D. Contaminated Land Risk Assessment Methodology

The following classification published by the NHBC, EA and CIEH (2008) has been used to summarise contamination risks in this report. The methodology differs from that presented in *Contaminated Land Risk Assessment, A Guide to Good Practice* (CIRIA C552, 2001), particularly in terms of the definitions of classification of consequence, which include a consideration of immediacy of hazards.
The key to the classification is that the designation of risk is based upon the consideration of both:

1. **the magnitude of the potential consequence (i.e. severity).**
   [takes into account both the potential severity of the hazard and the sensitivity of the receptor]
2. **the magnitude of probability (i.e. likelihood).**
   [takes into account both the presence of the hazard and receptor and the integrity of the pathway]

The potential consequences of contamination risks occurring at this Site are classified in accordance with Table D.1 below:

Table D.1: Classification of consequence

Classification	Definition
Severe	Highly elevated concentrations likely to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. 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. 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. Catastrophic damage to crops, buildings or property.
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. 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. 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. Significant damage to crops, buildings or property.
Mild	Exposure to human health unlikely to lead to "significant harm". Equivalent to EA Category 3 pollution incident including minimal or short-lived effect on water quality; marginal effect on amenity value, agriculture or commerce. 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. Minor damage to crops, buildings or property.
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.

Source: EA, CIEH, NHBC, R&D66:2008

The probability of contamination risks occurring at this site will be classified in accordance with Table D.2 below. Note: A pollution linkage must first be established before probability is classified. If there is no pollution linkage then there is no potential risk. If there is no pollution linkage then there is no need to apply tests for probability and consequence.

Table D.2: Classification of probability

Classification	Definition
High likelihood	There is a pollutant linkage and an event that either appears very likely in the short term or almost inevitable over the longer term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage and all elements are present and in the right place which means 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 a pollutant linkage and circumstances are possible under which an event would occur. However, it is by no means certain that even over a longer period such event would take place, and it is less likely in the shorter term.
Unlikely	There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur even in the very long-term.

Source: R&D66:2008 Table A4.4

For each possible pollution linkage (source-pathway-receptor) identified, the potential risk can be evaluated based upon the following probability x consequence matrix shown in Table D.3 below.

Table D.3: Qualitative contamination risk matrix

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**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

Source: R&D66:2008 (Table A4.5).

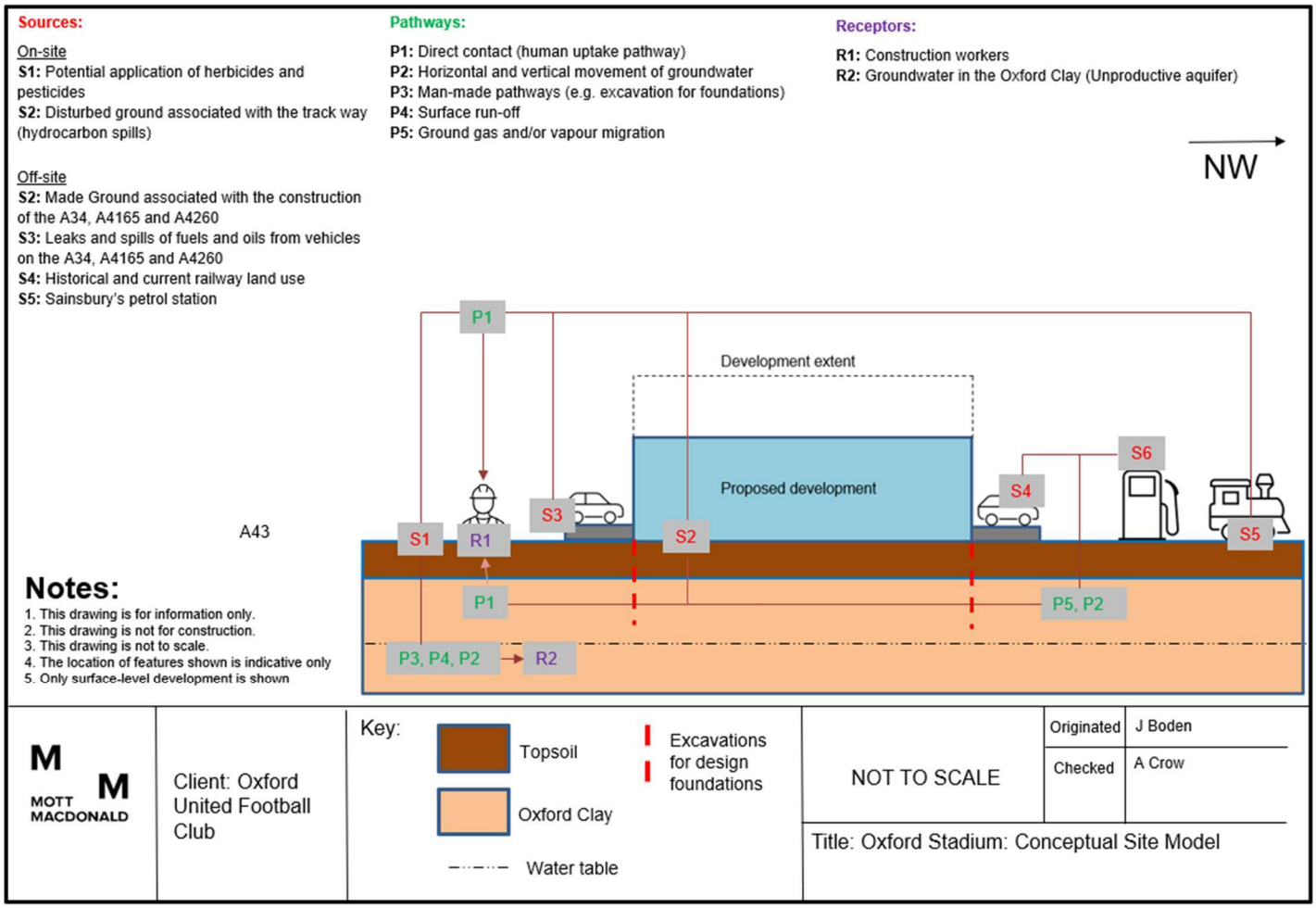
R&D66:2008 presents description of these risk categories, together with the investigatory and remedial actions that are likely to be necessary in each case. These definitions are reproduced in Table D.4.

