

## 11.0 LAND CONTAMINATION

### 11.1 INTRODUCTION AND METHODOLOGY

11.1.1 This Chapter of the **Environmental Statement (ES)** has been prepared by Rodgers Leask Environmental Ltd on behalf of Hallam Land Management, Barratt David Wilson and Davidson Developments and provides an assessment of ground conditions for a proposed mixed residential and commercial development application at Lubbesthorpe and also provides input on substructure solutions.

11.1.2 The assessment of the ground conditions is to be undertaken on a phased approach, in accordance with current best practice. A **Phase 1 Geo-Environmental Desk Study Report** (dated 24 September 2010) has been produced by Rodgers Leask Environmental Ltd as an initial assessment of the likely constraints relating to land contamination and geotechnical issues. The **Geo-Environmental Report** makes use of available records to enable the design of Stage Two works. The scope of the Phase One study involved reviewing the following sources of information:-

- a. Historical Ordnance Survey mapping.
- b. British Geological Survey (BGS) mapping information.
- c. Regulatory Authority information via a GroundSure EnviroInsight report. The GroundSure EnviroInsight report contains factual information which is produced from a database of records which have been obtained from various sources including; Local Authorities, Environment Agency, National Radiological Protection Board, English Nature. Additional information on environmental matters was obtained directly from the pertinent department in Blaby District Council and Natural England.

The above information was also used to construct a conceptualised model of the site for geological and contamination assessment.

11.1.3 A copy of the Rodgers Leask Environmental Ltd (RLE) **Geo-Environmental Report** is provided as a supporting document (document 4) to this **Environment Statement**.

### 11.2 PLANNING CONTEXT

11.2.1 The principal documents relevant to this assessment include:-

- Planning Policy Statement (PPS) 23;
- Contaminated Land Report 11 Model Procedures for the Management of Land Contamination.

11.2.2 Relevant aspects of each of these can be summarised as follows:-

- The Government's national policy with regard to planning and pollution control is contained within **PPS23**. This document advises that '*any consideration of the quality of land, air or water and potential impacts arising from development, possibly leading to impacts on health, is capable of being a material planning consideration, in so far as it arises or may from or may affect any land use*'. It

goes on to say *'the consideration of an Environmental Statement prepared as part of an Environmental Impact Assessment (EIA) is usually the most convenient way of ensuring the environmental impacts of a significant development proposal are comprehensively considered'*.

- The Model Procedures for the Management of Land Contamination, CLR 11, have been developed by the Environment Agency to provide the technical framework for applying a risk management process when dealing with land affected by contamination. The process involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the UK.

### **East Midlands Regional Plan (Regional Spatial Strategy), March 2009**

11.2.3 There are no policies of relevance to this Chapter contained within the East Midlands Regional Plan.

## **11.3 BASELINE CONDITIONS**

11.3.1 The RLE **Geo-Environmental Report** forms the baseline documents for the **ES**.

11.3.2 The site has been split into three parcels for ease of reference:-

- Parcel 1 - This parcel, forming the main area of the SUE, is approximately 323 hectares in area and is located to the north of the M69 and to the west of the M1 motorway.
- Parcel 2 - This parcel is approximately 71 hectares in area and is located to the south of the M69 and to the west of the M1 motorway.
- Parcel 3 - This parcel, forming the land proposed to form a new site access across the M1, is approximately 3.5 hectares in area and is located to the east of the M1 motorway and Parcel 1.

### **Site History**

11.3.3 Since the start of the Ordnance Survey mapping (1881-1882) the site has largely remained undeveloped agricultural land, with the exception of a number of small developments, predominantly farms, across Parcels 1 and 2 and several residential properties. Several fuel tanks were noted on the farms during the 2010 site walkover. A former quarry, later used as a tip is shown to the west of Parcel 2 on 1965-1967 records. By 1968-1973 Cottage Farm is no longer shown on the northern portion of Parcel 1. A number of historically mapped ponds on Parcels 1 and 2 remain to the present day. Nine in total were identified on the walkover study. Post 2002 mapping shows a drain and road on Parcel 3. By 2010 records Old House on the northwest of Parcel 1 was no longer shown.

