

THE DEVELOPMENT OF A WEB-BASED
DECISION SUPPORT SYSTEM FOR THE
SUSTAINABLE MANAGEMENT OF
CONTAMINATED LAND

Submitted by

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ABSTRACT

Land is a finite natural resource that is increasingly getting exhausted as a result of land contamination. Land is made up of soil and groundwater, both of which have many functions for which we depend on, including provision of food and water, supporting shelter, natural flood defence, carbon sequestration, *etc.* Contaminants in land also pose a number of threats to public health and the environment; other natural resources; and have detrimental effects on property such as buildings, crops and livestock. The most effective method of dealing with these contaminants is to cleanup and return the sites to beneficial use. The cleanup process involves making a choice from amongst competing remediation technologies, where the wrong choice may have disastrous economic, environmental and/or social impacts. Contaminated land management is therefore much broader than the selection and implementation of remedial solutions, and requires extensive data collection and analysis at huge costs and effort.

The need for decision support in contaminated land management decision-making has long been widely recognised, and in recent years a large number of Decision Support Systems (DSS) have been developed. This thesis presents the development of a Web-based knowledge-based DSS as an integrated management framework for the risk assessment of human health from, and sustainable management of, contaminated land. The developed DSS is based on the current UK contaminated land regime, published guidelines and technical reports from the UK Environment Agency (EA) and Department for Environment, Food and Rural Affairs (DEFRA) and other Government agencies and departments. The decision-making process of the developed DSS comprises of key stages in the risk assessment and management of contaminated land: (i) preliminary qualitative risk assessment; (ii) generic quantitative risk assessment; and

(iii) options appraisal of remediation technologies and remediation design. The developed DSS requires site specific details and measured contaminant concentrations from site samples as input and produces a site specific report as output. The DSS output is intended to be used as information to support with contaminated land management decision-making.

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