

# A358 Taunton to Southfields Dualling Scheme

Preliminary Environmental Information Report - Appendix 9.3  
Detailed Assessment Methodology for Contaminated Land

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# 1 Detailed assessment methodology for contaminated land

## Methodology for preliminary risk assessment

1.1.1 Current UK guidance recommends a phased risk-based approach to the assessment of soil contamination, based on the development and maintenance of a conceptual site model (CSM). The current best practice for risk assessment methodology is detailed in the Environment Agency's *Land Contamination Risk Management Guidance (LCRM)* [1]. This process starts with Tier 1: Preliminary Risk Assessment (qualitative), this can be followed by a Tier 2: generic quantitative risk assessment (GQRA), if identified as required in the PRA and potentially a Tier 3 detailed quantitative risk assessment (DQRA) depending on the findings of the GQRA.

1.1.2 The CSM is a representation of the relationships between possible contaminant sources, pathways and receptors to support the identification and assessment of potential contaminant linkages (PCL) and an assessment of known contaminant linkages, where identified from existing information. The model comprises identification of:

- Sources: the key pollutant hazards associated with the site.
- Receptors: the key targets at risk from the sources.
- Pathways: the means by which the contaminant can cause harm to the receptor.

1.1.3 All three elements must be present for a potential risk to exist.

1.1.4 The following potential receptors, sources and pathways are identified from the baseline studies presented in Chapter 9 Geology and soils, Section 9.7:

### Receptors

1.1.5 Sensitive receptors have been identified based on the review of the baseline information these include:

- Human receptors; construction workers, future maintenance workers, adjacent site users (public, residents, commercial workers); and
- Controlled waters (groundwater and surface water) that may be affected by contaminants.

### Sources

1.1.6 Potential sources of contamination within the study area have been identified based on the review of existing information, at this stage there is no ground investigation data available.

1.1.7 Historical and current land use activities identified in this desk study including; historical landfill sites, an infilled GWR cutting, fuel storage/depot and petrol filling stations could have caused soil and groundwater pollution. The type of contaminants likely to be present largely depends on materials /chemicals stored or used in processes undertaken, persistence/mobility of the contaminants and any redevelopment of the site since the activities took place. The contaminants could be present in various media; soils (Made Ground, waste), landfill leachate, groundwater, drains, ground gas, vapours.

## Pathways

- 1.1.8 Potential pathways through which the contamination from identified sources may reach the sensitive receptors have been based on the review of the desk study information, construction activities and end land use; relevant pathways include:
- Ingestion, inhalation, or dermal contact with soils/dust/asbestos fibres originating from the sources of contamination.
  - Inhalation of ground gasses/hydrocarbon vapours originating from sources of contamination, soils and groundwater.
  - Direct discharge, leaching from soil of contamination and migration of contaminated groundwater/leachate, both vertical and horizontal, to controlled waters.
- 1.1.9 The potential contaminant linkages (PCLs), which could be formed during the construction and operational phases have been identified and the potential risk class of each PCL has been based on consideration of the following:
- **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.
- 1.1.10 The risk has been classified using the categorisation and description of risk levels in Table 1-1 and Table 1-2 below.

**Table 1-1 Categorisation of risk (taken from NHBC [2])**

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

**Table 1-2 Description of risk levels (taken from NHBC [2])**

Terms	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
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action
Moderate risk	It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard. It is likely, that if any harm was realised any effects would be mild.
Very low risk	The presence of an identified hazard does not give risk to the potential to cause harm to a designated receptor.

- 1.1.11 Preliminary CSMs have been developed for each priority potentially contaminated sites as determined in the PRA 9 [3]. The risk magnitude of the PCLs have been assessed by considering the likelihood of pollution/harm occurring and the

consequence of the pollution/harm, through a qualitative risk assessment process, as described above. The CSMs were developed based on the design elements of the scheme which intersect with the area/site of potentially contaminative land use. The preliminary CSMs developed for these sites are presented at Appendix F of the PRA.