11.3.4 The surrounds of the site mainly comprised farmland on early records with sparse development. The villages of Enderby, to the south, and Braunstone, to the northeast,

were shown. Quarries were present to the west and south of Parcel 2. Railways were present to the north of Parcel 1 and to the west of Parcel 2 respectively. By 1914-1919 Enderby Warren Stone Quarry is shown adjacent to the western boundary of Parcel 2. Residential development gradually occurred over time with expansion of Enderby and Braunstone. By 1965-1967 the M1 motorway is shown adjacent to the eastern boundary of Parcels 1 and 2 and the western boundary of Parcel 3, running in a general north to south direction. By 1968-1973 a large electrical sub-station had been constructed to the southwest of Parcel 1 and a Motorway Service Area is shown to the northeast of Parcel 1. Further residential development had occurred to the north. The M69 motorway is shown adjacent to the southern boundary of Parcel 1 and the northern boundary of Parcel 2 by 1979-1981. Enderby Warren Stone Quarry is marked as a tip on 1989-1992 records and commercial development is shown to the east. By 2002 the railway to the west of Parcel 2 is marked as dismantled and commercial development was present to the south of Parcel 3 with an electrical sub-station. A second sub-station is shown to the south of Parcel 3 from 2010 records.

### Ground Conditions

11.3.5 Made ground is shown on British Geological Survey mapping to be located in the north of Parcel 1. Made ground is also shown covering the majority of Parcel 3.

11.3.6 Seven types of superficial deposits are indicated to underlie the site:-

- Alluvial deposits comprising clay, silt sand and gravel;
- Glaciofluvial sand and gravel deposits of the Mid-Pleistocene;
- Head deposits comprising clay, silt, sand and gravel;
- Oadby Member and Thrussington Till, comprising diamicton deposits (very poorly sorted sediment. Large sedimentary grains gravel size and larger ( $\geq 2$  mm) are set in a matrix of fine grains);
- Colluvial deposits, comprising clay, silt, sand and gravel.

11.3.7 The majority of the site is underlain by the Mercia Mudstone Group. This generally comprises red brown mudstone, with grey green silt lenses (skerries). In addition two areas of sandstone are present: one in the north of Parcel 1 and a further area underlying a small portion of the southern edge of Parcel 1 and the northern portion of Parcel 3.

11.3.8 There are no recorded faults on or within 500m of the site boundary.

11.3.9 The Coal Authorities Gazetteer for England and Wales indicates that the site is not in an area which may be affected by coal mining activities.

11.3.10 BR211 indicates that the site is not in an area where radon protection measures are necessary.

### Summary of Geo-Environmental Related Regulatory Information

11.3.11 The following forms a summary of geo-environmental related regulatory information gathered as part of the **Phase 1 Geo-Environmental Desk Study**:-

1. There is one discharge consent registered for the site itself. This consent relates to sewer storm sewage discharges from Enderby Sub Station.
2. Two pollution incidents are recorded on site; one on the western boundary of Parcel 1 and one in the vicinity of Warren Farm relating to an oil/fuel spill. Both were classed by the Environment Agency as minor.
3. There are no Source Protection Zones or surface or groundwater abstractions that are licensed by the Environment Agency on or within 500m of the site.
4. The nearest main river is the River Soar, located ~1000m southeast of the site.
5. A strip of land within the southern portion of Parcel 1 is classified as being 1 in 100 year flood zone. This corresponds to land either side of the west to east flowing water course.
6. Enderby Warren Quarry, Site of Special Scientific Interest (SSSI) is recorded abutting the site to the west of Parcel 2.
7. There are three closed landfill sites adjacent (within 250m) to the west of Parcel 2:-
  - Site 47 (approximately 2m west of Parcel 2) – Enderby Warren, Mill Lane, Enderby, owned by Sita. This site accepted industrial, commercial and household wastes. There are gas monitoring, control and extraction measures in place on site.
  - Site 82 (approximately 240m west of Parcel 2) – Quarry lane, Enderby, owned by Leicester City Council. This site is known to have accepted industrial, commercial and household wastes. There are gas monitoring, control and extraction measures in place on site.
  - Site 83 (approximately 125m west of Parcel 2) – Mill Hill Quarry, Enderby. This site is known to have accepted industrial, commercial and household waste. Tipping was completed in 1979/80 when the site closed and the license was surrendered. This site has gas monitoring, control and extraction measures in place. Blaby District Council hold limited records of works carried out at this closed landfill site.
8. There are no fuel station entries on or within 50m of the site.

