Preliminary Environmental Risk Assessment

Pease Pottage Cemetery

May 2014

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Preliminary Environmental Risk Assessment
Pease Pottage Cemetery

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This document has been prepared and checked in accordance with Waterman Group’s IMS (BS EN ISO 9001: 2008, BS EN ISO 14001: 2004 and BS OHSAS 18001:2007)

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<th>Date</th>
<th>Prepared by</th>
<th>Checked by</th>
<th>Approved by</th>
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</tr>
</tbody>
</table>

Comments
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Executive Summary

Objectives
Waterman Energy, Environment & Design Limited was instructed by Crawley Borough Council to undertake a Preliminary Environmental Risk Assessment for the proposed redevelopment of the subject Site into a cemetery.

Site Setting

| Current Use | The Site comprises Pease Pottage Camp Site which consists of a large area of grass surrounded by woodland. There are two buildings located at the Site in the southeastern corner, which are understood to be used for scout activities. |
| History | The Site has remained as undeveloped wooded land, with some areas of woodland clearing in 2006. |
| Geology | The Site is underlain by Upper Tunbridge Wells Formation, with differing areas of mudstone and sandstone. |
| Controlled Waters | The sandstone deposits of the Upper Tunbridge Wells Formation is classified as Secondary A Aquifer. |
| Consultation | Local Authority searches have been submitted to Crawley Borough Council, but a response is currently pending. |

Conceptual Model
In consideration of the proposed redevelopment of the Site, the following potential pollutant linkages were identified:

- Workers (gravediggers) may come into direct contact with potentially contaminated shallow soils as a result of burials performed on site;
- Migration of contaminants from burials performed on site entering the onsite water features;
- Potential ground gas ingress from burials performed on site and;
- Potential for contaminants from burials performed on site to migrate off-site.

Conclusions
Based on a review of the Site history, geology, hydrology and hydrogeology, the Site is considered to represent a low environmental risk with respect to ground contamination and controlled waters. Nevertheless the use of the site as a cemetery does have the potential to adversely impact the controlled waters identified beneath the site. Consequently further works are considered necessary to understand the site specific geology and better quantify the potential risk arising from the proposed use.

Recommendations

- In line with Environment Agency Guidance, a Tier 2 Assessment (a Generic Quantitative Risk Assessment) should be undertaken. This would include an intrusive Site Investigation in order to test the Conceptual Site Model and to establish the nature of ground conditions underlying the Site. Works should also include an assessment of the contamination status of soils, the leaching potential and soil vulnerability based on physical properties affecting the downward migration of water and the ability of the soil to attenuate, depth to the water table and groundwater flow mechanism;
- Using the results of intrusive Site Investigation to prepare a Generic Environmental Risk Assessment to assess the risk and characterise the ground conditions; and
- Future Site workers should wear appropriate PPE and RPE and adopt appropriate standard hygiene practices.
1. Introduction

1.1 Objectives

Waterman Energy, Environment & Design Limited ("Waterman") was instructed by Crawley Borough Council to undertake a Preliminary Environmental Risk Assessment for ground contamination for the proposed redevelopment of Pease Pottage into a Cemetery (hereafter termed "the Site").

1.2 Regulatory Context

The Site is currently undeveloped greenfield and it is proposed to redevelop the Site for use as a cemetery.

The National Planning Policy Framework (NPPF) sets out Government planning policy for England and how this is expected to be applied to development. Paragraphs 120 to 122 of Section 11 – Conserving and enhancing the natural environment of the NPPF relate to contaminated land matters and state the following:

“To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Planning policies and decisions should ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;
- after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and
- Adequate site investigation information, prepared by a competent person, is presented.

In doing so, local planning authorities should focus on whether the development itself is an acceptable use of the land and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

In order to assess the contamination status of the Site, with respect to the proposed end use, it is necessary to assess whether the Site could potentially be classified as “Contaminated Land”, as defined in Part IIA of the Environmental Protection Act 1990 and Contaminated Land Statutory Guidance 2012. This is assessed by the identification and assessment of potential pollutant linkages. The linkage between the potential sources and potential receptors identified needs to be established and evaluated.

