### 7.0 GEOLOGY, SOILS & GROUNDWATER

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Introduction</td>
<td>5</td>
</tr>
<tr>
<td>7.2 Planning Policy Context</td>
<td>6</td>
</tr>
<tr>
<td>7.3 Assessment Methodology and Significance Criteria</td>
<td>9</td>
</tr>
<tr>
<td>7.4 Baseline Conditions</td>
<td>18</td>
</tr>
<tr>
<td>7.5 Impacts</td>
<td>26</td>
</tr>
<tr>
<td>7.6 Assessment of Residual Impacts</td>
<td>33</td>
</tr>
<tr>
<td>7.7 Assessment of Cumulative Impacts</td>
<td>35</td>
</tr>
<tr>
<td>7.8 References</td>
<td>36</td>
</tr>
</tbody>
</table>

### APPENDICES - BOX 1 & 2 FOLDERS 4 - 9

- Appendix 7.1 Baseline Contamination Site Impacts & Effects Risk Matrices
- Appendix 7.2 Construction Impacts & Effects Risk Matrices
- Appendix 7.3 Operational Impacts & Effects Risk Matrices
- Appendix 7.4 Preliminary Sources Study Reports Zones 1 - 4
- Appendix 7.5 Factual Ground Investigation Reports Zones 1 - 4
- Appendix 7.6 Preliminary Ground Investigation Interpretative Reports Zones 1 - 4
7.1 INTRODUCTION

1. This Chapter of the Environmental Statement (ES) presents the potential environmental impacts of the proposed development upon the geology, soils and groundwater beneath the site. It also presents an assessment of existing impacts from contaminated soils on human health and the environment and those arising from disturbance from the construction of the proposed development and its post construction operation.

2. This Chapter describes:
   • The Planning Context
   • The assessment methodology and significance criteria adopted in undertaking the assessment;
   • The baseline conditions on which the proposed development impact is assessed;
   • The potential significant impacts and proposed mitigation for the construction phase
   • The potential significant impacts and proposed mitigation for the operation phase

3. This Chapter also describes an assessment of any potential cumulative impacts relating to geology, soils and groundwater with particular reference to contaminated land and mineral extraction.

4. This chapter has also assessed the particular concerns related to this chapter subject area raised within the scoping opinion documents. This has been undertaken in line with current practice by means of undertaking detailed desk based and intrusive investigations to confirm the existing ground model for the site. Thus providing characterisation of the materials present to form the baseline for assessment of potential risks during construction and operation of the proposed scheme. In doing this, assessments of the potential impacts resulting from soil, soil gas and groundwater contamination have been assessed along with minerals potential, ground stability and earthworks. The impacts are assessed within this chapter and the detailed supporting information is provided within the reports which form appendices to this chapter.
7.2 PLANNING POLICY CONTEXT

1. This section discusses the national, regional and local policies that exist and apply to the application proposal.

7.2.1 National Policy - Contaminated Land & Land Stability

1. The planning regime becomes relevant whenever any form of development is contemplated. The National Planning Policy Framework (NPPF) (Ref. 7-1) recommends that planning decisions should aim to ensure that:

   • New development is appropriate for the location with respect to pollution and instability.
   • The effects of pollution on health, the natural environment, general amenity and potential sensitivity of the area or proposed development to adverse effects of pollution should be taken account of.
   • Where a site is affected by contamination or land instability that responsibility for securing safe development rests with the developer.
   • The site is suitable for its new use taking account of ground conditions and land instability and proposals for mitigation including land remediation.
   • That following remediation land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

2. The main documents particularly relevant to this chapter of the Environmental Statement are the National Planning Policy Framework (NPPF), published in March 2012 and the National Planning Policy Guidance (NPPG) (Ref. 7-18) a web based resource. The NPPF & NPPG replaced the following documents which were of direct relevance to this specific element of the Environmental Statement:

   • Planning Policy Statement 23: Planning and Pollution Control, 2004
   • Planning Policy Guidance 14: Development On Unstable Ground, 1990
   • Minerals Policy Statement 1: Planning and Minerals, 2006

3. However the principal guidelines for identifying environmental impacts and mitigating these impacts defined within these now superseded documents are still relevant to assist in the appraisal of proposed developments and have been adopted within the NPPG with respect to these tree aspects.

4. Planning Policy Statement 23 (PPS 23) superseded by the current NPPG addresses the prevention of water pollution and provides guidance on the location of and the appropriateness of certain ‘polluting’ developments so as to prevent pollution and ensure that the environment and human health were protected.

5. Planning Policy Guidance 14 (PPG 14) superseded by the NPPG addresses the need to mitigate the risks of instability on land from underground natural or manmade features including solution features and mining and the existence of existing instability or the nature of the proposed development causing activation of slope instability.

6. Minerals Policy Statement 1 (MPS 1) superseded by the NPPG addresses the need to identify potential mineral resources that required safeguarding for future exploitation and to ensure that planned development takes account of this avoiding non mineral development over such resources without due consideration to the potential to allow these resources to be removed in advance or after development has been completed.
7. The Draft National Policy Statement For National Networks published December 2013 (Ref.7-19) has also been reviewed and consulted. This provides policy in line with the requirements set out within the NPPF & NPPG on the matters relevant to this chapter.

7.2.2 National Legislation - Contaminated Land & Land Stability

1. The management of potentially contaminated or contaminated land is regulated under Part IIA of the Environmental Protection Act (EPA) 1990 (Ref.7-2) updated within Part IIA Statutory Guidance April 2012 and by the use of the Contaminated Land Regulations (England) 2006 (Ref.7-3) amended 2012.

2. This is underpinned by the risk-based ‘suitable for use’ approach, which the Government considers as the most appropriate to deal with historic contamination. The purpose of the contaminated land regime is to investigate and, if necessary, remediate land to ensure that it is suitable for its current use. The management of contaminated land within the planning regime is achieved by assessing risks posed by contamination in relation to the proposed use of the site, and ensuring that it is suitable for use before planning permission is granted. Under both regimes, it is the existence of potentially unacceptable risk due to contamination, rather than the presence of contamination alone that is the ‘driver’ for remedial action.

3. Under Part IIA of the EPA, sites are identified as “contaminated land” if they are: (a) causing significant harm, or if there is a significant possibility of such harm, or (b) if the site is causing, or could cause, pollution of controlled waters. The Contaminated Land Regulations provide for the circumstances in which contaminated land requires to be designated as a “special site” and provides for a remediation regime in that regard. The Water Environment commonly known as the “Water Framework Directive (WFD)”, (Ref.7-4) provides for a single system of water management at the river basin or catchment level.

4. Once a site is determined to be “contaminated land” then remediation may be required to render significant pollutant linkages (i.e., the source-pathway-receptor relationships that are associated with significant harm and/or pollution of controlled waters) insignificant, subject to a test of reasonableness.

