
<th>Dated</th>
<th>On-site/Off-site</th>
<th>Features</th>
<th>Potential Contaminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-site</td>
<td></td>
<td>Further residential development is shown immediately adjacent to the northern site boundary on Lower Outwoods Road along with a hospital close to the north eastern point of the site. A sports ground is also identified close to the south eastern site boundary.</td>
<td>-</td>
</tr>
<tr>
<td>1991-1993</td>
<td>On-site</td>
<td>No significant changes from previous maps.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>Minor residential development is shown to the north, east and south of the site.</td>
<td>-</td>
</tr>
<tr>
<td>2006</td>
<td>On-site</td>
<td>A number of new structures are identified on Red House Farm resembling its current layout.</td>
<td>Contamination associated with allotments including made ground/shallow soils containing PAHs, and pesticides/Herbicides.</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>A major extension of the hospital adjacent to the north east corner of the site is identified along with an extension of the brewery to the south.</td>
<td>-</td>
</tr>
<tr>
<td>2012</td>
<td>On-site</td>
<td>No significant changes from previous maps.</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Off-site</td>
<td>No significant changes from previous maps.</td>
<td>-</td>
</tr>
</tbody>
</table>

**Assessment of topographical land survey**

2.15 The current topographical survey is shown on the desktop findings plan included in Appendix C. Field boundaries which are shown on historical maps up to 2012 are not visible on the topographical survey. These are likely to have been filled in and the material used is unknown. There is also potential for organic material along former boundaries and ditches.
3.0 ENVIRONMENTAL SETTING

Geology
3.1 The 1:50,000 British Geological Survey (BGS) map, sheet 140 (Ref. 4) shows the site is underlain with Mercia Mudstone and Till, Mid Pleistocene - Diamicton. Superficial Deposits. The soakage tests undertaken at the site by M-EC (Refer to Flood Risk Assessment, report ref: 20200/PH/09-12/3251) support the geological maps as clay was encountered at all trial holes.

Hydrogeology
3.2 The site is classed as a non-aquifer with soils of negligible leaching potential – Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants.

3.3 There are no licensed groundwater abstraction sites recorded within 500m of the site.

3.4 A detailed description of the aquifer types and Source Protection Zones is in Appendix B.

Hydrology
3.5 There are no licensed surface water abstractions located within 500m of the site.

3.6 The nearest watercourse to the site is a tributary of Shobnall Brook located adjacent to the western boundary. Shobnall Brook is located approximately 400m to the south of the site at its nearest point.

3.7 The site is situated within a Nitrate Vulnerable Zone.

Ecology
3.8 There are no Sites of Special Scientific Interest (SSSI) within the local area.

3.9 According to the Envirocheck Report the site is located in an area which is not affected by coal mining.

3.10 According to the Envirocheck report, the potential for compressible ground stability hazards at the site is classified as no hazard.
3.11 According to the Envirocheck report, the potential for ground dissolution stability hazards at the site is classified as no hazard.

3.12 According to the Envirocheck report, the potential for landslide stability hazards at the site is considered to be very low to moderate.

3.13 The Envirocheck report indicates that the potential for running sand and shrinking or swelling clay ground stability hazards at the site is considered to be low to no hazard.

3.14 According to BR211 (2007) (Ref. 8), no radon protective measures are necessary in the construction of new premises at the site.

**Environmental Sensitivity**

3.15 The sensitivity of each of the identified receptors is rated depending upon the environmental setting of the site, the likelihood for pollution to occur and potential liabilities associated with a pollution incident.

<table>
<thead>
<tr>
<th></th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Very High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater:</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Water:</td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Ecology:</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.16 The sensitivity of the groundwater is considered very low as the site is classed as a non aquifer with soils of negligible leaching potential. The site is not situated within a Groundwater Source Protection Zone.

3.17 The sensitivity of surface water is considered high as a tributary to Shobnall Brook is located to the west of the site and Shobnall Brook is located approximately 400m to the south at its closest point. The potential for the migration of contaminants to flow downhill and enter the Brook have been taken into account.

3.18 The sensitivity of the ecology is considered very low as there are no Sites of Special Scientific Interest (SSSI) located within 1km of the site.
4.0 ENVIRONMENTAL RISK ASSESSMENT

Introduction

4.1 This section assesses the significance of the environmental issues that have been identified on the site or in the surrounding area. This is achieved by developing a conceptual model for the site and undertaking a qualitative risk assessment.