To fall within this definition, it is necessary that, as a result of the condition of the land, substances may be present in, on or under the land such that:

a) significant harm is being caused or there is a significant possibility of such harm being caused; or
b) significant pollution of controlled waters is being caused, or there is significant possibility of such pollution being caused.
It should be noted that DEFRA has advised (Ref. Section 4, DEFRA Contaminated Land Statutory Guidance 2012) Local Authorities that land should not be designated as “Contaminated Land” where:

a) the relevant substance(s) are already present in controlled waters;

b) entry into controlled waters of the substance(s) from land has ceased; and

c) it is not likely that that further entry will take place.

These exclusions do not necessarily preclude regulatory action under the Environmental Permitting (England and Wales) Regulations 2010, which make it a criminal offence to cause or knowingly permit a water discharge of any poisonous, noxious or polluting matter to controlled waters. In England and Wales, under The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, a works notice may be served by the regulator requiring appropriate investigation and clean-up.

Construction of cemeteries is subject to the provisions of the Cemeteries Clauses Act 1847 and the Land Clauses Consolidation Act 1845. Where by the special Act the company shall be empowered for the purpose of making the cemetery, to take or use any land otherwise than with the consent of the owners and occupiers thereof, they shall, in exercising the power so given to them, be subject to the provisions and restrictions contained in this Act and the Lands Clauses Consolidation Act 1845 and shall make to the owners and occupiers of and all other parties interested in any lands taken or used for the purpose of the special Act, or injuriously affected by the construction of the works thereby authorized, full compensation for the value of the lands so taken or used, and for all damage sustained by such owners, occupiers, or other parties, by reason of the exercise, as regards such lands, of the powers vested in the company by this or the special Act, or any Act incorporated therewith; and, except where otherwise provided by this or the special Act, the amount of such compensation shall be determined in the manner provided by the Lands Clauses Consolidation Act 1845, for determining questions of compensation with regard to lands purchased or taken under the provisions thereof, and all the provisions of the last-mentioned Act shall be applicable to determine the amount of such compensation, and to enforce payment or other satisfaction thereof.

Local authorities have a responsibility for control of new cemeteries through the planning process. The Environment Agency (the Agency) has new powers under the Groundwater Regulations 1998 to take action where groundwater pollution occurs, or is likely to occur.

To address these problems, and so that regulatory decision making can be based on sound scientific knowledge, a study of existing information was commissioned by the Environment Agency to:

- review published studies relating to the potential environmental threat posed by cemeteries;
- identify and quantify the risks of pollution, where possible, by reference to published cases;
- review our current approaches to assessing proposals for extending cemeteries or developing new ones;
- provide guidance on assessing the relative importance of the factors that require consideration in terms of the potential impact of a cemetery on groundwater.

The output of this study, R&D Technical Report P2231, forms the basis of the risk-assessment framework for the issues raised.

This assessment is in accordance with a Tier 1 risk screening assessment as outlined in the R&D Technical Report P2231, named Assessing the Groundwater Pollution Potential of Cemetery Developments. Under this assessment, the vulnerability of potential receptors must be determined. The guidance considers the principal receptor to be groundwater and the factors that impact it as:

- soil nature and type, including structure, leaching potential and soil vulnerability based on physical properties affecting the downward migration of water and the ability of the soil to attenuate;
• presence and nature of drift, including type and thickness;
• depth to the water table, as unsaturated zone can attenuate contamination by physical, biological and chemical processes;
• groundwater flow mechanism (intergranular or fissured);
• groundwater vulnerability and aquifer type;
• abstractions;
• groundwater SPZs; and
• proximity of watercourses, springs and drains.

1.3 Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Crawley Borough Council, as documented in Waterman’s correspondence and associated fee table dated 14th April 2014 and in accordance with the agreed terms of appointment with Crawley Borough Council.

The benefit of this report is made to Crawley Borough Council.

The information contained in this report is based on a review of available historical, geological and hydrogeological sources, consultation with the regulatory authorities and observations made on Site on 11th April 2014.

Waterman has endeavoured to assess all information provided to them during this investigation, but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this investigation does not include an assessment for the presence of asbestos containing materials within or below buildings or in the ground at the Site.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the Site.
2. Methodology

This Preliminary Environmental Risk Assessment has been undertaken in general accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11 – Environment Agency, September 2004).

The report includes the following:
- collation of available documentary information;
- site reconnaissance;
- hazard identification and assessment;
- formulation of a Conceptual Model for the Site;
- identification of potentially unacceptable risks; and
- recommendations for further action.
3. Site Setting

3.1 Description and Reconnaissance

The Site is located at National Grid Reference 525600, 133590 on Buchan Hill, in Pease Pottage, Crawley.