5. Part 4 of Groundwater Protection: Policy and Practice (GP3) (Ref.7-9) summarises the legislation relevant to the management and protection of groundwater and sets out the Environment Agencies associated and complementary policies. Section 9 sets out the land contamination policy and legal framework regarding the contamination and the protection of groundwater.

6. In a Source Protection Zone (SPZ) 1, the EA will object to proposals for new developments such as waste treatment facilities. In all other areas, the EA applies a risk-based approach to management of non-landfill waste operations as detailed within (Ref.7-7 & 7-8) that present a risk to groundwater. Where necessary, activities are controlled via permits (Ref.7-5).
7.2.3 Local & Regional Policy - Contaminated Land & Land Stability

1 In addition to the national policies and guidance detailed above, baseline conditions have also been assessed with reference to the local North West Leicestershire District Council requirements in order to put any potential impacts in a localised context.

2 In particular the North West Leicestershire District Council Local Plan 2013 (Ref.7-15) has been consulted. The following core strategy policies identified are supportive of the development in a wider context or provide detail specific to this chapter;
   • CS 4: Strategic Highway Network Improvements
   • CS 5: Rail Infrastructure
   • CS 6: Strategic Rail Freight Interchange
   • CS 27: Groundwater Protection & Land Instability

3 CS 27 is directly pertinent to this chapter and reintegrates the National Policy and Legislation which is committed to ensure that proposed development addresses risks related to contamination and land instability. In particular this policy is protective of groundwater resources endorsing legislation and national planning policy and legislation this matter.

4 It is understood that the Core Strategy has been withdrawn however the primary reasons for withdrawal appear to relate to housing strategy and as such there is no reason to suggest that the above policies on directly pertinent issues will be revised.

5 The Leicestershire Minerals Development Framework Core Strategy & Development Control Policies up to 2021 (Ref 7-10) details the policy for minerals safeguarding within MDC 8.
7.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

7.3.1 Overview

1. The Environment Agency provides guidance on the conduct of an Environmental Impact Assessment with regard to contamination issues (Scoping Guidelines on the Environmental Impact Assessment of Projects 2002), and there is a considerable body of guidance that has been prepared in order to assist both local authorities and practitioners in assessing the degree to which land is contaminated and deciding whether such land is contaminated within the meaning of the part IIA of the Environmental Protection Act 1990.

2. Further guidance on the risk assessment process is given in EA documentation on the basis of the Contaminated Land Exposure Assessment (CLEA) model which is intended to be used as the common basis for contamination assessments in the UK. Guidance on the risk assessment process is given in the Contaminated Land Report 11 prepared by DEFRA.

3. With regard to pollution of controlled waters, the EA has prepared guidance on methods of assessment. These are contained in their Research and Development Publication No 20 ‘Methodology for the Derivation of Remedial Targets for Soils and Groundwater to protect Groundwater and in GP3 parts 1 to 4 (Ref 7-9).

4. There is no standard procedure for assessing the impact of the effect of potential unstable ground on a development project and the wider area. A ‘weight of evidence’ approach is used to determine whether unstable ground is likely to be a hazard and hence whether any mitigation or special construction measures may be needed. The data that needs to be assessed under a ‘weight of evidence’ methodology includes:
   • Geological mapping and memoirs for the area;
   • Inspections of the site and surrounding area;
   • Information from ground investigations;
   • Information from the local authority.

5. There is no particular guidance on addressing the issues of Mineral Safeguarding and its assessment. However through Desk studies and ground investigation it has been possible to identify the baseline conditions and the extent of areas of potential sand and gravel resources beneath parts of the site and their potential quality and suitability for future exploitation. Discussion as to the potential impact of the proposed development upon such resources and any likely mitigation necessary will be provided.
7.3.2 **Contamination Risk Assessment Methodology**

1. An assessment of the potential impacts of the proposed development on ground conditions at the site has considered the following stages of the development:
   - **Pre-development**: an assessment of existing environmental impacts from the existing site on human health and the environment; i.e. the existing “baseline conditions”;
   - **During construction**: the potential short term significant environmental impacts of the construction of the proposed development on human health and the environment; i.e. geology, soils and groundwater beneath the site, and;
   - **During operation**: the potential long term significant environmental impacts arising from the construction of the proposed development and its post construction operation.

2. Underpinning all sets of guidance on contamination issues is a hazard-pathway-receptor methodology which is used to identify significant pollutant linkages (SPLs). The following definitions apply:
   - Hazard: source of contamination;
   - Receptor: the entity which is vulnerable to harm from the hazard; and
   - Pathway: the means by which the hazardous contamination can come into contact with the receptor.

3. In order for there to be a “pollutant linkage” all three; “hazard”, “receptor” and “pathway”, must be present. Without all three, there is considered to be no significant pollutant linkage.

4. Without a significant pollutant linkage the contamination may be a hazard but does not constitute a risk to human health or the environment.

5. Therefore, in assessing the potential for contamination to cause a significant effect, the extent and nature of the potential source or sources of contamination must be assessed, pathways identified, and sensitive receptors or resources identified and appraised, to determine their value and sensitivity to contamination related impacts.

7.3.3 **Sources of Contamination**

1. The following methods have been used to assess the magnitude of the sources of land contamination at the site:
   - Consideration of previous land use: this includes the study of historic site maps and anecdotal information, covering both the site itself and the surrounding area;
   - Review of ground investigation data, including chemical contamination data;

2. The magnitude of sources of land contamination can be described qualitatively according to the categories shown in Table 7.1.
Table 7.1: Scale for Magnitude of Extent and Potential Sources of Land Contamination

<table>
<thead>
<tr>
<th>Magnitude</th>
<th>Definition</th>
<th>Previous Land Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>No detectable contamination from site investigation work on the site.</td>
<td>Greenfield site.</td>
</tr>
<tr>
<td>Low</td>
<td>Detectable but minor soil contamination less than threshold and unlikely to affect most sensitive receptors. Site investigation data detecting no significant contamination.</td>
<td>Previous or on-going activities with low potential to cause contamination (e.g. residential, retail or offices etc.).</td>
</tr>
<tr>
<td>Medium</td>
<td>Detectable localised soil contamination above threshold limits, identified during ground investigation.</td>
<td>Previous or on-going activities with some potential to cause moderate contamination (e.g. railways, collieries, scrap yards etc.).</td>
</tr>
<tr>
<td>High</td>
<td>Site investigation data indicating widespread and/or severe localised contamination.</td>
<td>Previous or on-going activity on or near to the Site with high potential to cause land contamination (e.g. gasworks, chemical works, landfill etc.).</td>
</tr>
</tbody>
</table>

7.3.4 Receptor Identification

1. The presence of and sensitivity of receptors at risk from potential land contamination can be assessed by consideration of the following:
   - Surrounding land uses, based on mapping and site visits and existing planning designations;
   - Proposed end-use, based on the nature of the proposed development;
   - Type of construction operations that will be necessary as part of the proposed development;
   - Surrounding sites of nature conservation importance; and
   - Geology, hydrogeology and hydrology of the site and its surrounding area.