4.2 The objective of the conceptual model is to identify potential contaminant sources, pathways and receptors relating to the site and surrounding area. Once information on potential sources, pathways and receptors has been collated a qualitative risk assessment (Ref. 6) is used to assess the source-pathway-receptor linkage and evaluate the potential for a pollution event to occur using a risk classification tool (Ref. 7). The level of risk is achieved by comparing the likelihood of a pollution event to occur versus the consequence of a pollution occurrence. The consequence is essentially a measurement of the severity of a hazard (or source) and sensitivity of the receptor (e.g. aquifer type or end user).

Conceptual Model

4.3 The potential sources (hazards) identified on site and surrounding the site are summarised below:

- Current operational site as a turf farm and Turkey Processing Unit; potential for traces of pesticides/herbicides and other biological contaminants. Presence of waste materials (rubble, gravel and wood) are also noted onsite adjacent to the industrial buildings. A grassed mound (possibly top soil) is located adjacent to the industrial buildings.

- Current hydrocarbon storage comprising a large above ground storage tank, along with farm machinery and scrap vehicles. Limited secondary containment present on site, however, there was no visual evidence of spillages. Potential for hydrocarbon contamination within the shallow soils.

- Off-site historic and current industrial/commercial land uses including Brickworks, Refuse Tip, Hospital, Mortuary and various Workhouses. Potential for migration of heavy metal and hydrocarbon contamination onto site.
4.4 The receptors and possible pathways in relation to the site and surrounding areas are summarised below:

- Future residential occupiers at the site – possible direct contact with contaminated soils, inhalation of dust and consumption of vegetables grown in contaminated soils.

- Construction workers during site clearance and redevelopment works – direct contact with contaminated soils and inhalation of dust. Exposure to potential explosive and asphyxiating ground gases.

- Surface Water – A watercourse (Shobnall Brook) is present 400m to the south of the site.

- Future buildings, underground structures and services – Chemical attack on underground services (water pipes/sewerage) and foundations.

- Ecological receptors (fauna) – landscaped gardens, potential for vegetation die back from phytotoxic metals via root uptake and ground gases.

