## APPENDIX D

(i) Conceptual Model

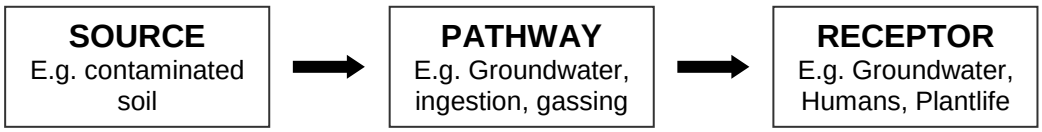
The report aims to identify land which could potentially be affected by contamination, such that it could affect the value or re-use of the land, or such that mitigation would be required for certain proposed end uses of the land.

The assessment also aims to identify land which would be regarded as 'contaminated land' under the terms of the Environmental Protection Act 1990, Part IIa. This act includes a stricter test for contaminated land than that outlined above. Land is considered to be contaminated if either: the land is causing significant harm to people, ecosystems or infrastructure; or there is a significant possibility that such harm could be caused; or pollution of controlled waters is being, or is likely to be, caused.

The following situations are defined as being where harm is to be regarded as significant: chronic or quite toxic effect, serious injury or death to humans; irreversible or other adverse harm to the ecological system; substantial damage to or failure of buildings; death of, or disease or other physical damage affecting, livestock or crops; pollution of controlled waters.

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

As an example, the pollutant source could be an identified leak of oil or an area of dumped waste.




The pathways could include transport of the contaminant by groundwater, surface water, windblown dust, or vapours, and for human receptors will include the means by which contaminants enter the body, for example skin contact, ingestion and inhalation.

Receptors include people, other living organisms, the built environment and groundwater and surface waters (these latter two also being contaminant pathways).

The source-pathway-receptor methodology relationship allows an assessment of the environmental risk to be determined, based on the nature of the source, the degree of exposure of the receptor to the source and the sensitivity of the receptor.

This section of the report is based on the information set out in the previous sections of the report and should not be read independently of such sections.

## Initial Conceptual Model

From the available information the preliminary conceptual model is visualised as follows:

| Target (Receptor) | POTENTIAL SOURCE-PATHWAY LINKAGE |
|---|---|
| **Site users / residents** | Inhalation of soil gas, odours or dust. |
| | Ingestion of, and skin contact with, contaminated soil. |
| | Ingestion of contaminants in vegetables etc. or in soils adhering to vegetables, etc. |
| **Construction/ maintenance workers.** | Inhalation of soil gas, odours or dust |
| | Ingestion of, and skin contact with, contaminated soil |
| **Plants** | Adverse effects on growth caused by presence of contaminants in soil |
| **Buildings and Structures** | Flow of ground gas into buildings. Asphyxiation, toxicity, explosion and fire hazards |
| | Sulphate attack of foundations |
| | Hydrocarbons penetrating plastic water supply pipes |
| **Groundwater** | Migration of soluble contaminants into groundwater on or off site. Migration of oils into groundwater on or off site. |
| **Surface water** | Migration of soluble contaminants and/or direct run-off of contaminants. Migration of oils into groundwater on or off site. |

### Initial Environmental Risk Assessment

## General

It is accepted that an environmental risk assessment can be based on a source-pathway-target model. An examination is carried out as to whether a target will be at risk from a contamination source, that a source exists, and whether there are any pathways (routes of exposure) which might actually link the source to the target.

Environmental risk assessments rely heavily on numerical trigger concentrations or guidelines because exposure of targets to contamination is difficult to quantify directly. Quantification of risk is therefore mainly undertaken for general scenarios in order to derive trigger levels. These are derived for various contaminants for particular targets and routes of exposure. An example of a sensitive target would be users of a domestic back garden, where routes of exposure might be skin contact, dust inhalation, direct ingestion and indirect ingestion via cultivation and consumption of fruit and vegetables.

In March 2002, the first parts of the new CLEA risk assessment guidance were released by DEFRA/Environment Agency.

The risk assessment approach is an extension of the 'fit for use' concept whereby land is cleaned up to a standard fit for the proposed use, that is, so all remaining risks are acceptable. However, as well as being 'fit for use', the environmental risk assessment approach also addresses the soil and water environment so that these are also safeguarded where necessary. For example if a site was contaminated with heavy metals and the development comprised the proposed construction of hard standings and buildings only, the fit-for-use approach might require no remediation for the site. However, consideration of the wider

environment needs to address whether groundwater is being contaminated, and if so whether remediation is required for this reason.

The following classification presented by CIRIA has been used in the assessment of risk:

| Estimation of risk from consideration of magnitude, consequences and probabilities | | | | |
|---|---|---|---|---|
| **Probability** | **Consequences** | | | |
| | **Severe** | **Moderate** | **Mild** | **Minor** |
| **High** | Very high | High | Moderate | Moderate / Low |
| **Medium** | High | Moderate | Moderate / Low | Low |
| **Low** | Moderate | Moderate / Low | Low | Very Low |
| **Unlikely** | Moderate / Low | Low | Very Low | Very Low |

Reference: Contaminated Land Risk Management; A Guide to Good Practice, CIRIA C552:2001

## APPENDIX E

(i) Notes on Limitations

The desk study report includes examination and provision of historical maps and an environmental database search covering geology, hydrogeology, historical, land use, water abstractions, groundwater source protection zones, landfill sites, radon, trade directory entries, petrol filling stations and nature reserves for the site and surrounding area. A Coal Authority Report has not been obtained as part of the investigation.

This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese knotweed). It is recommended that these are considered as part of the assessment of development constraints for the site.

The assessment and judgements given in this report are directed by both the finite data on which they are based and the proposed works to which they are addressed. The data essentially comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information. Actual risks can only be assessed following a physical investigation of the site.

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