2. The sensitivity of potential receptors can be described qualitatively according to the categories shown in Table 7.2.
<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Definition</th>
<th>Future Site Users</th>
<th>Surrounding Land Uses</th>
<th>Construction Workers</th>
<th>Ecological Sites</th>
<th>Built Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>Environment is insensitive to impact, no discernible changes e.g. soils are not in use, the land has an industrial/commercial land use and/or mainly covered by hard standing.</td>
<td>Industrial land covered by hard standing</td>
<td>Heavily industrialised areas</td>
<td>No disturbance to ground</td>
<td>No sites of potential ecological value nearby</td>
<td>Minor industrial development without subsurface services</td>
</tr>
<tr>
<td>Low</td>
<td>Environment responds in a minimal way such that only minor changes are detectable e.g. landscaped areas.</td>
<td>Commercial landscaping or open space areas</td>
<td>Light industrial areas, commercial landscaping or open space areas</td>
<td>Minimal disturbance of ground</td>
<td>No sites of significant ecological value close by</td>
<td>Infrastructure (roads, bridges, railways)</td>
</tr>
<tr>
<td>Medium</td>
<td>Environment clearly responds to effect(s) in quantifiable manner e.g. low grade agricultural land, recreational ground.</td>
<td>Residential without plant uptake</td>
<td>Residential without plant uptake</td>
<td>Limited earthworks</td>
<td>Locally designated ecological sites</td>
<td>Buildings, including services and foundations</td>
</tr>
<tr>
<td>High</td>
<td>Environment responds to major change(s) e.g. agricultural land use for good production, allotments.</td>
<td>Residential with plant uptake, and allotments</td>
<td>Residential with plant uptake, and allotments</td>
<td>Extensive earthworks, and demolition of buildings</td>
<td>Nationally or internationally designated ecological sites</td>
<td>As above but of high historic value or other sensitivity</td>
</tr>
</tbody>
</table>

Table 7.2: Sensitivity of potential receptors
7.3.5 **Significance Criteria**

1. If a hazard has been identified and potential sensitive receptors are present, then the potential impacts can be determined by considering the pathways whereby the hazard may impact upon the receptors. Table 7.3 indicates the most feasible potential impacts that may generally occur in relation to proposed development sites for different classes of receptor. During the assessment it has been assumed that there is (or will be during or after construction) a pathway present between the hazard and the receptor, unless there is a clear indication that this will not be the case.

### Table 7.3: Potential Impacts of Land Contamination on Sensitive/Important Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Site Users (residents/workers/visitors)</td>
<td>Direct or indirect ingestion of contaminated soil, inhalation, dermal contact (operational)</td>
</tr>
<tr>
<td></td>
<td>Concentration of flammable or asphyxiating in-ground gases in enclosed spaces (operational)</td>
</tr>
<tr>
<td></td>
<td>Inhalation of harmful in-ground vapours indoors and outdoors (operational)</td>
</tr>
<tr>
<td>Surrounding Land Uses</td>
<td>Inhalation or deposition of wind-borne dust (construction stage)</td>
</tr>
<tr>
<td></td>
<td>Migration of contamination in sub-surface strata (including ground gases) (operational and/or construction stage)</td>
</tr>
<tr>
<td>Construction Workers</td>
<td>Direct or indirect ingestion of contaminated soil and groundwater, inhalation, dermal contact (construction stage)</td>
</tr>
<tr>
<td></td>
<td>Concentration of flammable or asphyxiating gases in confined spaces (construction stage)</td>
</tr>
<tr>
<td></td>
<td>Inhalation of asbestos during building demolition (construction stage)</td>
</tr>
<tr>
<td>Ecological Receptors</td>
<td>Phytotoxic impacts on plan species (operational)</td>
</tr>
<tr>
<td></td>
<td>Toxic impacts on fauna (operational)</td>
</tr>
<tr>
<td></td>
<td>Indirect impacts via contamination of water resources (operational and/or construction stage)</td>
</tr>
<tr>
<td>Built Environment</td>
<td>Chemical attack of buried concrete structures (operational)</td>
</tr>
<tr>
<td></td>
<td>Permeation of water supply pipelines (operational)</td>
</tr>
<tr>
<td></td>
<td>Concentration of explosive gases above LEL (operational)</td>
</tr>
</tbody>
</table>
2. The strength of pathway between a source and receptor is a function of the distance between the two and the ease or otherwise of the migration pathway. For example, on sites underlain by impermeable clays, the migration pathway via groundwater would be weak even over short distances, whereas within sands or gravels, the migration pathway would be strong for receptors in close proximity to a source and weak for receptors at some distance from the source.

3. For construction workers on contaminated sites, the pathway is invariably strong because they are likely to be in close proximity to the soils, particularly during ground works.

4. For industrial and commercial developments, where much of the ground may be covered in hard surfacing, the migration pathways for soil or water contamination are generally moderate of weak.

### 7.3.6 Magnitude of Impact

1. A combination of the source and receptor rankings will provide an indication of the level of contamination on the site and nature and severity of possible effects. It should be noted that both rankings may vary in the different scenarios being considered (i.e. baseline, construction and operation).

2. For sites where there is no (or very limited) site investigation data, this stage consists of comparing the magnitude of the hazard and the sensitivity of the receptor for each potential impact, using the qualitative descriptions outlined in Tables 7.1 and 7.2 above.

3. Where site investigation data are available, the assessment of the magnitude of impact can be assisted by an assessment of the testing results that exceed relevant contaminant screening levels for each particular type of impact. Appropriate screening levels are selected based on the nature of the hazard-pathway-receptor linkage and with reference to current published guidelines.

### 7.3.7 Significance of Effects

1. The likely significance of effects (before any mitigation) can then be assessed on the basis of the matrix as shown in Table 7.4 in conjunction with professional judgement of the site specific factors that may be of relevance.

**Table 7.4: Classification of Effects**

<table>
<thead>
<tr>
<th>Sensitivity of Receptor</th>
<th>Magnitude of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Very Low</td>
</tr>
<tr>
<td>High</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td>Major/Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate/Minor</td>
</tr>
<tr>
<td>Medium</td>
<td>Major/Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate/Minor</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Moderate/Minor</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td>Very Low</td>
<td>Moderate/Minor</td>
</tr>
<tr>
<td></td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Negligible</td>
</tr>
</tbody>
</table>
2. Major and moderate effects are considered to be significant. Minor and negligible effects are considered insignificant. Where a Moderate/Minor effect has been identified then judgement will be used to determine whether the effect is significant or not.

