

Qualitative Risk Assessment – Whitegate Road, Wrexham

Definitions of Consequence, Probability and Risk Matrix table

Consequence	
Classification	Definition
Severe	Short-term (acute) risk to human health likely to result in “significant harm” as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).
Medium	Chronic damage to Human Health (“significant harm” as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem. (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (“significant harm” as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor Harm,	although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Probability	
Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears 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 a pollution 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 a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it improbable that an event would occur even in the very long term.

		Consequence			
		Severe	Medium	Mild	Minor
Probability	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	Very low risk
	unlikely	Moderate /low risk	Low risk	Very low risk	Very low risk

Qualitative Risk Assessment of on site and off site sources of contamination

	Source	Mechanism	Observation	Probability	Consequence	Risk	Action
On site sources	Contamination of made ground	Tarmacadam surfacing -impermeable layer composed of 60% hydrocarbons which bind in aggregate	Hydrocarbons are locked within material unless heated to high temperature	Low likelihood	minor harm	Very low risk	Break up and remove off site. Do not excessively heat up
	Contamination of made ground	Sub base layers -imported graded material.	Material likely imported from local quarries due to specification. No visual or olfactory indications of contamination	Low likelihood	minor harm	Very low risk	contamination testing revealed no elevated levels of metals, inorganics or PAH's
	Contamination of made ground	Grey dense silty sand layer is likely imported construction waste material from alternative site. Material is mainly granular within silty	No visual or olfactory indications of contamination	Low likelihood	Mild	low risk	contamination testing revealed no elevated levels of metals, inorganics or PAH's
	Contamination of natural ground	Brown medium dense silty gravel layer is likely the natural ground conditions . Material is mainly granular within silty matrix.	No visual or olfactory indications of contamination - undisturbed natural ground	Low likelihood	minor harm	Very low risk	contamination testing revealed no elevated levels of metals, inorganics or PAH's
	Contamination of groundwater	Percolation of ground water through contaminated material	No visual or olfactory indications of contamination	Low likelihood	minor harm	Very low risk	Evaluation of contamination results against WHO guidelines revealed no issues
Off site sources	Railway sidings - 162 m away contamination of ground	Contamination of ground due to spillage of oil	Unlikely to percolate through to site due to distance	Low likelihood	minor harm	Very low risk	Evaluate PAH values of contamination testing
	Historical Sewage tanks - 200m(1898-1872)	Contamination of ground water with sewage	No olfactory indications of contamination	Low likelihood	Mild	low risk	low risk - No ground gas monitoring - Radon protection offers protection against low flow rates of ground gas
	Historic landfill site -300m (The Dunks, Queens Park)	Ground gas migration through granular material- carbon dioxide and methane	Inert landfill located over 250m	Low likelihood	Mild	low risk	low risk - No ground gas monitoring - Radon protection offers protection against low flow rates of ground gas
	Historic landfill site -472m (Marshall Refractories Ltd)	Ground gas migration through granular material- carbon dioxide and methane	Inert landfill located over 250m	Low likelihood	Mild	low risk	low risk - No ground gas monitoring - Radon protection offers protection against low flow rates of ground gas
	Coal mining	Ground gas migration through granular material- carbon dioxide and methane	Within coal mining area however no shafts or worked seams shown within 500m	Low likelihood	Mild	low risk	low risk - No ground gas monitoring - Radon protection offers protection against low flow rates of ground gas

Conclusion

Contamination tests carried out on four samples from across the site revealed no elevated levels of metals, inorganics or PAH's. This confirms that the site is not contaminated as per Soil Guideline Values for residential properties given by the Environment Agency. The Qualitative risk assessment indicated that there is a low risk of gas migration causing harm through granular ground conditions from historic inert landfill sites over 250m away to the site. The low risk of gas migration therefore does not require a quantitative risk assessment of gas to be carried out. Basic radon protection has been specified for the site due to it being in an area where 5-10% of properties are affected by radon. Basic Radon protection is an impermeable membrane placed within the foundation detail in order to create a barrier to gas migration. The radon protection barrier will essentially also mitigate against the low risk of gas migration from the inert landfill sites over 250m away.

Clarification

I would like to clarify the previously reported statement 'The site is within an area where basic radon protection is required. Basic radon protection will also act as a protective measure to natural ground gas such as carbon dioxide and methane. As basic radon protective measures have been specified for the residential premises CIRIA guidance advises that further gas monitoring is not required'

The statement relates to guidance given in the document 'A pragmatic approach to ground gas risk assessment for the 21st Century' from a CIRIA/Environmental protection UK Ground gas seminar by Geoff Card and Steve Wilson Page 5 which reads:

'Requirements for gas protection: Many areas of the UK require radon protection measures to be installed in accordance with BRE guide BR211 (2007) without any data from site specific monitoring. The main form of protection for new buildings is to provide a radon barrier in the floor slab construction and ventilation below it. In commercial buildings positive pressurisation and a membrane may be used. These are the same methods used to protect against the ingress of other ground gases such as methane or carbon dioxide (Wilson et al, 2007 and Boyle and Witherington, 2007). Therefore it seems unreasonable to mandate gas monitoring in such situations, where gas protection is already to be provided and the results will not increase the design requirements or result in any cost reduction. (SEE ALSO FIGURE 4 and TABLE 4)

We therefore consider that given the low risk of ground gas causing harm and the mitigation measures in places for radon protection also offering protection from ground gas that further monitoring or greater mitigation measures are not required on top of that already specified.