### **Geotechnical Issues**

- 11.3.12 There are two small areas where buildings were once shown. It is not known whether these contained basements. However it should be assumed that some made ground and historic substructure is present in these areas.
- 11.3.13 In addition to the above, an area of made ground is shown to be present on mapping in the northern portion of Parcel 1 and across the majority of Parcel 3. No information as to the nature of this material is given.
- 11.3.14 Notwithstanding the above, site history would suggest that, generally, undisturbed ground conditions should be present in the majority of the site.
- 11.3.15 The geology has been identified as superficial deposits underlain predominantly by the Mercia Mudstone Group of the Rhaetian/Scythian age. The geology would suggest that traditional strip/trenchfill / pads and ground beams foundations will be generally appropriate, although this should be confirmed through intrusive investigation. In addition,

alternative foundation solutions may be necessary if deep made ground is encountered during intrusive investigation works.

- 11.3.16 A tree survey shall be required which extends beyond the site boundaries for use in foundation design where shrinkable soils are found to be present.

### Contamination Issues

- 11.3.17 The potential sources of contamination identified are summarised in **Table 11a** below:

**Table 11a: Summary of potential contamination sources**

Source	Contaminants	Location
Residual contaminants relating to historic burning of crop stubble	Arsenic, PAH's	Entire site
Landfill adjacent to Parcel 2	Carbon dioxide, Methane, Hydrogen Sulphide, Leachate from the landfill.	Parcel 2
Fuel tanks	Hydrocarbons	Local to the fuel tanks
Pollution incidents	Hydrocarbons	NGR 453224, 300799 watercourse NGR 454034, 300203 Warren Farm
Organic materials in alluvial deposits and pond beds	Carbon dioxide, Methane	Localised to areas underlain by alluvium and ponds
Made ground shown to be present in Parcel 1	Unknown	Northern portion of Parcel 1 – see Appendix E

- 11.3.18 Based on the DTS information above, the following potential pollutant linkages are considered applicable to the site: The risk classification has been qualitatively derived in accordance with **CLR 11 Model Procedures for the Management of Land Contamination:-**

Table 11b: Conceptual model

Pollutant	Source	Pathway	Receptor	Probability	Consequences	Risk
1	Contaminated soils	Dermal contact; Inhalation of dust	Humans Construction workers	Unlikely	Minor	Very Low
2	Contaminated soils	Ingestion of soil, dermal contact; Inhalation of dust	Humans – end users	Low likelihood	Medium	Moderate / Low
3	Contaminated soils	Ingestion of contaminated water via plastic pipes	Humans – end users & Construction workers	Low likelihood		Moderate / Low
4	Contaminated soils	Inhalation of soil dust	Members of the public during construction adjacent to the site			
5	Contaminated soils	Leaching of sulphate and corrosive contaminants	Buried structures/concrete, services	Low likelihood		
6	Contaminated soils	Leaching to groundwater	Secondary A and B Aquifers	Low likelihood	Medium	Moderate / Low
7	Contaminated groundwater	Leaching to groundwater. Groundwater may be in hydraulic continuity with the streams and ponds	Unnamed streams and ponds	Low likelihood	Medium	Moderate / Low
8	Ground gasses associated with the landfill adjacent to the site, any made ground or alluvial material	Inhalation of asphyxiant gasses; Migration of explosive gases into confined spaces	Humans – end users, Neighbouring buildings and occupants	Low likelihood	Severe	Moderate

Pollutant	Source	Pathway	Receptor	Probability	Consequences	Risk
9	Ground Gasses associated with the landfill adjacent to the site, any made ground or alluvial material	Inhalation when working in confined spaces	Construction workers and future ground workers	Low likelihood		
10	Contaminated soils	Uptake of available phytotoxic contaminants	Flora & Fauna	Unlikely	Mild	Very Low

## 11.4 PROJECT DESIGN

11.4.1 The development proposals are suited to the potential ground issues i.e. the commercial land is located adjacent to the landfill rather than residential units.