### 7.3.8 Risk Assessment

1. The severity of the potential significance (determined using the above matrix), and consideration of likelihood of an event occurring, can then be incorporated into the final risk based assessment. Likelihood would take into account both the presence and distribution of a particular hazard within the site as well as the integrity (strength) of the pathway between the hazard and receptor.

#### Table 7.5: Likelihood Matrix

<table>
<thead>
<tr>
<th>Magnitude of Impact</th>
<th>Strength of Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Very Low</td>
<td>Unlikely</td>
</tr>
</tbody>
</table>

2. Table 7.5 demonstrates the perceived likelihood of an event occurring and Table 7.6 provides details of the level of risk based on the combination of the likelihood of an event occurring and significance of effects. Table 7.6 interprets the risk assessment.

#### Table 7.6: Risk Assessment

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Significance of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major</td>
</tr>
<tr>
<td>High</td>
<td>Very High Risk</td>
</tr>
<tr>
<td>Medium</td>
<td>High Risk</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate Risk</td>
</tr>
<tr>
<td>Unlikely</td>
<td>Moderate/ Low Risk</td>
</tr>
</tbody>
</table>
3. Impacts on ground conditions as a result of the proposed development are assessed in terms of changes to the baseline conditions during the site preparation and construction phases, and post development during the operational phases. Impacts of the site preparation and construction phase on baseline ground conditions will be reflected as changes to any potentially complete pollutant linkages. Similarly, the residual impacts of the proposed development are identified by reviewing the baseline data in the light of the post-development context and identifying net changes.

4. The assessment approach has been undertaken with a clear understanding of:
   - Previous land uses;
   - Existing physical baseline conditions;
   - Underlying geology and soils;
   - Sensitivity of surrounding receptors; and
   - Potential to mitigate impacts resulting from the proposed development.

5. The sensitivity of receptors at risk from potential contamination or earthworks has been assessed with a clear understanding of the following:
   - Surrounding land use;
   - Type of construction methods, which will be necessary to achieve the final design layout;
   - Surrounding sites of nature conservation or built heritage importance; and
   - Underlying geology and soils.

6. The results of external consultations undertaken as part of the information gathering for the determination of the baseline conditions have included within the Desk Study report attached within Appendix 7.1.
7.4 BASELINE CONDITIONS

7.4.1 Introduction

1. This section provides an assessment of existing environmental impacts from the existing site on human health and the environment; i.e. the existing “baseline conditions”.

2. For ease of assessment by the various regulators and consultees involved in reviewing the proposed development the site has been divided into four separate main areas for the assessment of geology, soils and groundwater;

   - Zone 1: Main Development Plateau and Rail Freight Interchange
   - Zone 2: Rail Branch Line
   - Zone 3: Major Trunk Road Improvements
   - Zone 4: Kegworth Bypass including bridge over the M1

3. The four separate Zones are shown below in Figure 7.1

Figure 7.1 Report Zones
7.4.2 Supporting Information

1. The baseline ground model of soil and geological conditions at the sites have been assessed by means of a staged process as recommended by Local Authority and industry guidance:

   - Preliminary Sources Study Reports (PSSR): desk studies in the Highways Agency format including site walkovers and the assessment of available geological plans, historical plans, published environmental data and available exploratory hole logs have been undertaken. In addition preliminary consultations have been undertaken with regulators including North West Leicestershire District Council, Highways Agency and the Environment Agency to confirm the expected ground model and geotechnical hazards and risks and contaminated land risks. Four separate reports have been prepared, one for each of the zones of the proposed development. These reports sought to identify particular hazards and formed the basis for the detailed design and specification of Ground Investigations. Copies of these reports are included as Appendix 7.4.

   - Factual Site Investigation Reports: A site wide Ground Investigation has been undertaken to complement, supplement and confirm the data found within the Preliminary Sources Study Reports. The investigation was undertaken at one time but to aid consultees and regulators during assessment and consultation the investigation has been reported specific to the four spate zones detailed above. These Factual Ground Investigation reports compile the data obtained from the intrusive ground investigations carried out across each zone of the site including detailed engineers exploratory hole logs, insitu testing, gas and groundwater monitoring, soil and groundwater chemical and geotechnical testing results and as built plans showing the position of all boreholes. Copies of these reports are included as Appendix 7.5.

   - Preliminary Ground Investigation Interpretative Reports: Available Ground Investigation data has been used to provide separate interpretative reports for each of the four zones of the site. These reports draw together, build upon and update the data and risk assessments included within the PSSR’s using the site specific factual ground investigation data obtained. They seek to confirm the ground models for the separate zones allowing geotechnical and geo-environmental risk assessments to be updated using the current up to date site specific data. Copies of these reports are included as Appendix 7.6.

2. Investigations have been carried out generally in accordance with standard industry practice and guidance including but not limited to the following primary documents;

   - Highways Agency HD22/08, ‘Managing Geotechnical Risk’.
7.4.3 Local Landscape Character, Topography, Geography and Geomorphology Summary

1. The site sits within a formerly glaciated area signified by rolling hills created by the harder geological formations and erosion of the glacial deposits.

2. The land generally slopes from the high plateau where East Midlands Airport on southern extremity of the site is located with a general ground level of approximately 88m AOD down to the north east which has a ground level of approximately 30m AOD.

3. The land is rolling farmland dissected by minor streams with a knoll located in the north west.

4. Two very minor drainage ditches/streams are shown to dissect the western area and appear to originate from springs or rises and the natural groundwater runoff catchment of the land in the south west.

5. One stream originates close to Field Farm and runs west and then north through Lockington Village, whilst a second stream originates further west and follows a similar path through natural folds in the ground west then north along western boundary through Hemington Village.

6. The ground in the north of the proposed development area is relatively flat but for the disturbance of manmade features including Railways, Highways on embankment and quarry/landfill operations. This area is considered to form a river terrace to the River Trent which runs broadly west to east to the north of the site.

7. The land to the east and west of the site follows a similar rolling farm land form with a general fall to the north, although further east and south of Kegworth the land falls east toward the River Soar which flows south to north to join the River Trent.

8. The geological sequence of the area is understood to be one of interbedded clays, mudstones, siltstones and sandstones deposited within sea conditions and eroded by periods of glaciations and later deposition and erosion from the River Trent which has cut through the geological strata depositing River Gravels along its course and across a wide flood plain.
7.4.4  **History**

1. Available mapping shows that the majority of the site has and remains to be farmland with Field Farm present in its current location since the earliest maps 1880’s maps with the villages of Lockington to the north, Hemington and Castle Donington to the north west and west respectively and Kegworth to the east.

2. During the early part of the 20th century an airfield was established on the flat plateau farmland immediately south of the site (now East Midlands Airport).