Table D.4: Definition of risk categories and likely actions 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 remediation action OR 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 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 harm could arise to a designated receptor from an identified hazard. However, it is either 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, but it is likely at worst, that this harm if realised would normally 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 pollution linkage has been established.

Source: CIRIA C552, January 2001.

E. Conceptual site model, graphical representation



F. Report author qualifications and LCRM checklist

F.1 Report author professional qualifications

Initials	Role	Job title	Academic and professional affiliations/qualifications
SK	Originator	Graduate Geotechnical Engineer	MEng, GMICE
JB	Originator	Graduate Contaminated Land Consultant	BSc, MSc
MW	Checker	Associate Engineering Geologist	MSCi, FGS
AC	Checker	Principal Hydrogeologist	BSc, MSc, FGS, CGEOL
MG	Approver	Technical Principal	

F.2 Reporting checklist

The following checklist has been generated from the guidance given in the LCRM on the report requirements for the Desk Study.

Item	Relevant section of this report
Site ownership and current status	Section 1
Location, national grid reference	Section 2
Size of the site – include any plans and maps	Section 2
History and general description of the site	Section 2
Potential for unexploded ordnance	Section 2
Contact details of relevant organisations	Document cover page
Pollution incidents, spills, accidents or regulatory actions	Section 2
Current or past permits, licences or authorisations	Section 2
Proposed future changes to land use, such as planning applications	Section 2
Previous investigations or remediation	None available to review
Chemical or biological information from for example, previous site monitoring reports	None available to review
Natural background contamination information, such as for radon gas, if available	Section 2
Audit reports that may have been done	None available for review
Location of historical landfill sites	Section 2
Details of any reviews of coal or other mining related contamination hazards – current or historic	Section 2
Presence or proximity of sensitive ecological receptors such as Special Protection Areas – to find out, you can use Natural England's MagicMap	Section 2
Location of any protected areas of countryside	None to review

Item	Relevant section of this report
Presence of any archaeological or heritage sites such as scheduled ancient monuments	Section 2
Details on other specific Part 2A receptors such as property in the form of crops, livestock, buildings	None available to review
Presence of made ground, drift deposits, bedrock	Section 3
Geological features such as faults	Section 2
Presence of groundwater aquifers – unconfined, confined or a mixture of both	Section 2
Aquifer type – principal, secondary or unproductive strata	Section 2
Sensitive groundwater locations such as source protection zones or safeguard zones	Section 3
The vulnerability of the groundwater to pollution	Section 5
The likelihood of perched groundwater	Section 2
Any abstraction points or wells on or close to the site – you must include private water supplies	Section 2
The presence of and proximity to other controlled waters such as surface water and coastal	Section 3
Any available water quality information	None available for review. WFD designation is given in Section 2
Information on characteristics such as the likely groundwater flow direction	Section 2
Consultation with regulators	None undertaken
Details of any uncertainties, data gaps and limitations	Section 1.3
Identify potential contaminant linkages	Section 5
Conceptual site model	Section 5
Qualitative risk assessment and methodology	Section 5 and Appendix D, respectively
Indication of potentially unacceptable risks	Not applicable
Conclusions and justification of proposed next steps.	Sections 6.1, 6.2 and Section 6.3 respectively
Factual details of the investigation and monitoring results	None available to review