Figure 1: Current Site Layout

Source: Landmark 2014

The Site comprises Pease Pottage Camp Site which consists of a large area of grass surrounded by woodland. There are two buildings located at the Site in the southeastern corner, which are understood to be used for scout activities. Furthermore, two brooks were noted running along the eastern and western boundary of the Site.

According to the Landmark EnviroCheck report, there are no licences or consents registered to the property.

A site location plan and site layout plan are presented as Appendix D. A selection of photographs taken during the site inspection is presented as Appendix B.

3.1.1 Site Surroundings

A summary of the current surrounding land uses, including relevant licences and consents, is shown in Table 1.

Table 1: Summary of surrounding land uses

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>The A264 is located to the immediate north, with residential properties beyond.</td>
</tr>
<tr>
<td>East</td>
<td>The M23 is located to the immediate east of the Site.</td>
</tr>
</tbody>
</table>
There are two contemporary trade directory entries within a 500m radius of the Site, the closest of which pertains to a carpet, curtain and upholstery cleaners located 115m east.

South  Cottesmore Hotel, Golf and Country Club is noted to the immediate south of the Site.

West  Stanford Scout Camp site is located to the immediate west of the Site with recreational facilities and a hotel as part Cottesmore Hotel, Golf and Country Club located beyond.

There are no recorded active Environmental Permits relating to former Local Authority Pollution Prevention and Control (LAPPC), Integrated Pollution Prevention and Control (IPPC) Permits or Radioactive Substances Consents within 500m of the Site. There is also no Notification of Installations Handling Hazardous Substances (NIHHS) sites or Control of Major Accident Hazard (COMAH) sites within 500m of the Site.

In addition, there are no recorded waste management facilities or landfills within 500m of the Site.

3.2 History

Figure 2: Historical Site Use

Source: Landmark 2014

A review of historical maps obtained from Landmark Information Group Historical Maps has been undertaken, and a summary of relevant information is shown in chronological order in Table 2.

<table>
<thead>
<tr>
<th>Source</th>
<th>Site a</th>
<th>Surroundings a</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS Map 1:10,560</td>
<td>The Site appears to have been, in the</td>
<td>The surroundings are occupied by Pease Pottage</td>
</tr>
</tbody>
</table>
3.2.1 Previous Environmental Assessments

No previous environmental assessments have been provided for the site.

3.3 Geology

The geology beneath the site has been established from the British Geological Survey (BGS) 1: 50,000 scale Geological Map, Sheet 302 (Horsham), Solid and Drift Edition. A summary of the geology is provided in Table 3 below:

Table 3: Site geology

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Area Covered</th>
<th>Estimated Thickness</th>
<th>Typical Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Tunbridge Wells Formation - Mudstone</td>
<td>Partial areas of the Site.</td>
<td>Up to 100m</td>
<td>Thinly bedded silty mudstones and siltstones are laterally persistent over long distances.</td>
</tr>
<tr>
<td>Upper Tunbridge Wells Formation - Mudstone &amp; Sandstone</td>
<td>Partial areas of the Site.</td>
<td>Up to 100m</td>
<td>Thinly bedded silty mudstones, siltstones, silty sandstones and fine-grained sandstones are laterally persistent over long distances. Sandstones, which form prominent scarp and dip slope features, are typically fine-grained and quartzose, weathering to a pale yellowish grey or brown colour.</td>
</tr>
</tbody>
</table>

The Upper Tunbridge Wells Formation comprises mudstone and sandstone, which is varied across the Site.

3.3.1 Ground Stability

The BGS map does not reveal any structural, geomorphological or geochemical features on or near to the Site. A fault is identified as passing 750m north of the Site.

The Site is not in an area that could be affected by coal mining activity.
3.3.2 Ground Gas

The Site is located within a lower probability radon area where less than 1% of homes are above the radon action level. As such, radon protection measures are not required in the construction of new homes or buildings. A 2010 update to the guidance issued by the Health Protection Agency has reduced the threshold within which properties are considered at risk. As such, the Building Control Department at the Local Authority should be consulted in the event of future building works or extensions.