3. This land reverted back to farmland between Wold War I and World War II. However during World War II this airfield was revived and became a more significant RAF Castle Donington used for the training of bomber pilots. Parts of the RAF base infrastructure including the bomb stores appear to have extended into a small part of the south western corner of the site; however these were later decommissioned shortly after the war leaving little trace of their past existence.

4. Following the war the airfield was dormant for some time before becoming East Midlands Airport in the 1960’s and has continued to expand over time.

5. Also during the Mid 1960’s the M1 appears to have been constructed as it is shown running north to south along the eastern boundary of the site. The majority of the changes following this period up to the present relate to the highway infrastructure with the inclusion of Junction 24, and associated development of new roads including the A453 and later A50 Junction 24A.

6. Throughout the latter half of the 20th Century exploitation of the River Terrace sand and gravel deposits north of the site has taken place with later backfilling of the voids for landfill. This continues to this day in the north east corner of the site adjacent to Junction 24A where Lafarge Aggregates Ltd is undertaking a rolling programme of removal of the natural sand and gravels and restoration by means of inert land filling.

7. The vast majority of the site in all four areas remains farmed with the only exception being the Lafarge Aggregates workings which affects a small area of the site in the North East corner.

8. Full details of the history of the site and surrounding areas can be found within the PSSR reports included in Appendix 7.4 of this chapter.

7.4.5  **Geology and Soils**

1. Full details of the geology, ground conditions and ground model are included within the supporting reports included within the Appendices 7.4 – 7.6 attached to this chapter. A short summary is detailed below:

7.4.5.1  **Made Ground**

1. Little or no Made Ground has been identified across the site.

2. Limited localised areas of Made Ground are anticipated to be present associated with the former alignments of highways in the north of the site, farm tracks, farm buildings and former areas previously occupied by ancillary elements of RAF Castle Donington.
3. Other areas of limited existing Made Ground will be anticipated with respect to the wider modern highways infrastructure including embankments for the M1, A453, A50 and associated ancillary works.

4. Of particular note is the ongoing Lafarge Aggregates Ltd quarry/landfill. Whilst works do not directly impact the site at this time it is anticipated that by the time construction commences aggregate removal and landfill replacement will have taken place in a small area of the north eastern part of the proposed development site, specifically beneath the proposed alignment of some of the major trunk road junction improvements. It should however be understood that aggregates are not more than 4m in depth and restoration of the land is by means of controlled inert landflling. Therefore this is only considered to represent a local geotechnical hazard to construction and stability which will be resolved by suitable ground improvement or earthworks techniques rather than a contaminated land hazard.

7.4.5.2 Drift Geology
1. The majority of the proposed SRFI development site is devoid of drift deposits, however a small area of Thrussington Till caps the Knoll in the north west with Head deposits and various named River Terrace deposits are located mainly beneath the open spaces and highways and rail infrastructure elements of the scheme.

7.4.5.3 Solid Geology:
1. The site is underlain in the by the various formations previously grouped together as the Mercia Mudstone Group Formation. This includes;
   - Gunthorpe Member; interbedded mudstone and dolomitic siltstone.
   - Taporley Siltstone Formation interbedded mudstones, siltstone and sandstomes
   - Edwalton Member which comprises primarily of mudstone with subordinate siltstone and sandstone skerry bands
   - Branscombe Mudstone formation - Mudstone and siltstone, red-brown with common grey-green reduction patches and spots
   - Arden Sandstone Formation - consisting of grey, green and purple mudstones interbedded with paler grey-green to buff coloured siltstones and fine- to medium-grained, varicoloured green, brown, buff, mauve sandstones; beds of conglomerate occur locally.
   - Bromsgrove Sandstone Formation - Sandstones, red, brown and grey, commonly pebbly or conglomeratic at the bases of beds, interbedded with red and brown siltstones and mudstones.
7.4.6 Hydrology - Surface Waters
1. The River Trent flows and meanders west to east some 3km north of the proposed development site.
2. The River Soar flows in a broadly meandering south to north, east of the eastern extent of the Kegworth Bypass.
3. Two small streams originate from surface water runoff and rises (natural springs) in the SRFI site and run north separately towards the River Trent through the Villages of Hemington and Lockington. Other small farm ditch drainage streams are evident in the north of the site in the area of the railway and highway infrastructure improvements flowing variably north and east via a network of small field boundary ditches.
4. Full details of the findings are available within the individual reports included within the Appendices to this chapter.

7.4.7 Hydrogeology - Groundwater
1. The site is not located upon a source protection zone.
2. The Solid and Drift deposits beneath the site are variably determined as Secondary A and B aquifers with the Bromsgrove Sandstone (at significant depth beneath) classed as a Principal Aquifer.
3. Perched groundwater water tables are anticipated to be present in the River Terrace Deposits beneath the northern portion of the site where the major highway and rail infrastructure is proposed.
4. Smaller variable seepages of groundwater maybe expected within the subordinate permeable strata (sandstones and siltstones) confined within the mudstones.
5. Groundwater is also expected to be present within the Bromsgrove Sandstone aquifer which is likely to represent the principal aquifer beneath the site.
6. Full details of the findings are available within the reports attached as Appendices 7.4 – 7.6 to this chapter.

7.4.8 Contamination & Ground Gases
1. Review of North West Leicestershire District Council Contaminated Land Strategy (Ref. 7-13) did not identify any naturally occurring contaminants that might be expected to be present at the site. This was confirmed by the limited soil chemistry data obtained as part of the PSSR research.
2. Available ground investigation results confirm the concentrations of contamination within the site soils. The soil concentrations have been compared to the proposed commercial end use soil screening values (SSV) to assess the risk to human health and the environment; and have not identified any contaminants of concern. Indeed many of the contaminants tested for were at or below detection limits as would be expected of natural soils.
3. Available ground investigation results confirm the concentrations of contamination within the groundwater beneath the site. The groundwater concentrations have been compared to suitable controlled water screening values and have not identified any contaminants of concern. Indeed many of the contaminants tested for were at or below detection limits as would be expected of groundwaters from natural soils.
4. Gas monitoring has been undertaken and did not detect any significant soil gas concentrations of concern as would be expected of natural soils.

5. Full details can be found within the detailed reports included within Appendix 7.4 -7.6 of this chapter.

7.4.9 **Mining and mineral extraction**

1. The site is not located within an area affected by coal mining or mining instability. This is supported by the Coal Authority’s online Gazetteer, interactive map viewer and scoping response.

2. The north east corner of the site by Junction 24a is allocated for sand and gravel extraction and this is underway. Commercially viable extraction extends to depths of around 4m below ground levels where the solid deposits in the form of mudstones are encountered. Some of the overburden soils are also of limited quality too.

