

## Appendix H: Assessment of Plausible Contaminant Linkages

### Qualitative Risk Assessment of Land Potentially Affected by Contamination

Plausible Contaminant Linkages Assuming Future Development							
No.	Source	Pathway	Receptor	Consequence	Probability	Risk	Justification
<b>Hazards to Human Health</b>							
1	Non-volatile contamination in soils	Direct contact / ingestion	Future site users	Medium	Likely	Low Risk	Hardcover restricts contaminant linkage, Risks to be mitigated through design
2	Volatile contamination in soils	Inhalation	Future site users	Medium	Likely	Moderate Risk	Risks to be mitigated through design
3	Contamination in soils	Direct contact / ingestion/ Inhalation	Maintenance works	Medium	Likely	Moderate Risk	Residual risks. Risks to be mitigated through design
4	Ground gas	Inhalation / asphyxiation	Future site users	Severe	Likely	High Risk	Risks to be mitigated through design/remediation
5	Ground Gas	Explosion	Future site users	Severe	Unlikely	Moderate/Low Risk	Risks to be mitigated through design
6	Ground gas	Inhalation / asphyxiation / explosion	Maintenance works	Severe	Low Likelihood	Moderate Risk	Risks to be mitigated through design/remediation
<b>Hazards to the Water Environment</b>							
7	Contamination in soils	Leachable contamination	Secondary Aquifer	Mild	Likely	Moderate/Low Risk	Risks to be mitigated through remediation
8	Groundwater contamination	Aquifer	Secondary Aquifer	Medium	Likely	Moderate Risk	Risks to be mitigated through remediation
9	Groundwater contamination	Aquifer	Surface water	Medium	Low Likelihood	Moderate/Low Risk	Risks to be mitigated through remediation
<b>Hazards to Flora and Fauna</b>							
10	Contamination in Soils	Plant uptake	Plants and soft landscaping	Minor	Low Likelihood	Very Low Risk	No plausible contaminant linkage
11	Ground gas / low oxygen	Plant uptake	Plants and soft landscaping	Minor	Low Likelihood	Very Low Risk	No plausible contaminant linkage

Hazards to Building Structure and Services							
12	Contamination in soils	Direct contact with subsurface	Buried concrete	Mild	Likely	Moderate/Low Risk	Risks to be mitigated through design/remediation
13	Contamination in soils	Direct contact with subsurface	Plastic water supply pipes	Mild	Likely	Moderate/Low Risk	Risks to be mitigated through design/remediation
14	Ground gas	Explosion	Building structure	Severe	Low Likelihood	Moderate Risk	Risks to be mitigated through design/remediation

Notes:

In preparing the tables the following assumptions have been made:

1. The proposed development comprises commercial or industrial use with hardcover
2. The final foundation design is not confirmed and may be influenced by a need to ensure no preferential pathways are created between any potential sources of contamination and underlying natural strata.
3. Risks to construction workers, members of the public and the environment during the construction stage will be mitigated through the use of best industry practice and the adoption of appropriate health and safety precautions including the use of PPE.

### Classification of Consequence

The classifications of consequence (severity) are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). AECOM has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance (Appendix G).

Classification	Definition
Severe	<p>Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs.</p> <p>Equivalent to EA Category 1 pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce.</p> <p>Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population.</p> <p>Catastrophic damage to crops, buildings or property.</p>
Medium	<p>Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs.</p> <p>Equivalent to EA Category 2 pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce.</p> <p>Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population.</p> <p>Significant damage to crops, buildings or property.</p>
Mild	Exposure to human health unlikely to lead to "significant harm".

Classification	Definition
	<p>Equivalent to EA Category 3 pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce.</p> <p>Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.</p> <p>Minor damage to crops, buildings or property.</p>
Minor	<p>No measurable effect on humans.</p> <p>Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems.</p> <p>Repairable effects of damage to buildings, structure and services.</p>

#### Classification of Probability

The classifications of probability are taken from R&D Publication 66 (NHBC and Environment Agency, 2008). AECOM has chosen to apply the classifications to a broad range of development scenarios.

It should be noted that the categories of pollution incident have no relation to the categories of significant possibility of significant harm to human health or significant possibility of significant pollution of controlled waters in respect of the Part 2A Statutory Guidance (Appendix G). Also, in the Part 2A Statutory Guidance “pollutant linkage” is now termed “contaminant linkage”, although it is noted that the terms are effectively synonymous.

Category	Definition
High Likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.
Low likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.

#### Categorisation of Risk

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

### Description of Risk Levels and Likely Action Required

Term	Description
Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remediation action <u>or</u> there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action. Realisation of the risk is likely to present a substantial liability to the site owner or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.
Moderate risk	It is possible that without appropriate remediation action, harm would arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from identified hazard. It is likely that, at worst, if any harm was realised any effects would be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.
Very low risk	It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that this harm if realised would normally be mild or minor.
No potential risk	There is no potential risk if no pollutant linkage has been established.

### Summary of Definitions

Term	Description
Hazard	A property or situation which in certain circumstances could lead to harm. (The properties of different hazards must be assessed in relation to their potential to affect the various different receptors).
Consequences	The adverse effects (or harm) arising from a defined hazard which impairs the quality of the environment or human health in the short or longer term.
Probability	The mathematical expression of the chance of a particular event in a given period of time (e.g. probability of 0.2 is equivalent to 20% or a 1 in 5 chance).
Likelihood	Probability; the state of face of being likely.
Risk	A combination of the probability or frequency of the occurrences of a defined hazard AND the magnitude of the consequences of that occurrence.
Contaminant linkage	An identified pathway is capable of exposing a receptor to a contaminant and that contaminant is capable of harming the receptor. In the Part 2A Statutory Guidance the terms "contaminant", "pollutant" and "substance" have the same meaning, and some non-statutory technical guidance relevant to land contamination uses alternative terms such as "pollutant", "substance" and associated terms in effect to mean the same thing.