- 1.1.12 The process comprises a tiered approach, as described in Section 1.1.1. The simple and conservative qualitative Tier 1 assessment of potential risks from potential contaminant linkages (PCL) (Source-Pathway-Receptor) has been completed. At this stage potential contaminant linkages are identified. Where suitable investigation data exists to assess these, the data would be used to ascertain whether a risk exists. If suitable investigation data does not exist, investigations to confirm whether such a linkage is viable would be scoped, e.g. where there is a possibility of presence of made ground, soil sampling and laboratory testing would be identified as the required investigation.
- 1.1.13 For the PEI Report a Tier 1 assessment has been completed and this has been used to scope the requirements for the geo-environmental ground investigation and monitoring. On completion of the ground investigation Tier 2 assessment will be completed and potentially a Tier 3 if required, see paragraphs 1.19 to 1.12 below.
- 1.1.14 Any potential risks identified at Tier 1 would be studied in more detail through a Tier 2: Generic Quantitative Risk Assessment (GQRA). The results of any investigations completed would be reviewed at this stage and quantitative assessment is undertaken.
- 1.1.15 If a Tier 2 assessment identifies potential risk, i.e. the applied generic assessment criteria are exceeded such as category 4 screening levels [4](a set of generic screening levels for 6 common contaminants which are estimates of contaminant concentrations in soil that are still considered to present an acceptable level of risk, within the context of Part 2A) then a Tier 3: Detailed Quantitative Risk Assessment (DQRA) is required. This involves derivation of site-specific assessment criteria and may involve additional targeted ground investigations to refine the CSM. Where pollutant linkages are identified as viable on completion of Tier 3 assessments, remediation mitigation measures would be identified. However, the detailed design of how required mitigation would be implemented would be completed at a detailed design stage, including remedial options appraisal and remediation and verification plan.
- 1.1.16 It is also acknowledged that, as with any other highway scheme, further investigation work will be carried out and additional assessments completed as design and construction progresses. These would follow the methodology set out above.
- 1.1.17 Any soils that do not meet chemical acceptability criteria should be treated for use or disposed of to a suitably licenced facility using licensed carriers.

To promote sustainable reuse of excavated made ground and natural soils either within the scheme or at a receiver or hub site, a Materials Management Plan (MMP) will be prepared in advance of construction works in accordance with CL:AIRE *Definition of Waste Code of Practice* (2011) (v.2) [5]. This will include measures to establish acceptable reuse criteria and procedures, to ensure the suitability of material for reuse, can be demonstrated and verified. A soil waste management plan (SWMP) will also be prepared prior to construction to for the

removal, transportation and disposal of all waste materials resulting from excavations and identify opportunities to maximise the recycling potential of all materials arising from construction of the proposed scheme.

- 1.1.18 In addition, a discovery strategy linked to the EMP would be developed to enable unforeseen ground conditions to be addressed if or when encountered. Any imported soils/fill materials would require verification prior to use within the proposed scheme. This approach to soil sampling, testing and assessment would be defined in an earthworks specification for the construction works. This specification would be prepared in accordance with the *Specification for Highway Works, Series 600 Earthworks* [6].

## 2 Detailed methodology for assessment of potential operational impacts

- 2.1.1 Assessment of any new pollution linkages would be undertaken in line with the processes detailed in Section 1 of this Appendix.
- 2.1.2 The assessment would assume that all soils suitable for reuse would be retained on-site for reuse within the proposed scheme.
- 2.1.3 To promote sustainable reuse of excavated made ground and natural soils either within the scheme or at a receiver or hub site, a Materials Management Plan (MMP) will be prepared in advance of construction works in accordance with CL:AIRE Definition of Waste Code of Practice (2011) (v.2) [5]. This will include measures to establish acceptable reuse criteria and procedures, to ensure the suitability of material for reuse, can be demonstrated and verified.
- 2.1.4 A discovery strategy, linked to the EMP, would be developed to enable unforeseen ground conditions to be addressed if or when encountered. This approach is in line with the Specification for Highway Works, *Series 600 – Earthworks* [6].

## References

- [1] Environment Agency, “Land Contamination: Risk Management (LC:RM),” 2020 10 2020. [Online]. Available: <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm..> [Accessed 30 04 2021].
- [2] National House Builders Council (NHBC) and Environment Agency (EA), “Guidance for the Safe Development of Housing on Land Affected by Contamination. R & D Publication 66 Volume I.,” NHBC & EA, 2008.
- [3] Highways England, “Contamination Preliminary Risk Assessment,” HE, 2021.
- [4] Contaminated Land: Applications in real environments (CL:AIRE), “Development of category 4 screening Ilevels for assessment of land affected by contamination. SP1010.,” CL:AIRE, 2014.
- [5] Contaminated Land Applications in Real Environments (CL:AIRE), “The Definition of Waste: Development Industry Code of Practice (DoWCoP). Version 2.,” CL:AIRE, London, 2011.
- [6] Highways England, “Manual Of Contract Documents For Highways: Volume I Specification for Highways Works. Series 600: Earthworks. Amendment.,” HE, 2016.