

Collaboration-driven Characterisation to Expedite a Remedial Strategy

Commercially Driven Approach

A typical commercial site re-development process is focussed on the planning application cycle, driven by business needs. Contaminant sources are addressed individually where they intersect development boundaries, data is fragmented and hard to control and harmonise. Despite a large volume of data, significant uncertainty can remain in sitewide geology and hydrogeology model, and data gaps reduce confidence in numerical modelling and remediation decision making.

1. UK Regulation – Land Contamination

In the UK, the Land Contamination Risk Management (LCRM) was published in October 2020 and updated in July 2023 to define a process to identify and assess if there is an unacceptable risk, assess what remediation options are suitable to manage risk, plan and carry out remediation and then verify that remediation has worked. LCRM is used in a range of regulatory and management contexts, including voluntary remediation, planning, assessing liabilities and also under the UK part 2A contaminated land regime.

LCRM has three stages: 1) Preliminary risk assessment; 2) Generic quantitative risk assessment; and 3) Detailed quantitative risk assessment. Stage 1 incorporates site investigations, Stage 2 remediation option selection and Stage 3 detailed remediation strategy, implementation and verification. Competent persons with appropriate knowledge, skills, experience and qualifications have to be engaged throughout the LCRM steps.

Reference: Environment Agency (2023) Land Contamination Risk Management, July 2023.

2. The Challenge

Quintessa was instructed to review and update a management strategy for known chlorinated ethene impacts at a client's site. The two main drivers for revisiting the strategy were firstly to demonstrate to the regulators that the contamination was being adequately assessed and managed, and secondly to facilitate planning applications via remediation design, for new developments at the site which interacted with contaminant source areas.

The existing strategy had proven difficult to implement as there were several different source zones, operated by two different organisations, within the same nuclear site licence boundary. The zones were all being addressed at different times, using different contractors. Cycles of characterisation were needed as specialist risk assessment, numerical modelling and remediation design phases came online. The programme to achieve a detailed remediation strategy for each zone was being lengthening due to this complex cyclic approach and rebound between Stage 1 and Stage 2 of the LCRM process. As the technical deliverables were becoming more complex, the client introduced an independent and specialist technical peer review panel, which identified underlying weaknesses in the preceding interpretation process, causing more cycles of information gathering and interpretation prior to submission to the regulator. These delays were reducing regulatory confidence in the suitability of the existing management strategy approach.

3. The Approach

To understand what was required from the new management strategy, it was important to engage the client, across interrelated departments and the different organisations, to understand the timescales and underpinning requirements for the wider site. This enabled a holistic view of whole-site needs to be established. The new management strategy needed to support the short- and medium-term site development aspirations by enabling detailed remediation strategies to be prepared to satisfy pre-emptive planning conditions. The new management strategy also needed to support decommissioning programmes for aged legacy facilities and meet environmental permit conditions.

Regulatory engagement was also an important step in derivation of the updated strategy. It was important to understand the regulator's concerns and expectations. Their main requirements were for the client to demonstrate that the wider site impacts were understood and controlled and to reach the point where improvement could be made through agreement of a voluntary remedial strategy as early as possible and within timescales communicated.

From the early engagement process, it became clear that interrelationships between management strategy needs were complex and that timescales were challenging. Uncertainties in the site conceptual model would also make the interpretation, risk assessment and modelling stages difficult to manage through the supply chain. Therefore, a collaboration-driven site characterisation approach was used to support and drive the updated management strategy. This approach was selected to ensure that existing site knowledge was maximised and to enable data users throughout the whole assessment process to input into early data gathering activities. The peer review panel was brought into each step of the process to ensure independence. The client supply chain was also reviewed to ensure that relevant specialisms were available to input into the process from the outset. This approach also satisfied the requirements of LCRM in the use of competent persons. The change to collaborative thinking and stakeholder engagement was positively received by the regulator.

5. Benefits

Using this collaboration-driven approach, has the benefit of removing repeated cycles of data gathering and reducing uncertainties in the underpinning site conceptual model. It improves the process of data collection and data control as the process is well planned and stakeholders already understand how they will need to access and use the data.

It is also possible to shorten timescales and reduce cumulative costs by reducing and removing data cycles and by using collaborative thinking to deliver robust outcomes to the regulator first time at each step. This supports a far smoother progression through the LCRM stages. The regulator has visibility of the inputs and outputs at each stage and the reassurance that the supply chain is in place to deliver the strategic outcomes.

6. Challenges

The main challenges in establishing a collaboration-driven characterisation approach were:

- Engagement with the client lead team to secure the up-front investment in engaging a wider supply chain.
- Communicating business risks of uncertainty in the conceptual site model and the resulting uncertainty in forecasting remediation budgets.
- Planning ahead to understand how the regulators would apply bespoke planning conditions and understanding how this could impact the client facility design team's timescales to facility operation.
- Developing trust within the supply chain so that a fully collaborative mind-set could develop. This was supported by the definition of clear roles and boundaries for each supplier from the outset.

4. Collaboration

A series of workshops were established as key activities within the updated management strategy, the first being to define the remaining uncertainties in the conceptual site model (including source zone and plume delineation) and the data needs for addressing each uncertainty. Each discipline was invited to participate in the workshop to ensure that no assumptions were made by non-specialists about the significance of uncertainty or the data required to address it by another specialist. Outputs from the first workshop are being used to design an investigation, using a sitewide approach for the conceptual site model and then a zone-specific approach for each source. The second workshop objective is then to review the overall investigation and monitoring design to see where it could be optimised to meet each stakeholder's requirements. This optimisation workshop uses the principles of Data Quality Objectives (DQO) to ensure that each data point has a value and that the data gathered will be fit for purpose.

Following site investigation implementation and monitoring, a key workshop step is to agree the sitewide conceptual model so that each discipline is forming their interpretation from a common point and using integrated data. As each stakeholder has been involved in the process to reduce uncertainty, they are invested in the common understanding. The involvement of the independent peer review panel also ensures that no stakeholder can take control of the process to prioritise their needs over others.

The early workshop stages and stakeholder engagement have forged a stronger collaboration mindset within the supply chain, with clear roles and a common purpose. Involvement of the regulator in this process has also added confidence in the approach and driven progress.