3. There are no known new plans to quarry sand and gravel on the proposed development site and no areas of the site are allocated within Leicestershire County Council plans for protection for future mineral or aggregate exploitation. However the floodplain sands and gravels in the area of the River Trent are known natural sand and gravel resource that continues to be commercially exploited.

4. Full details may be found within the PSSR’s included within Appendix 7.4.

7.4.10 **Landfill, Waste Disposal, Waste Treatment and Waste Transfer**

1. There is one licensed landfill located at Lockington Fields in the north east of the site where the proposed new highway infrastructure will be sited. This is at the site of the Lafarge Aggregates Ltd sand and gravel quarry and the licence is for inert non biodegradable waste and as such is not considered to represent a significant risk of contamination or gas that would detrimentally impact upon the proposed infrastructure at the location.

2. Full details may be found within the PSSR’s included within Appendix 7.4.

7.4.11 **Land Use and Pollution**

1. With the exception of the Lockington Fields quarry/Landfill the vast majority of the site has and remains in agricultural use and is not considered to represent any potential sources of pollution.

2. Some additional Ground Investigation at enabling works stage (post planning) maybe necessary in the areas of the farmyard at Field Farm and in the area of airport controlled land where the former RAF Castle Donington had some infrastructure historically. However, it is considered unlikely that significant contamination sources would be encountered at either location and were contamination to be found it is likely that it would be very localised as the underlying geology is cohesive in nature and would inhibit movement vertically and horizontally.

3. There are no major or significant pollution incidents recorded upon the site.

4. Full details may be found within the PSSR’s included within Appendix 7.4.
7.4.12 **Potentially Sensitive Receptors**

1. These include:
   - Current and Future End Users
   - The geological strata beneath the site are locally determined to be a Secondary and Principal Aquifers and thus this is the primary sensitive receptor at the site.
   - The River Trent and River Soar are sensitive receptors.
   - Neighbours and Public (East Midlands Airport, Lockington, Hemington, castle Donington and Kegworth)

7.4.13 **Summary of Site Status**

1. The site is primarily open farmland and no major or significant past or present sources of soil, groundwater or potential gas contamination have been identified.
2. No significant geotechnical hazards have been identified to underlie the site or represent risks to land stability in its current form, during construction or operation.
3. Limited thickness of low quality sand and gravel is anticipated to be present beneath the northern portions of the site where the major trunk road and rail branch line infrastructure improvements are proposed. Given its low quality, mixed nature and limited thickness it is not considered to be economically suitable for commercial extraction. This appears to be demonstrated by the fact that none of the areas beneath the proposed development site are currently included for protection as a future resource by Leicestershire County Council.
4. Indeed from the records provided by Lafarge Aggregates Ltd included within the PSSR for Zone 3 ([Appendix 7.4](#)) it can be seen that wide spread exploration work was done on fields extending as far south as Junction 24 on the east of the M1 however findings confirmed that the deposits were not sufficiently thick or of sufficient quality to make it economically viable to extract them beyond the application boundary allocated.
5. As the deposits are the same on the western side of the M1 it is anticipated that the same assessment would be confirmed for the area where the proposed Rail Branch Line will link to the existing railway, with only a small area at the northern portion of branch line being deemed potentially viable. All suitable viable sources appear to be north of the site; beyond the existing railway line and M1 Junction 24a and have already been extensively exploited.
6. It should also be pointed out that shallow groundwater tables would be present and therefore extraction becomes less viable as demonstrated by the data gathered within [Appendix 7.5](#).
7.5 IMPACTS

1. This section provides an assessment of the potential significant environmental impacts of the proposed development on human health and the environment during both the construction and operational phases.

2. The assessment is based on an assessment of the magnitude of contamination sources, geotechnical hazards and mineral sterilisation as obtained from desk study, existing ground investigation and monitoring information included within Appendices 7.4 – 7.6, which form the base line conditions and an assessment of the source - pathway - receptor philosophy and identified pollutant linkages.

3. The receptors potentially at risk from land contamination that could be present are indicated below and their relative sensitivity is assessed using the criteria below to enable predicted impact to be determined. This approach differs slightly from the general approach suggested within Chapter 1 but is necessary and consistent with that required to assess anticipated impacts specific to these particular ground related issues.

Table 7.7: Potential Construction and Operational Phase Receptors

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Sensitivity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction/maintenance workers</td>
<td>High</td>
<td>Significant earthworks planned.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construction workers involved with in and below ground construction will have a high sensitivity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Construction workers involved in above ground works will be less sensitive.</td>
</tr>
<tr>
<td>Adjacent Commercial site users</td>
<td>Low</td>
<td>Includes workers at East Midlands Airport, Travellers on the M1/A453/A50 and other associated highways, Network Rail.</td>
</tr>
<tr>
<td>Adjacent Residential users</td>
<td>High</td>
<td>More sensitive receptors associated with the adjacent and nearby residential areas (Castle Donington, Hemington, Lockington, Kegworth) including local schools.</td>
</tr>
<tr>
<td>Future site users</td>
<td>Very Low to Low</td>
<td>Includes employees, visitors i.e. commercial/industrial setting with minimal exposure opportunity to contamination sources</td>
</tr>
<tr>
<td>Surface water</td>
<td>High</td>
<td>River Trent, River Soar</td>
</tr>
<tr>
<td>Groundwater</td>
<td>High</td>
<td>The Bromsgrove Sandstone is a Principal Aquifer.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The River Terrace Deposits are Secondary Aquifers.</td>
</tr>
</tbody>
</table>
4. The baseline data supported by the attached reports included within Appendices 7.4 -7.6 confirms the current state of the site. In order to assess the proposed development impacts it is important to understand the impacts that the existing site poses at present. Due to the varying characteristics of the site and the impacts and risks are presented on table Matrix 7.1 included within Appendix 7.1.

5. It can be seen from this that there are no known risks present Low or Very Low existing impacts and risks to the environment, in particular to controlled waters (aquifer and rivers), site users and adjacent land users.

7.5.1 Construction Phase Impacts and Mitigation

1. The construction of the scheme with respect to land use geology and soils are discussed within the separate sections below according to the anticipated order of construction. A risk matrix detailing the main construction risks related to soil, geology and groundwater is included in Appendix 7.2 as Matrix 7.2.

7.5.1.1 Works Contamination

1. Construction plant and activities have the potential to affect ground conditions through the introduction or mobilisation of contamination via accidental spillages/leaks on the site e.g. from oils, lubricants and fuel. However no existing sources of contamination are present and risks related to works will be managed by the adoption of the Construction Management Framework Plan.

2. Therefore, provided the Works are adequately supervised and managed, in accordance with current best practice, the environmental impacts from construction plant and activities to geology and soils are considered to be very low to negligible.

