

# Remediation of land at Hauxton



## Submission to revise the groundwater risk assessment

### Introduction

South Cambridgeshire District Council (SCDC) has received a submission from Harrow Estates Plc which revises the risk assessment to derive remedial targets in relation to groundwater and surface water for the remediation site at Hauxton.

Technical specialists from SCDC, the Environment Agency (EA) and others, will look at the submission in detail before any final decision. This briefing is not intended to comment on the merits of the submission which will be the subject of very close scrutiny before the final decision.

The submission does not propose any changes to the way in which work is carried out on site.

This briefing is intended to provide an overview of what a risk assessment is, what a conceptual model is, and what the submission to planners at SCDC is asking for.

It then covers some of the more technical aspects of the revised risk assessment.

### Background

Revising risk assessments can be a normal part of the process for contaminated land clean-up. The approved Remediation Method Statement (RMS) (which sets out how the site will be remediated) and Condition 2 of the planning consent [S/2307/06](#), has always allowed for revised risk assessments to be submitted once more was known about the site and to better reflect actual site conditions.

Specialist agencies, such as the Environment Agency, will be formally consulted in order to assess the submission.

### What is a risk assessment?

The risk assessment is a document informed by a 'conceptual model' using information from early investigation works at the site. A conceptual model is explained further down the briefing.

It is usual that an initial groundwater risk assessment for any contaminated site tends towards being extremely conservative, with remediation target levels based on early investigations before remediation works begin. In this case more information has been generated through the excavation of the site and consequently it is suggested by Harrow that several parameters within the model can be more realistically defined.

Changing and updating the conceptual model, and therefore the risk assessment, gives scope for the submission which, if approved, would have the effect of revising some of the target concentrations.

The submitted revised risk assessment relates only to the model used to derive targets for controlled waters and it does not make any changes to the human health risk assessment or targets.

In accordance with condition 2 of the Planning Consent, any updates and suggested revisions to target concentrations have to be the subject of a full justification in the form of a Quantitative Risk Assessment. This will be reviewed by SCDC as the planning authority with advice from technical specialists including those at the Environment Agency and other expert organisations, before any permission will be given to work to a new risk assessment.

## What happens next?

Technical specialists from SCDC, the Environment Agency and others, will look at the submission in detail before any final decision.

If approved, it is understood Harrow will start working to the new targets straightaway. However, monitoring will continue in any event to ensure groundwater targets on site are protective to ensure groundwater leaving the site is within the environmental limits determined by the EA.

## The revision process for any contaminated land site

When a planning application is first considered for clean-up of a contaminated land site, an assessment is made as to the levels of contaminants that must be removed from the various soils on site, and not unusually this type of assessment will be based on a computer model – a quantitative risk assessment. This groundwater risk assessment model is an estimate of what might be going on in the ground (based on initial exploration) and an assessment of the possible risk of contaminants moving through the soil in water and off the site. Following the precautionary principle, it is not unusual for levels to be set very low to ensure that once work starts on site, the risk to surrounding land and water is kept as low as possible.

As a site is excavated and more becomes known about the soils on site and what contaminants are also present, far more informed decisions can be made about what levels of contaminants give a sufficiently low risk in what type of soil.

Throughout the process of reviewing any application involving a revised risk assessment, the objectives of the planning authority and its statutory consultees, (being primarily the Environment Agency and the Health and Environmental Services department) will be to protect the site and the environment surrounding the site, to protect human health and to ensure remediation of the land to an appropriate standard.

Depending on the scale of work being proposed and/or undertaken, it is acknowledged that further revised risk assessments and associated proposed clean-up levels could be submitted to the planning authority later during the remediation process. If that were the case then any such revisions would again be the subject of most careful and stringent scrutiny.

## Hauxton's conceptual model and risk assessment

As with most contaminated land, in order to determine how the soil and groundwater should be remediated, a 'conceptual model' for the Hauxton site was prepared to give a better understanding of what was thought likely to be happening in the ground.

This model was made up of information gained from site investigations and before remediation work began and looked at factors such as:

- Soil types and thicknesses
- Soil bulk densities
- Soil organic content
- Permeability (how quickly water moves through the soil) and
- Groundwater flow directions, among other factors

Parameters from this conceptual model were then put into a numerical risk assessment model (called a Quantitative Risk Assessment or QRA). This risk assessment gave target concentrations/levels for soil and groundwater on site, and intended to ensure there would not be an unacceptable risk to both future residents and the nearby watercourses.

At the Bayer site, two different types of models were used: one to derive the target concentrations for human health purposes and one to derive target concentrations that are protective of the nearby watercourses and groundwater (also referred to as controlled waters).

Two types of model were required because there are different pathways/mechanisms involved when modelling risk to human health in comparison to modelling risk to controlled waters.

# Technical information relating to the revised risk assessment submission

The main changes currently proposed to the conceptual model of the site relate to the geology and groundwater flow and an increased level of data. These changes in particular reflect the multiple layers at the site and which it is submitted, are now capable of being assessed on a more specific basis rather than as one complete unit/area in order to provide a more detailed and comprehensive assessment.

As the remediation work is extensive – involving full excavation of the whole site - the basis of the submission by Harrow Estates is that works on site have now facilitated a very much more detailed understanding of the geology and hydrogeology (how the water flows through the ground).

The site had previously been reworked over many years removing the natural ground conditions and creating a mixed made ground sub surface which included discontinuous sand and gravel lenses within a less permeable marl/clay known as the reworked West Melbury Marly Chalk Formation (RWMMCF), all of which sat above the impermeable Gault Clay.

It is part of the submission that without the presence of the predominantly discontinuous sand and gravel lenses, the RWMMCF layer is not very permeable and groundwater flow within this layer will be very limited.