There are no registered landfills within 500m of the subject Site, which may be a source of both off-site contamination and ground gas. A review of the historical maps identified potentially infilled pits in the surrounding area. Given the age of infill (1910s), the potential for significant ground gas generation is considered to be low.

3.4 Controlled Waters

3.4.1 Surface Waters

There are two water features present on the Site, pertaining to two unnamed tributaries of Broadfield Brook. One of the tributaries runs through the eastern boundary of the Site, whilst the other runs through the western boundary of the site. In addition, Creasy's Brook is located 250m west of the Site.

According to data from the General Quality Assessment scheme, the EA has not classified the water surface water bodies in accordance with the GQA scheme. There are five recorded Environmental Permits pertaining to surface water discharge consents within a 1km radius of the site, the closest of which is located 100m east of the Site. This is registered to Mr and Mrs Etherington for sewage discharges to the tributary of Broadfield Brook, located 100m east of the Site.

There are no recorded surface water abstractions within a 1km radius of the site.

Overall, therefore, data suggests that nearby surface water quality is likely to be of average quality.

According to the EA’s indicative flooding data, the Site is not located in an area of fluvial flooding/on a flood plain. There are no recorded flood defences in the area.

3.4.2 Groundwaters

According to the EA Groundwater Vulnerability Map, (Sheet 46, East Sussex), the geological deposits underlying the Site are classified as per Table 7 below:

<table>
<thead>
<tr>
<th>Stratum</th>
<th>EA Classification</th>
<th>Hydrogeological Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Tunbridge Wells Formation - Mudstone</td>
<td>Unproductive Strata</td>
<td>Contains insignificant quantities of vertically or laterally extensive groundwater.</td>
</tr>
<tr>
<td>Upper Tunbridge Wells Formation - Mudstone &amp;</td>
<td>Secondary A Aquifer</td>
<td>May be important in supporting local abstractions or in providing baseflow to rivers and streams.</td>
</tr>
<tr>
<td>Sandstone</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Site is not located within a groundwater Source Protection Zone.

Based on available information, it is likely that groundwater flow will be in a northeastern direction, in continuity with Broadfield Brook.

There are no recorded groundwater abstractions within a 500m radius of the site. In addition, there is one recorded Environmental Permit within a 500m radius, pertaining to sewage discharges into land via a soakaway and located 100m east of the Site.
There is one recorded pollution incident to controlled waters within a 500m radius of the Site. This incident occurred on Site in 1993, whereby a natural pollutant entered an unknown receptor resulting in a Category 3 incident (‘Minor’).

Overall, therefore, data suggests that underlying groundwater quality is likely to be of good quality.

### 3.5 Consultations

The agencies and individuals which have been contacted and/or their records reviewed during the course of this study are listed in Table 5.

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Consultee</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crawley Borough Council</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Health</td>
<td>Kelvin North</td>
<td>Pending</td>
</tr>
<tr>
<td>Planning</td>
<td>Online</td>
<td>Written</td>
</tr>
<tr>
<td>Building Control</td>
<td>TBC</td>
<td>Pending</td>
</tr>
</tbody>
</table>

#### 3.5.1 Environmental Health

Information has been requested from the Environmental Health Officer (EHO) but a response is currently pending.

#### 3.5.2 Planning Department

A review of the online planning register at Crawley Borough Council does not indicate the presence of any major planning applications pertaining to the Site.

#### 3.5.3 Building Control Department

Information has been requested from Building Control Department. A response is currently pending.
4. Conceptual Model

The Conceptual Model for the Site is presented in Table 9 below. The risk rating included in Table 9 has been assessed qualitatively using the criteria given in Appendix D.