7.5.1.2 Works Methods & Phasing

1. The construction work will be undertaken in accordance with current best practice guidance and legislation. This will be supplemented by the preparation and adoption of detailed site specific construction monitoring and management plans as follows:
   - Construction Management Framework Plan (CMFP) - Air, noise, dust, light, odour
   - Site Waste Management Plan (SWMP) - Demolition & Construction
   - Earthworks Specification

2. **Construction Management Framework Plan**: The Construction Management Framework Plan sets out the overarching systems and controls that will be adopted and developed during construction of the scheme to minimise any adverse environmental impacts. This will be included within all construction contracts and all contractors will be required to comply with these overarching principals. Contractors will be required to plan and undertake the works in a suitable manner including providing and monitoring of noise, dust & vibration and where appropriate controlled water quality as well as control of waste. Contractors will be required to prepare and agree action plans with regulators and establish agreed trigger levels. The action plans will define the monitoring requirements and will be agreed with regulators and reviewed throughout the works to confirm that no unacceptable emissions from site occur. Should an exceedance occur the action plan will define what remedial actions must be taken.
3. **Site Waste Management Plan**: A Site Waste Management Plan in accordance with the Site Waste Management Plan Regulations 2008 (Ref.7-6) is anticipated to be prepared and implemented although this is understood to no longer be mandatory. This will promote the reduction, re-use and recycling of waste, and reduce the amount of waste going to landfill. On this site it is anticipated that a cut and fill earthworks balance will aim to be achieved to minimise off site disposal and importation of clean replacement materials.

4. As the site is considered to be clean and no contaminated soils requiring remediation or special controls have been identified then at this stage it is **not considered necessary** or mandatory to prepare a Materials Management Plan in accordance with the CL: AIRE Code of Practice entitled “The Definition of Waste: Development Industry Code of Practice, Version 2, March 2011, as only “clean and natural” soils will be re-used on the site of origin. However, should recycled or reused materials from off site sources be proposed to be imported for use within the works then a Material Management Plan will need to be developed alternatively a sources will need to meet a suitable environmental quality standard such as WRAP.

5. **It is anticipated that a detailed Earthworks Specification will be prepared**: The detailed Earthworks Specification will define the geotechnical classification and properties of insitu materials, how and where they may be reused in a similar way to a Materials Management Plan to control the acceptability and suitability of materials reused.

6. Risk assessments will be undertaken to identify main health and safety and environmental risks and indicate suitable mitigation to be put in place to reduce risks to acceptable levels.

7. The works will be designed to where possible to achieve a cut to fill volume balance to minimise waste and to reduce off site disposal and on site importation of aggregates etc. This will reduce lorry movements to a minimum and the subsequent environmental impacts.

8. Appropriate working times and plant will be utilised to minimise noise impact.

9. Careful positioning of plant, appropriate use of plant and appropriate methods of working including the use of dust suppression will be used, as appropriate, to minimise dust nuisance wherever possible and practical.

10. Temporary surface water control measures will be carefully designed and constructed to manage surface water runoff and avoid suspended solids and contamination reaching water courses or sewers or surface waters.

11. Works methods will be designed to minimise risks to personnel and shall utilise appropriate plant and equipment. Where risks remain appropriate training, supervision, personal protective equipment (PPE), welfare and hygiene measures will be put in place.

12. Site haul roads and construction movements will be limited, as far as reasonably possible and main temporary haul roads will be sensitively positioned within reason to minimise impacts to neighbours and the public.

13. Works methods and plant will be selected to reduce and minimise light, noise, dust and vibration which may have a minor impact upon Neighbouring Sites and the public.

14. Therefore, the environmental impacts from the earthworks works are considered likely to be **short term minor negative impacts**.
7.5.3 Earthworks
1. An earthworks cut and fill is necessary to allow the scheme to be constructed. This will be designed to achieve, wherever possible and practical, a cut and fill balance, thus minimising the need for off-site disposal and import of materials.
2. It is anticipated that these works would be commenced by the removal of topsoil, this material being either temporarily stockpiled for reuse in landscape and habitat creation areas around the built scheme or being placed directly on areas of the open space.
3. It is anticipated that excavation will be undertaken using large excavators which should be able to excavate through the strata, although some ripping or breaking of more massive rock cannot be discounted, however this is expected to be limited to deeper excavations in the eastern part of the SRFI site.
4. It is anticipated that all natural arisings from earthworks cutting should be suitable for reuse within general fill operations, provided they are suitably handled.
5. Where arisings are wet of optimum making them unsuitable for reuse within structural fill they may be reused within non-structural landscaping areas or modified or stabilised to allow reuse within structural fill thereby ensuring a cut fill balance is achieved and no export of arising’s to landfill will be required.
6. Crushing and screening maybe necessary to allow reuse of some granular and rock arisings.
7. Potentially fugitive dust will be controlled by water dampeners as necessary, especially during the dry summer months during the earthworks, crushing, breaking or other construction processes.
8. Therefore the environmental impacts from earthworks are considered short term minor negative impacts primarily related to dust generation.

7.5.6 Sensitive Receptors
1. Works are not anticipated to interfere directly with the underlying secondary and principal aquifers. However downward percolation and infiltration of rainfall is expected to occur during the earthworks reprofiling once compacted vegetated cover is removed and excavations and mass earthworks are exposed. It is anticipated that where possible works will be phased to minimise exposed open areas as far as is reasonable. Techniques and methods of construction will also be utilised to minimise this wherever possible with particular care taken to managing earthworks and temporary surface water drainage to avoid increased infiltration from surface water. However it is considered impossible to avoid this completely. However as no contamination has been identified this is not considered likely to have any impact upon the aquifer water quality. Therefore it is anticipated that there will be a neutral impact.
7.5.2 Operation Phase Impacts and Mitigation

7.5.2.1 Design

1. Chapter 2 (Development Proposals) details the overall scheme design. In outline the proposed scheme includes:
   • An intermodal freight terminal accommodating up to 16 trains per day and trains of up to 775m long and including container storage and HGV parking;
   • Up to 557,414 sq m of rail served warehousing and ancillary service buildings;
   • A new rail line connecting the terminal to the Castle Donington branch freight only line;
   • New road infrastructure and works to the existing road infrastructure;
   • Demolition of existing structures and structural earthworks to create development plots and landscape zones;
   • Strategic landscaping and open space, including alterations to public rights of way and the creation of new publicly accessible open areas;
   • Bus interchange.

2. The reuse of site won soils at the site within the earthworks is anticipated to have a **neutral impact** on the environment whilst facilitating development to proceed.

3. The operation of the constructed proposed development will be contained by buildings and hard standings. No exposure pathway will be present which would allow waste discharges to land, surface water or groundwater as the proposed development design and operation will be controlled by environmental legislations and regulations which are protective of environmental receptors. Therefore there is a **negligible environmental impact to geology, soils and groundwater from the operation of the proposed development**.