**Qualitative Risk Assessment**

4.5 A qualitative risk assessment has been formulated for the potential source-pathway-receptor linkages identified in the conceptual model. The risk assessment is based on the suggested approach set out in the available guidance (Ref. 6, 7). The guidance uses a combination of the likelihood of a pollution event, taking account of the presence of a hazard (or source) and integrity of a pathway versus the consequence of a pollution occurrence, which is essentially a measure of the severity of a hazard to an identified receptor (such as a major aquifer or site end-user).
4.6 The risk assessment methodology detailing the classes of significance is given in Appendix B. The risks associated with each potential pollution linkage are evaluated in Table 4.
<table>
<thead>
<tr>
<th>Source</th>
<th>Pollutant</th>
<th>Pathway</th>
<th>Receptor</th>
<th>Likelihood of Occurrence</th>
<th>Consequence (severity)</th>
<th>Potential Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing land use as a turf and poultry wholesaler</td>
<td>Shallow soils containing PAHs, heavy metals and pesticides/herbicides. Range of contaminants inc pH, pathogens and other biological contaminants</td>
<td>Direct contact and ingestion of contaminated soils, inhalation of vapours</td>
<td>Residential end users</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact with contaminated soil/vegetation die-back</td>
<td>Flora and fauna</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attack on plastic water pipes</td>
<td>Drinking water pipes</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infiltration, through strata</td>
<td>Groundwater</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface water run off via drains, run off, migration via baseflow</td>
<td>Surface waters</td>
<td>Moderate</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Current oil/ hydrocarbon storage, scrap vehicles, farm machinery</td>
<td>Hydrocarbons</td>
<td>Direct contact and ingestion of contaminated soils. Inhalation of contaminated dust / asbestos fibres and hydrocarbon vapours. Ingestion of home-grown vegetables. Staining evident around fuel storage.</td>
<td>Future residential site users</td>
<td>Likely</td>
<td>Medium</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact and ingestion of contaminated soils. Inhalation of contaminated dust / hydrocarbon vapours. Staining evident around fuel storage.</td>
<td>Construction workers</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate / Low [use of personal protection equipment would lower the risk]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attack on future buildings (comprising existing converted structures and new build), utility services</td>
<td>Drinking water pipes and concrete structures</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Source</td>
<td>Pollutant</td>
<td>Pathway</td>
<td>Receptor</td>
<td>Likelihood of Occurrence</td>
<td>Consequence (severity)</td>
<td>Potential Risk</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
<td>---------</td>
<td>----------</td>
<td>--------------------------</td>
<td>------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Infiltration, through permeable strata to groundwater/aquifer directly underlying the site. Limited secondary containment and oily staining evident around storage. Hardstanding coverage across the site.</td>
<td>Groundwater</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low</td>
<td></td>
</tr>
<tr>
<td>Surface waters</td>
<td>Migration via runoff or baseflow as groundwater</td>
<td>Surface waters</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low</td>
<td></td>
</tr>
<tr>
<td>Flora (future private gardens and soft landscaping)</td>
<td>Direct contact with contaminated soil causing vegetation die-back.</td>
<td>Flora (future private gardens and soft landscaping)</td>
<td>Unlikely</td>
<td>Mild</td>
<td>Very Low</td>
<td></td>
</tr>
<tr>
<td>Groundwater</td>
<td>Infiltration of contaminants from historic surrounding industrial sites through permeable strata to underlying groundwater/aquifer directly underlying the sites. Migration towards the site.</td>
<td>Groundwater</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low</td>
<td></td>
</tr>
<tr>
<td>Surface waters</td>
<td>Migration via baseflow. Surface runoff from surrounding industrial sites.</td>
<td>Surface waters</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low</td>
<td></td>
</tr>
<tr>
<td>Landfill gas (including methane and carbon dioxide)</td>
<td>Migration, ingress and accumulation of ground gases. Explosion and asphyxiation.</td>
<td>Future residential end users</td>
<td>Very Low</td>
<td>Medium</td>
<td>Moderate/Low</td>
<td></td>
</tr>
<tr>
<td>Construction workers,</td>
<td>Migration, ingress and</td>
<td>Construction workers,</td>
<td>Very Low</td>
<td>Medium</td>
<td>Moderate/Low/</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Pollutant</td>
<td>Pathway</td>
<td>Receptor</td>
<td>Likelihood of Occurrence</td>
<td>Consequence (severity)</td>
<td>Potential Risk</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>--------------------------</td>
<td>------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>accumulation of ground gases. Explosion and asphyxiation.</td>
<td>particularly the ground workers</td>
<td></td>
<td></td>
<td>lower the risk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infiltration, through permeable strata to sensitive groundwater/ aquifer.</td>
<td>Surface waters</td>
<td>Very Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attack on future buildings and underground services. Landfill site likely to comprise inert materials.</td>
<td>Future building structures</td>
<td>Very Low</td>
<td>Mild</td>
<td>Very Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact with contaminated soil causing vegetation die-back.</td>
<td>Ecological receptors</td>
<td>Very Low</td>
<td>Mild</td>
<td>Very Low</td>
</tr>
<tr>
<td>Onsite in filled pond</td>
<td>Hydrocarbons in shallow soils</td>
<td>Direct contact and ingestion of contaminated soils.</td>
<td>Future residential and commercial end users</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact and ingestion of contaminated soils.</td>
<td>Construction workers</td>
<td>Low likelihood</td>
<td>Medium</td>
<td>Moderate/Low [use of personal protection equipment would lower the risk]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attack on future buildings, utility services and underground structures.</td>
<td>Drinking water pipes and concrete structures</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Migration via runoff</td>
<td>Surface water</td>
<td>Unlikely</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Direct contact with contaminated soil causing vegetation die-back.</td>
<td>Flora (soft landscaping)</td>
<td>Unlikely</td>
<td>Mild</td>
<td>Very Low</td>
</tr>
</tbody>
</table>
5.0 CONCLUSION

Environmental Risk Assessment

5.1 The findings of this environmental risk assessment have identified potential risks from the current operational turf farm and Turkey Processing Unit located on site, current hydrocarbon storage on site, historic off-site commercial and historic land uses and a former landfill site located to the south of the site.