11.4.2 An intrusive geo-environmental investigation to identify suitable foundation solutions and to confirm the contaminative status of the site will be undertaken. The following will be incorporated into the site investigation:

- Trial pits across the site to take samples and investigate ground conditions across the site.
- Boreholes (BH's) across the site to take samples, to undertake geotechnical tests such as standard penetration tests (SPT's) and install gas and groundwater monitoring pipework in the area surrounding the landfill site on Parcel 2.
- Gas monitoring and risk assessment, in accordance with **CIRIA C665 'Assessing Risks Posed by Hazardous Ground Gasses to Buildings'**, should be undertaken on Parcel 2.
- Intrusive investigations will be targeted towards the area of made ground shown on geological mapping, around the existing and former farm buildings, the area of Parcel 2 that is adjacent to the landfill site, the site of the two Recorded Pollution Incidents and in the vicinity of the large sub-station to the southwest of Parcel 1.
- Groundwater monitoring may be required across the site.
- Samples will be analysed to establish the concentrations of the contaminants within soils. Leachate analysis of the soils would also be required. Groundwater analysis may be necessary. Subsequent to the testing a contamination assessment should be undertaken in accordance with **CLR 11**.

- Laboratory testing of topsoil will to assess the options for sale/disposal of any excess soils.
- Appropriate geotechnical testing and analysis will be undertaken to assist in the geotechnical assessment.

11.4.3 Additional targeted investigation into the quality of reserves within the Minerals Consultation Area may be required in order to satisfy the **Leicestershire and Leicester Minerals Core Strategy, Policy MDC8 (Safeguarding Mineral Resources)**.

## 11.5 ASSESSMENT OF EFFECTS

### Operation

11.5.1 An intrusive geo-environmental investigation, including contamination risk assessment, will be undertaken. This will identify any need for remedial actions to reduce environmental risks to acceptable levels. Notwithstanding this it is anticipate that the proposed development will have a **slight/minor positive** effect with respect to land contamination.

### Construction Effects

11.5.2 As with many development projects it is likely that during construction there may be some minor negative effect on the site and surrounding area. These potential **minor negative** effects are listed below.

11.5.3 Roads into the site would be regularly swept and a suitable traffic management plan established.

11.5.4 Noise from onsite machinery will be kept to a minimum by using plant with approved silencing equipment and operations will be kept within agreed hours of work only. Vibration from excavation and haulage operations will be minimal and only result in a minor negative effect. Vibration moving off-site will be kept with the limits defined in British Standard 5228.

11.5.5 Litter, pests and scavengers are not anticipated to be an issue. However measures will be put in place if problems are observed.

### Cumulative Effects

11.5.6 The cumulative effects of the proposed scheme are **neutral**.

### Residual Effects

11.5.7 The residual effects of the proposed scheme are **minor positive** as further land remediation is undertaken as necessary.

### Summary

11.5.8 **Table 11c** below provides a summary of the likely environmental effects of the proposed scheme in relation to land contamination and ground conditions:

**Table 11c: Summary of Likely Residual Environmental Effects in Relation to Contamination and Ground Conditions**

Issue	Significance	Mitigation	Residual Effect
Contamination risk to human health – Ingress of methane and carbon dioxide from former landfill area adjacent to Parcel 2.	Medium	Potential need to incorporate gas protection measures within building design and possibly a gas vent trench.	Intermediate Positive
Contamination risk to human health – general site area.	Low	Not known – risk assessment required.	Neutral
Contamination risk to controlled waters – general site area.	Low	Not known – risk assessment required.	Neutral
Contamination risk to substructures.	Low	Use appropriate specification of concrete.	Minor Positive
Contamination risk to human health – Ingress of methane and carbon dioxide from alluvial deposits and made ground on Parcel 1 and 3.	Negligible	Undertake monitoring and provide appropriate protection in building design.	Minor Positive
Dust during construction	Intermediate	Utilise dust suppression methods and contain dust materials (i.e. PFA for grouting) covered when feasible.	Minor Negative during development, Intermediate Positive long term.
Odour during construction	Negligible	None	Neutral
Vibration during construction	Low	Monitor to ensure vibration at the site boundaries are within acceptable limits.	Potential Minor Negative during construction. Neutral post construction.

Issue	Significance	Mitigation	Residual Effect
Litter, pests and scavengers during construction	Low	Monitor and if this becomes an issue instigate appropriate action.	Potential Minor Negative during construction Neutral post construction.

## 11.6 STATEMENT OF EFFECTS

- 11.6.1 Incorporation of the mitigation measures, if required, should ensure that there are no residual effects caused by the development and as such the remediation should have a **minor positive** effect on the character and integrity of the site.
- 11.6.2 It is concluded that the development will have a **minor positive** effect on the site and surrounding area.