Table 6: Conceptual model for the Site

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Potential Sources</th>
<th>Pathways</th>
<th>Risk</th>
<th>Justification / Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Site Users</td>
<td>Potential contaminants present soils on-Site</td>
<td>Direct contact, ingestion and inhalation.</td>
<td>Low</td>
<td>The Site has never been developed in its history and no potential contaminative land uses have been identified.</td>
</tr>
<tr>
<td>Future Site Users</td>
<td>Ground gas from human remains</td>
<td>Migration through granular deposits and accumulation in internal spaces, inhalation and risk of explosion.</td>
<td>Low to Medium</td>
<td>The Site is intended to be changed in use into a cemetery. Ground gas has the potential to build up in confined spaces and any overlying buildings. However the quantum, depth and duration of the burials proposed would have a significant effect on the potential generation volumes. Additional evaluation will be needed once this information is available from Crawley Borough Council.</td>
</tr>
<tr>
<td>Off-site residents/users</td>
<td>Potential contamination migration.</td>
<td>Migration off-site and direct contact, ingestion and inhalation.</td>
<td>Low</td>
<td>No potential contaminative land uses have been identified as having been present on Site.</td>
</tr>
<tr>
<td>Future Off-site Residents/Users</td>
<td>Contaminants relating to the proposed use as a Cemetery</td>
<td>Migration off-site and direct contact, ingestion and inhalation.</td>
<td>Low</td>
<td>The Site is proposed to be changed in use into a Cemetery. Contaminants from a burial site may migrate into the soil zone surrounding the burial and/or into any underlying aquifers. However, Off-site residents/users are unlikely to come into contact with contamination as there are no drinking water abstractions within a 2km radius of the Site.</td>
</tr>
<tr>
<td></td>
<td>Ground gas relating to the proposed use as a Cemetery</td>
<td>Migration through granular deposits and accumulation in internal spaces, inhalation and risk of explosion.</td>
<td>Medium</td>
<td>The Site is intended to be changed in use into a cemetery. Ground gas has the potential to build up in confined spaces and any overlying buildings. However the quantum, depth and duration of the burials proposed would have a significant effect on the potential generation volumes. Additional evaluation will be needed once this information is available from Crawley Borough Council.</td>
</tr>
<tr>
<td>Receptor</td>
<td>Potential Sources</td>
<td>Pathways</td>
<td>Risk</td>
<td>Justification / Mitigation</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Off-Site Structures</td>
<td>Contaminants relating to the proposed use as a Cemetery</td>
<td>Direct contact and/or leaching and migration</td>
<td>Low</td>
<td>The potential for the vertical and lateral migration of contaminants to impact existing building foundations and services in the surrounding area is considered to be unlikely given the nature of contaminants and distance of existing structures from the site.</td>
</tr>
<tr>
<td></td>
<td>Ground gas relating to the proposed use as a Cemetery</td>
<td>Direct Contact</td>
<td>Medium</td>
<td>The Site is intended to be changed in use into a cemetery. Ground gas has the potential to build up in confined spaces and any overlying buildings. However the quantum, depth and duration of the burials proposed would have a significant effect on the potential generation volumes. Additional evaluation will be needed once this information is available from Crawley Borough Council.</td>
</tr>
<tr>
<td>Controlled Waters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tributaries of the</td>
<td>Contaminants relating to the proposed use as a Cemetery</td>
<td>Vertical and lateral migration.</td>
<td>High</td>
<td>Under EA guidance, there should be a minimum distance of 30m from any watercourses. The intrusive investigation should confirm the presence of a groundwater body present beneath the Site and, if so, whether this is in hydraulic continuity with the Tributaries of the Broadfield Brook running through the Site. The presence of mudstone across the Site may afford the Broadfield Brook protection against the lateral migration of contaminants from burials.</td>
</tr>
<tr>
<td>Broadfield Brook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper Tunbridge Wells</td>
<td>Contaminants relating to the proposed use as a Cemetery</td>
<td>Vertical migration.</td>
<td>High</td>
<td>The Site is not located in a Groundwater Source Protection Zone. The intrusive investigation will confirm the hydrogeological site conditions and presence or absence of groundwater. Where a groundwater body is present, there is the potential for contaminants, arising from burials, to impact groundwater via vertical migration.</td>
</tr>
<tr>
<td>Creasy’s Brook located</td>
<td>Contaminants relating to the proposed use as a Cemetery</td>
<td>Vertical and lateral migration.</td>
<td>Low</td>
<td>Under EA guidance, there should be a minimum distance of 30m from any watercourses. Given the distance away from the Site, the potential for lateral migration of contaminants via groundwater flow towards Creasy’s Brook is considered to be low.</td>
</tr>
<tr>
<td>250m west of the Site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Conclusions

Based on a review of the Site history, geology, hydrology and hydrogeology, the Site is considered to represent a low environmental risk with respect to ground contamination and controlled waters. Nevertheless the use of the site as a cemetery does have the potential to adversely impact the controlled waters identified beneath the site. Consequently further works are considered necessary to understand the site specific geology and better quantify the potential risk arising from the proposed use.