5.2 The risks to residential future end users and construction workers have been assessed as medium/low. A higher level of risk applies to construction workers during redevelopment of the site as these receptors will be in direct contact with the soil as part of the groundwork’s. However the use of personal protective equipment (PPE) and an awareness of the risk would lower the risk.

5.3 The risks posed to the future buildings, utility services and underground concrete structures have generally been assessed as low.

5.4 The risk to the groundwater is very low as the site is classed as a non-aquifer.

5.5 The potential sources of contamination described above are also high risks to surface water given the proximity of the Shobnall Brook to the site and the sloping nature of the site toward the watercourse.

Statutory Designation

5.6 In our opinion, it is unlikely that the site would be designated as statutory contaminated land by the Local Authority under the provision of Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995). A proven “pollutant linkage” within the definition of causing “significant possibility of significant harm” to people, controlled waters or the wider environment as defined in the statutory guidance, Edition 2, May 2006 has not been identified at the site.
6.0 RECOMMENDATIONS

6.1 It is recommended that a copy of this Phase I ERA is submitted to the Local Planning Authority to support any future planning application at the site. This will enable the contaminated land officer at East Staffordshire Borough Council to review the findings and give comment as consultee to the Local Planning Officer.

6.2 As a geotechnical investigation is likely to be required at the site in order to determine the engineering capacity of the ground, it is recommended that limited environmental sampling (including soil sampling, gas and surface water monitoring) is carried out at the same time to obtain sufficient data to further refine the conceptual model and environmental risks. The results of the additional testing should be provided in a Phase II Ground Investigation report.
7.0 REFERENCES


4. The 1:50,000 British Geological Survey (BGS) map, sheet 140, Burton Upon Trent.


SITE LOCATION PLAN

Project: RED HOUSE FARM, LOWER OUTWOODS ROAD, BURTON UPON TRENT

File Ref: 20200

O.S. Grid Ref: 422761, 324428

Postcode: DE13 0QX
PHASE I ENVIRONMENTAL RISK ASSESSMENT METHODOLOGY

LAND USE
This chapter establishes the former and current land uses that may have caused contamination or given rise to environmental concerns on the site. An inspection of the site has been undertaken to provide further details of the site and neighbouring activities and to observe environmental conditions.

Historical Maps
Information about the history of the site has been obtained primarily through an inspection of historical Ordnance Survey maps. These maps provide an excellent record of the historical uses of a site and can be very important in assessing potential liabilities. Historical maps can show past potentially contaminative uses at a site that would not necessary be obvious during a site inspection, for example storage tanks or previous usage such as a gas works or quarry.

Public Record Information
Information concerning environmental regulations relating to the site has been obtained from a public register which has been accessed from a commercial database operated by the Landmark Information Group. This is the quickest means of gathering publicly available information. The data is supplied from within a 1km radius of a given National Grid Reference of a site. The database contains information from the Environment Agency (EA) and other statutory authorities responsible for monitoring environmental protection measures within the area of a site under existing legislation (see below).

Information has also been obtained directly from the environmental regulators in order to gauge the environmental characteristics of the site in more detail and to establish whether there have been any breaches of environmental regulations or pollution incidents associated with the site. This is used to support the publicly available information gathered from the commercial database. The time in which responses are returned can vary between statutory authorities.

Environmental Legislation
The principal environmental legislation in England consists of the Environmental Protection Act 1990 (EPA 90), the Water Resources Act 1991 and the Environment Act 1995 (EA 95). These Acts prescribe protection measures for all the environmental media (land, water and air) and are regulated by the EA and the Local Authority. Part 1 of the EPA 1990 sets out the statutory framework for Integrated Pollution Control (IPC) and Air Pollution Control (APC).
ENVIRONMENTAL SETTING
This chapter assesses the environmental sensitivity of the site location to contamination/pollution. It is important to establish the environmental setting because, irrespective of the level of contamination on the site, if its location is not ‘sensitive’ to this contamination/pollution, there is a reduced risk of an environmental liability arising. The sensitivity is assessed using British Geological Survey (BGS) information and data from the EA on groundwater and surface water. Data on abstractions have been obtained from the Landmark Information Group. The vulnerability of surface waters and groundwater is based on sensitivity to pollution, distance from abstractions, type and nature of groundwater and type of overlying strata. The EA have classified aquifers into three types - major aquifers, minor aquifers and non-aquifers - depending upon the hydrogeological sensitivity, permeability and whether they support large abstractions for drinking water supplies.

