

Demystifying a Black Art

The critical importance of robust risk assessment modelling in delivering value-engineered remedial solutions is not yet fully appreciated in the UK marketplace, explains **Steve Pearmain** of **Atkins**

Despite the demise of ‘look-up’ numbers as brownfield remedial target criteria and the laudable move towards the derivation of site and development-specific remediation criteria, quantitative risk assessment is still regarded in many circles as an academic pastime at best, and a black art at worst.

This is unfortunate as it undervalues the real benefits robust risk assessment modelling can bring to a brownfield regeneration project, both in terms of informing design decisions and helping ensure that implemented remedial schemes are both proportionate and appropriate to a particular site’s circumstances.

Such an approach should not be confused with the ‘risk it away’ philosophy promoted by some of the less ethical ‘practitioners’ in the field but rather be seen as a valuable tool which, when used correctly, should contribute to the delivery of a cost-effective quality product.

The background

The UK contaminated land assessment and remediation framework has matured considerably in recent years to one that understandably places more emphasis on the importance of ensuring that the decision-making process is

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underpinned by sound science and authoritative guidance. This is why we now have a comprehensive catalogue of supporting technical guidance and numerous models that simulate contaminant transport through environmental media and the various receptor uptake mechanisms.

The establishment of a logical roadmap-type framework for getting from desk study to implementation of appropriate remedial measures, as presented in *Contaminated Land Report (CLR) 11*, represents a fundamental step change in the assessment process, although unfortunately not one that has yet been embraced by all in the brownfield sector. Risk assessment is an integral part of the new framework and one that, if undertaken diligently, will complement traditional value-engineering principles.

Risk assessment and the ‘objective’

Put simply, the primary objective of most remediation strategies is to reduce and/or control any unacceptable risks to human or environmental receptors to acceptable levels.

Setting aside the current heated debate on what constitutes acceptable and unacceptable, the first step for any project in delivering a successful remediation scheme is to develop robust Conceptual Site and Conceptual Exposure Models (CSM and CEM) that clearly identify the potential pollutant linkages (PPLs) pertinent to a particular site scenario.

Once the PPLs are identified the usual next stage is to proceed to quantitative risk assessment to assess the significance of the PPLs in a site and land use-specific context, and to establish which in fact are ‘relevant pollutant linkages’ (RPLs) that require addressing.

It is essential that the selected risk assessment tools (there will normally be more than one) are both appropriate to the CSM and CEM and are modified as necessary to reflect specific site conditions and circumstances. Failure to select the appropriate tools for the job, or to ensure their alignment with the CSM/CEM, will often result in the generation of overly conservative

soil and groundwater remedial target criteria and hence the implementation of an inappropriate and disproportionate remedial scheme.

Evaluation through implementation

Each identified RPL is then subject to a formalised Remediation Options Appraisal (ROA) process which seeks to identify the most appropriate remedial solution for each specific linkage with consideration of a number of criteria, including effectiveness, cost, durability and sustainability. The potential remedial solutions are then scored against the qualifying criteria and the highest ranked solution(s) are incorporated into an overarching Remediation Strategy that details how the proposed remedial scheme will be implemented, managed and verified on site.

Following stakeholder agreements to the Remediation Strategy the project progresses to the detailed design phase, including production of specifications/contractual documentation, and ultimately implementation on site, close-out and the production of a Verification Report for the site and public record.

The bottom line

It can be seen above that risk assessment plays a critical role in many aspects of the current framework. Not only does it establish which are the RPLs that require assessment during the ROA process, it also generates the site and end use-specific remedial target criteria that will both underpin the design of any remedial scheme and be used to verify the efficacy of its implementation. Risk assessment has consequently evolved into a complex discipline in its own right and it is important from a value-engineering perspective that only appropriately trained and qualified risk assessors are utilised on brownfield regeneration schemes.

But what about the real world?

An example of the real cost savings robust risk assessment can deliver on a project is aptly demonstrated by a recent Atkins commission to produce a Remediation Strategy for a particularly sensitive site.

The subject site recorded PAH and metal concentrations in excess of generic human health screening criteria and Detailed Quantitative Risk Assessment modelling was undertaken to derive Site Specific Assessment Criteria (SSAC) for the constituents of concern. Legitimate modifications to the generic allotment CEM raised the Benzo(a)pyrene (BaP) remedial target an order of magnitude and it is currently anticipated that programmed supplementary on-site exposure pattern survey work will further align the model with the site CEM and consequently raise the BaP remedial target higher still.

The resultant remedial target criteria will focus the remedial works on areas where ground conditions are more likely to represent significant possibility of significant harm and at the same time generate cost savings of several hundred thousand pounds.

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