In line with the Tier 1 risk screening assessment, the following potential pollutant linkages have been identified for the Site:

- Workers (gravediggers) may come into direct contact with potentially contaminated shallow soils as a result of burials performed on site;
- Migration of contaminants from burials performed on site entering the onsite water features;
- Potential ground gas ingress from burials performed on site; and
- Potential for contaminants from burials performed on site to migrate off-site.
6. Recommendations

The following actions are recommended to address the potentially unacceptable risks identified and may reduce the overall risk rating for the Site.

- In line with Environment Agency Guidance, a Tier 2 Assessment (a Generic Quantitative Risk Assessment) should be undertaken. This would include an intrusive Site Investigation in order to test the Conceptual Site Model and to establish the nature of ground conditions underlying the Site. Works should also include an assessment of the contamination status of soils, the leaching potential and soil vulnerability based on physical properties affecting the downward migration of water and the ability of the soil to attenuate, depth to the water table and groundwater flow mechanism;
- Using the results of intrusive Site Investigation to prepare a Generic Environmental Risk Assessment to assess the risk and characterise the ground conditions; and
- Future Site workers should wear appropriate PPE and RPE and adopt appropriate standard hygiene practices.

The objectives for the above proposed investigation would be to satisfy the EA guidance and demonstrate that no impact to groundwater would occur or, at worst, that the impact would not amount to pollution as defined in the Groundwater Directive. If the risk is deemed to be high or is still not clearly defined from the Tier 2 assessment, a Tier 3 assessment will be required. In cases where there seems to be a high risk of pollution to groundwater, more detailed site investigation, risk assessment and monitoring may be necessary. The use of groundwater modelling techniques or other stochastic models may be required.
## Glossary

For the purpose of this report, the following terms and definitions apply (see BS 10175:2001).

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<td>Accuracy</td>
<td>Level of agreement between true value and observed value.</td>
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| Conceptual Exposure model | Textual and or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information from the preliminary investigation and refined during subsequent phases of investigation and which is an essential part of the risk assessment process.  
   **Note 1:** The conceptual exposure model is initially derived from the information obtained by the preliminary investigation.  This conceptual model is used to focus subsequent investigations, where these are considered to be necessary, in order to meet the objectives of the investigations and the risk assessment. The results of the field investigation can provide additional data that can be used to further refine the conceptual model. |
| Contamination         | Presence of a substance which is in, on or under land, and which has the potential to cause significant harm or to cause significant pollution of controlled water.  
   **Note 1:** There is no assumption in this definition that harm results from the presence of the contamination.  
   **Note 2:** Naturally enhanced concentrations of harmful substances can fall within this definition of contamination.  
   **Note 3:** Contamination may relate to soils, groundwater or ground gas. |
| Controlled water      | Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters.  
   **Note 1:** See Section 104 of The Water Resources Act 1991. |
| Harm                 | Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case humans, including property. |
| Hazard               | Inherently dangerous quality of a substance, procedure or event.                                                                                                                                              |
| Pathway              | Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.                                                                                                                                                                      |
| Precision            | Level of agreement within a series of measurements of a parameter.                                                                                                                                              |
| Receptor             | Persons, living organisms, ecological systems, controlled water, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).                                                                 |
| Risk                 | Probability of the occurrence, magnitude and consequences of an unwanted adverse effect on a receptor.                                                                                                                                                                   |
| Risk assessment      | Process of establishing, to the extent possible, the existence, nature and significance of risk.                                                                                                                                                                         |
| Sampling             | Methods and techniques used to obtain a representative sample of the material under investigation.                                                                                                               |
| Soil                 | Upper layer of the earth's crust composed of mineral parts, organic substance, water, air and living matter.                                                                                                                                                              |
| **Note 1:** In accordance with BS 10175:2001 the term soil has the meaning ascribed to it through general use in civil engineering and includes topsoil and subsoil; deposits such as clays, silt, sand, gravel, cobbles, boulders and organic deposits such as peat; and material of natural or human origin (e.g. fills and deposited wastes). The term embraces all components of soil, including mineral matter, organic matter, soil gas and moisture, and living organisms. |
| Source               | Location from which contamination is, or was, derived.                                                                                                                                                           |
| **Note 1:** This could be the location of the highest soil or groundwater concentration of the contaminant(s).                                                                                                       |
| Uncertainty          | Parameter, associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement.                                                     |