Major Aquifers (Highly Permeable)
These are highly permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes.

Minor Aquifers (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 of water for abstraction, they are important both for local supplies and in supplying base flow to rivers.

Non-Aquifers (Negligibly permeable)
Formations which are generally regarded as containing insignificant quantities of groundwater form a third group. However, groundwater flow through such rocks, although imperceptible, does take place and needs to be considered in assessing the risk associated with persistent pollutants. Some non-aquifers can yield water in sufficient quantities for domestic use. Major or minor aquifers may occur beneath non-aquifers.

Soil Classification
Three sub-classes are recognised for high soil classes:

HI Soils that readily transmit liquid discharges because they are either shallow or susceptible to rapid bypass flow directly to rock, gravel or groundwater;
H2 Deep, permeable, coarse textured soils that readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential; and

H3 Coarse textured or moderately shallow soils that readily transmit non-adsorbed pollutants and liquid discharges but which have some ability to attenuate absorbed pollutants because of their large clay or organic matter contents.
**Flood Risk**

The Flood Map combines detailed local data with information from a new national model of England and Wales and indicates where flooding from rivers, streams and watercourses is possible. Under Section 105 of the Water Resources Act 1991, the Environment Agency has a duty to survey matters relating to flooding.

**ENVIRONMENTAL RISK ASSESSMENT**

This chapter assesses the potential for the site to give rise to environmental risks and whether or not the risks are acceptable or if further assessment and/or remedial action is required.

The qualitative risk assessment firstly considers the source of contamination and potential contaminants associated with the source(s) (or hazards). As well as the type of source, the extent, concentration and availability of a contaminant is also assessed.

The effect of a hazard on an identified receptor is largely governed by the sensitivity of a receptor. Receptors may typically include people, buildings, animals, plants and local resources (such as groundwater, surface waters, mines etc). A change in the receptor should be considered if the end use of the site changes; for example, if a commercial site is to be redeveloped into a residential housing estate, as a residential occupier is considered more sensitive than a commercial occupier.

The presence of contamination (as a potential hazard) does not necessary mean that there is a risk. It is the exposure pathway and the quantity of contamination that reaches the receptor that may determine the effect on a receptor (such as the integrity of a barrier between a contamination source and receptor).

The risk classifications for both likelihood and consequence are based on methodology presented in Contaminated Land Risk Assessment, A Guide to Good Practice (CIRIA C552, 2001) and has been developed from procedures outlined in DETR Circular 02/2000. The DETR, with the EA and Institute of Environment & Health, has also published guidance on risk assessment (Guidelines for Environmental Risk Assessment and Management). The guidance states that the designation of risk is based upon a consideration of both:

- The magnitude of the potential consequence (severity) of risk occurring, which takes into account both the potential severity of the hazard and the sensitivity of the receptor; and
The likelihood of an event occurring (probability), which takes into account the both the presence of the hazard and receptor and the integrity of the pathway.

The magnitude of consequence (severity) and likelihood (probability) is defined in the CIRIA guidance, together with examples. The two classifications are then compared (as shown on Table A to obtain an estimation of risk for each pollution linkage, ranging from very high risk to very low risk. A description of the risks and likely actions required is presented in Table B. The benefit of estimating the risk in this way is that it can be revised after each investigation phase as the conceptual model and corresponding pollution linkages are refined.

**Table A: Comparison of consequence against probability**

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Consequence</th>
<th>Severe</th>
<th>Medium</th>
<th>Mild</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>High likelihood</td>
<td>Very high risk</td>
<td>High risk</td>
<td>Moderate risk</td>
<td>Moderate/low risk</td>
<td></td>
</tr>
<tr>
<td>Likely</td>
<td>High risk</td>
<td>Moderate risk</td>
<td>Moderate/low risk</td>
<td>Low risk</td>
<td></td>
</tr>
<tr>
<td>Low likelihood</td>
<td>Moderate risk</td>
<td>Moderate/low risk</td>
<td>Low risk</td>
<td>Very low risk</td>
<td></td>
</tr>
<tr>
<td>Unlikely</td>
<td>Moderate/low risk</td>
<td>Low risk</td>
<td>Very low risk</td>
<td>Very low risk</td>
<td></td>
</tr>
</tbody>
</table>