4. Any fuels, chemical substances and hazardous materials required to be stored at the sites during operation will be stored in accordance with contemporary guidance and pollution prevention and control regulations. This will ensure that there is a **negligible environmental impact**.

5. In ground concrete required for buildings and infrastructure will be designed in accordance with BRE SD1 to ensure that it will resist any contamination or naturally occurring aggressive ground conditions. This will ensure that there is a **negligible environmental impact**.

6. There are not anticipated to be any long term impacts upon the geology as a result of the operation of the proposed development therefore there is a **negligible environmental impact**.

7.5.2.2 Stability, Mining, Minerals & Aggregates

1. Earthworks together with suitable embankment, cutting and foundation design will ensure that the reprofiled site is stable and buildings, infrastructure and surrounding adjacent lands are suitably supported. Further information is provided within the reports included within the appendices to this chapter. Therefore **no environmental impacts will be experienced from instability**.
2. The site does not lie within an area affected by shallow or deep mining. Therefore **no environmental impacts will be experienced with respect to instability resulting from below ground mining**.

3. Reference to past and present Leicestershire County Council mineral resource strategies indicate that the proposed development would not sterilise any identified, allocated or protected future potential resource for provision of aggregates or minerals. However the alignment of the northern part of the Rail Branch Line on embankment will sterilise a limited depth of potential future aggregate. The volume sterilised will be limited to the footprint and is not anticipated to be significant given the vast resources regionally available along the River Trent Valley. Prior extraction as a form of mitigation is also not considered economically viable or sustainable as the removed aggregate would need to be replaced with a similar or better imported aggregate resource to provide a suitable foundation formation for the proposed rail embankment. This would be further complicated by the presence of a shallow groundwater table. Therefore the sterilisation of a very limited volume of potential future aggregate resource, relative to the regionally available resources is considered to be **a minor negative environmental impact**.

7.5.2.3 Re-instatement (Open Space Areas)

1. Wherever possible the areas of the site designed to be open space, landscape or habitat will be left untouched by main earthworks. This is considered to represent a **negligible environmental impact**.

2. Where works affect the area of open space, landscaping and habitat creation the recommendations of the Soil Code (The Code of Good Agricultural Practice for the Protection of Soils) will be adhered to in order to avoid causing long term change to the soils. Normal procedure is to strip topsoil with a bulldozer blade or excavator and to store it to one side of the working-width. This will ensure separation from any other materials and will protect it from further stress. The forces exerted by this action are comparable with those experienced during cultivation so significant compaction to the topsoil is avoided. This is considered to represent a **negligible environmental impact**.

3. Soil resilience generally increases throughout the spring and summer months as the soil dries out, so that even vulnerable soils may be handled with minimal impact when dry. In this respect the works programme will wherever possible attempt to schedule any works during this period to improve opportunities for phasing of soil handling. This is considered to represent a **negligible environmental impact**.

4. Areas of planned open space, landscape areas and habitat creation affected by significant cut and fill earthworks will be restored and reinstated to the requirements of the ecologists and landscape designers with planting undertaken to their requirements. Similarly where possible land form will also be to the requirements of landscape, visual requirements. This is considered to represent a **negligible environmental impact**.

5. Careful attention to slopes angles and drainage conditions will facilitate the re-establishment of normal rooting patterns. This is considered to represent a **negligible environmental impact**.
6. Should sub-soil compaction be suspected, re-excavation and aeration or other appropriate cultivation can be undertaken if required. This is considered to represent a negligible environmental impact.

7.5.2.4 Sensitive Receptors
1. Works are not anticipated to interfere with or directly affect the underlying principal and secondary aquifers water quality.
2. Works are not anticipated to interfere with or directly affect the adjacent River Trent or River Soar. Therefore river quality is anticipated to be unaffected Therefore this is considered to represent a negligible environmental impact.

7.5.2.5 Sustainability
1. The reprofiling works will be designed to achieve an earthworks cut to fill balance where possible. Thus minimising the need for off-site disposal and import of materials. This reduces the need for waste disposal and loss of void space in off-site landfills, reduces the requirement for importation of valuable natural quarried soils and rock and has the added benefit of minimising off site lorry movements. Therefore this is considered to represent a sustainable approach to development.
2. Where materials are required to be imported, the developer will endeavour to utilise recycled inert clean aggregate and soils sourced locally. This might include the reuse of crushed concrete, brick, PFA in place of importing natural aggregate and rock resources. Therefore this is considered to represent a sustainable approach to development.
7.6 ASSESSMENT OF RESIDUAL IMPACTS

1. The project as described and the mitigation measures proposed are anticipated to result in negligible environmental impacts. This can be summarised by the following points:
2. The hard development does not sterilise any areas of land proposed for future provision of mineral or aggregate resource supply.
3. Earthworks cut and fill balance will negate the need for large amounts of lorry movements and removal of materials to landfill and importation of materials.
4. The reuse of clean natural soils will not cause any impact to surface waters or aquifers.
5. A project management team will oversee construction work and enforce appropriate environmental monitoring control measures. This will ensure that short term construction impacts to environmental receptors including the public and adjacent site users are managed and minimised or completely prevented.
6. The construction contractor will adhere to best construction practice.
7.7 ASSESSMENT OF CUMULATIVE IMPACTS

1. There are no known or identified cumulative impacts resulting from this proposed development with any surrounding committed projects with respect to soils, geology and contamination.

2. The proposed alignment of High Speed 2 is understood to run beneath the main development plateau and East Midlands Airport runway within tunnel. The alignment details and design are at a preliminary stage. Tunnelling beneath built environments is a common and well understood civil engineering process and is perfectly feasible without affecting built development above. Therefore there are not anticipated to be any potential future cumulative impacts resulting from later construction of the HS2 railway within tunnel beneath the proposed East Midlands Gateway.
7.8 REFERENCES

Ref. 7-1 National Planning Policy Framework (March 2012).
Ref. 7-2 Environmental Protection Act, 1990 (Part IIA).
Ref. 7-3 Contaminated Land Regulations (England) 2006 amended 2012
Ref. 7-5 The Environmental Permitting Regulations (England & Wales) 2010.
Ref. 7-6 The Site Waste Management Plans Regulations 2008.
Ref. 7-7 Environment Agency: Guiding Principles For Land Contamination (2010)
Ref. 7-10 Leicestershire County Council: Minerals Development Framework - Core Strategy & Development Control Policies up to 2021
Ref. 7-11 North West Leicestershire District Council: Local Plan Core Strategy Draft.
Ref. 7-12 North West Leicestershire District Council: Development Control Policies Issues & Options November 2005
Ref. 7-15 North West Leicestershire District Council: Local Development Scheme 2013 - 2016.
Ref. 7-16 Environmental Protection Act, 1990 (Part IIA) – Statutory Guidance April 2012
Ref. 7-17 The Contaminated Land (England) (Amendment) Regulations 2012