Following excavation and remediation of the soil, the submission states that material will be redeposited back on site in a sequence similar to the likely natural geological sequence.

## The new conceptual model has three horizontal layers:

**Type A – Granular Made Ground: over**

**Type B – Cohesive including RWMMCF: over**

**Type C – Gault Clay**

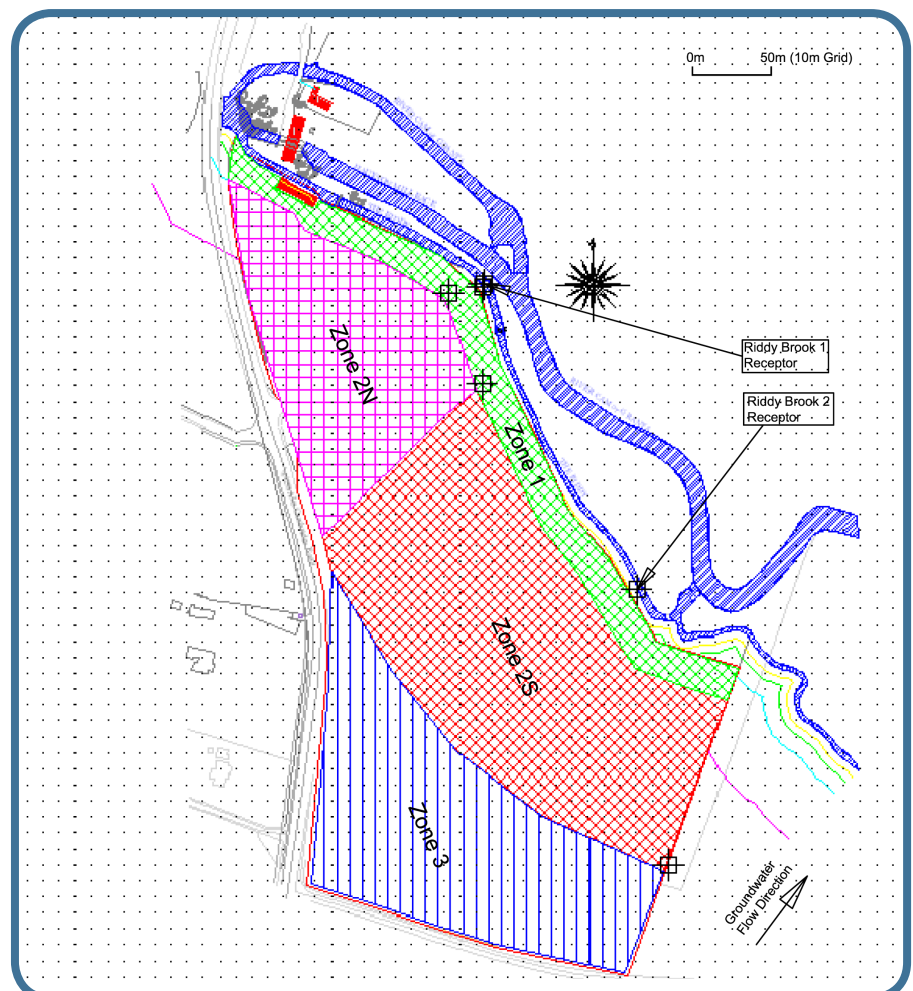
Rather than treating the site as a single layer, it is part of the submission that target concentrations are derived for all three layers and individual parameters are used in the new risk assessment model that are specific to each layer.

## Further zoning of the site

Originally there were two zones designated across the site: the first encompassing material for a distance up to 20 metres from the site boundary nearest the Riddy Brook (inner zone) and the second comprising the remainder of the site (outer zone).

Because of the 20m boundary zone being nearest to the main watercourse receptor, and therefore with a shorter groundwater travel time, the remedial targets for this area were stringent.

The revised model proposes to divide the second zone, being the outer zone, into three further zones, which represents different groundwater travel times towards the surface water receptor.



## Type of modelling software used

A different risk assessment modelling tool/software called ConSim has been put forward on the basis that it will be more complex and considered more suitable for assessing the effects of the four zones across the site and the increased level of data.

## What effect have these changes had on the targets?

No changes have been made to the human health targets - the revised risk assessment relates only to controlled waters.

The new revised risk assessment models the site in three horizontal layers and divides the site into 4 zones, resulting in 12 sets of targets.

If approved, some targets would as a result be more stringent, some would remain the same and others would be less stringent on the basis that more is now known about the soil make-up and how the site will be reinstated.

### Original targets

- **2 sets of targets, one for the inner 20m zone and one for the outer zone**

### New Targets

- **4 sets of targets, one for each zone, within the Type A material**
- **4 sets of targets, one for each zone, within the Type B material**
- **4 sets of targets, one for each zone, within the Type C material**

The revised risk assessment as submitted covers 5 (of the 23) contaminants of concern (Dicamba, Schradan, Bis(2-chloroethyl)ether, Ethofumesate, 1,2 dichloroethane). Unless further risk assessments are submitted and agreed, the original target concentrations will continue to apply to the remainder of the contaminants of concern.

More than half of the targets for Type A material have stayed the same or become more stringent. Type A is the most permeable material and the layer where the majority of the groundwater flow takes place.

The main changes proposed have been due to the new model separating out the less permeable layers, namely Type B and C, and which, it is submitted, provides justification for allowing some soils with higher concentrations to be placed in these layers beneath Type A material. As a result, it is part of the submission that the target concentrations for material to be placed in Type B and C layers either stay the same or be increased.



The submission can be seen at [www.scambs.gov.uk/bayersite](http://www.scambs.gov.uk/bayersite)