**Table B: Description of the classified risks and likely action required**

<table>
<thead>
<tr>
<th>Level of Risk</th>
<th>Description of Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High Risk</td>
<td>There is a high probability that severe harm could arise to a designated receptor from an identified hazard, or there is evidence that severe harm to a designated receptor is currently happening. If this risk is realised, it is likely to result in significant environmental and financial liability to current and/or future site owners/occupiers. Urgent investigation (if not already undertaken) and remediation is likely to be required.</td>
</tr>
<tr>
<td>High Risk</td>
<td>Harm is likely to arise to a designated receptor from an identified hazard. If risk is realised, it is likely to present a sizeable environmental and financial liability to current and/or future site owners/occupiers. Urgent investigation is required and remediation work may be</td>
</tr>
<tr>
<td>Risk Level</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely the harm would be relatively mild. Investigation is normally required to clarify the risk and determine the potential environmental liability. Some remedial works may be required over the longer term.</td>
</tr>
<tr>
<td>Low Risk</td>
<td>It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. Limited investigation may be recommended to clarify the risk, dependant on the sensitivity of the receptor and view point of those of interest. Any remedial works are likely to be fairly limited.</td>
</tr>
<tr>
<td>Very Low Risk</td>
<td>There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is likely to be mild or minor.</td>
</tr>
</tbody>
</table>

The acceptability of risk will always depend upon the view point of those of interest, whether it is an occupier of a site, a regulator or stakeholder. As a result, it could be that action will be required to deal with a level of risk even if it is classified as very low.
APPENDIX C
General Notes:
1. Do not scale this drawing. It is a sketch, only.
2. This drawing is to be used in conjunction with all other relevant Engineering, architectural, and specialist design drawings and details.
3. All dimensions are in metric values unless otherwise stated on this plan. All levels are in metres above NN.
4. All features may contain asbestos materials.

Key:

- Location of gain covered mound
- Location of former clay pit/landfill
- Location of former pit/landfill
- Line of former field boundary
- Line of former ditch
- Western Power overhead high voltage electricity cable
- Western Power overhead low voltage electricity cable
- 11kV overhead cable
- Site boundary

- Former Almshouses
- Former School
- Former Hall
- Former Field Boundary
- Former Hall Boundary
- Former Pit
- Former Clay Pit
- Former Landfill
- Former Reserve
- Covered Reserve
- Covered Mound
- Tributary of Sinwell Beck

Tributary of Sinwell Beck

RESERVOIR ROAD

ST MARGARETS

RIDGE: 86.54

LEVEL: 90.24m

Approximate Tree Eaves: 83.29

RIDGE: 96.57

LEVEL: 90.89

Approximate Tree Eaves: 92.32

RIDGE: 102.06

LEVEL: 99.61

Approximate Tree Eaves: 99.35

1:2500

LEVEL: 100.20m

Approximate Tree Elevation: 91.50

Vegetation:

Wellington House Leicester Road

F: 01530 588 116

Ibstock Leicestershire LE67 6HP

www.m-ec.co.uk

BT

10/09/2012

REVISION:

- 20100_04_01

BARWOOD STRATEGIC LAND

F LLP

RED HOUSE FARM

LOWER OUTWOOD ROAD

BURTON UPON TRENT

DESKTOP FINDINGS PLAN

MEC

20100_04_01

A3

10/09/2012

JP

EM

1:2500

21

RIDGE: 84.48

RIDGE: 86.69

RIDGE: 83.35
Photograph 1 – View of the site from the south looking north

Photograph 2 – View of the site from the north east looking to the south west
Photograph 3 – Stockpiled brick/stone within close proximity of the farm buildings

Photograph 4 – View of one of the farm buildings including a large fuel tank
Photograph 5 – Scrapped cars and transporter lorries parked adjacent to the farm buildings

Photograph 6 – Additional view of range of machinery parked within the hardstanding area
Photograph 7 & 8 – View of a gas oil tank located adjacent to the farm reception building