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## APPENDIX 04

### Risk Assessment Methodology

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## Appendix: Qualitative Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptor may be human health, a water resource, a sensitive local ecosystem or even future construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g. the pathway of direct contact). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks. The following risk assessment thus focuses on those parts of the site where hazards or potential hazards have been identified and is not general to the whole site.

### Hazards

Potential sources of contamination are identified for the site, based on a review of the current and previous site uses. Not only the nature but also the likely extent of any contamination is considered, e.g. whether such contamination is likely to be localised or widespread.

### Receptors

The varying effects of a hazard on individual receptors depends largely on the sensitivity of the target. Receptors include any people, animal or plant population, or natural or economic resources within the range of the source which are connected to the source by the transport pathway. Receptors can, in addition, extend to remediation processes and future construction materials that may be adversely affected by on-site contamination. In general, however, receptors can be divided into a number of groups depending on the final use of the site.

### Pathways

The mere presence of contamination does not infer a risk. The exposure pathway determines the dose delivered to the receptor and the effective dose determines the extent of the adverse effect on the receptor. The pathway which transports the contaminants to the receptor or target generally involves conveyance via soil, water or air.

### Exposure Assessment

By considering the source, pathway and receptor, an assessment is made for each contaminant on a receptor by receptor basis with reference to the significance and degree of the risk. In assessing this information, a measure is made of whether the source contamination can reach a receptor, determining whether it is of a major or minor significance. The exposure risks are assessed against the present site conditions.

A preliminary risk assessment has been undertaken for these potential source-pathway-receptor linkages to identify potentially unacceptable risks on a qualitative basis. This approach is based on DEFRA and CIRIA guidance on risk assessment and Model Procedures. Risk is based on a consideration of both:

- The likelihood of an event (probability); [takes into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [takes into account both the potential severity of the hazard and the sensitivity of the receptor].

In order to then determine the risk to the identified receptor, both the likelihood and severity of the potential hazard is input into a risk assessment matrix as follows:

		Consequence			
		Severe	Medium	Mild	Minor/Negligible
Probability (Likelihood)	High Likelihood	Very high risk	High risk	Moderate risk	Moderate/Low risk
	Likely	High risk	Moderate risk	Moderate/Low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/Low risk	Low risk	Negligible risk
	Unlikely	Moderate/Low risk	Low risk	Negligible risk	Negligible risk

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as follows:

Term	Description
Very high risk	Severe harm to a receptor may already be occurring OR a high likelihood that severe harm will arise to a receptor, unless immediate remedial action works / mitigation measures are undertaken.
High risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short term, but likely to be required over the long term.
Moderate risk	Possible that harm could arise to a receptor but low likelihood that such a harm would be severe. Harm is likely to be medium. Some remedial works may be required in the long term.
Moderate / low risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as medium. It can be driven by cases where there is an acute risk which carries a severe consequence, but where the exposure is unlikely.
Low risk	Possible that harm could arise to a receptor. Such harm would at worst normally be mild.
Negligible risk	Low likelihood that harm could arise to a receptor. Such harm unlikely to be any worse than mild.

The colour coding for each risk category is used in the risk assessment summary table.

## Classification of Consequences

Classification	Definition
Severe	<ul style="list-style-type: none"> <li>■ Acute risks to human health</li> <li>■ Short-term risk of pollution of sensitive water resource (e.g. major spillage into controlled waters)</li> <li>■ Impact on controlled waters e.g. large scale pollution or very high levels of contamination</li> <li>■ Catastrophic damage to buildings or property (e.g. explosion causing building collapse)</li> <li>■ Ecological system effects – irreversible adverse changes to a protected location. Immediate risks.</li> </ul>
Medium	<ul style="list-style-type: none"> <li>■ Chronic risks to human health</li> </ul>

Classification	Definition
	<ul style="list-style-type: none"> <li>■ Pollution of sensitive water resources (e.g. leaching of contaminants into controlled waters)</li> <li>■ Ecological system effects – substantial adverse changes to a protected location.</li> <li>■ Significant damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage)</li> </ul>
Mild	<ul style="list-style-type: none"> <li>■ Non-permanent health effects to human health</li> <li>■ Pollution of non-sensitive water resources (e.g. pollution of non-classified groundwater)</li> <li>■ Damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage)</li> <li>■ Substantial damage to non-sensitive environments (unprotected ecosystems e.g. crops)</li> </ul>
Minor/Negligible	<ul style="list-style-type: none"> <li>■ Non-permanent health effects to human health (easily prevented by appropriate use of PPE)</li> <li>■ Minor pollution to non-sensitive water resources</li> <li>■ Minor damage to non-sensitive environments (unprotected ecosystems e.g. crops)</li> <li>■ Easily repairable effects of damage to buildings, structures, services or the environment (e.g. discoloration of concrete, loss of plants in a landscaping scene).</li> </ul>

## Classification of Likelihood

Classification	Definition
High Likelihood	An event is very likely to occur in the short term, and is almost inevitable over the long term OR there is evidence at the receptor of harm or pollution
Likely	It is probably that an event will occur. It is not inevitable, but possible in the short term and likely over the long term
Low Likelihood	Circumstances are possible under which an event could occur. It is by no means certain that even over a longer period such an event would take place, and less likely in the short term
Unlikely	It is improbable that an event would occur even in the very long term

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