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Annex 1: The SuRF-UK Indicator Set for Sustainable Remediation Assessment

FINAL NOVEMBER 2011

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CONTAMINATED LAND: APPLICATIONS IN REAL ENVIRONMENTS



Annex 1: The SuRF-UK Indicator Set for Sustainable Remediation Assessment

November 2011

ISBN 978-1-905046-22-5

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Published by Contaminated Land: Applications in Real Environments (CL:AIRE),
7th Floor, 1 Great Cumberland Place, London W1H 7AL.
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Acknowledgements

Funding for this project from the Homes and Communities Agency (HCA) is gratefully acknowledged, along with technical contributions of the SuRF-UK Steering Group and contributions from the delegates at the SuRF-UK open forum meetings.

The SuRF-UK Steering Group members are:

- Prof. Paul Bardos, r³ environmental technology ltd
- Dr Brian Bone, Bone Environmental Consultant Ltd
- Dr Richard Boyle, Homes and Communities Agency & SAGTA¹
- Ms Nicola Harries, CL:AIRE
- Mrs Alison Hukin, Environment Agency
- Ms Naomi Regan, National Grid & SAGTA¹
- Prof. Jonathan Smith, Shell Global Solutions & SAGTA¹

¹ SAGTA: Soil and Groundwater Technology Association (http://www.sagta.org.uk/). This is a not-for-profit association of member organisations drawn from UK companies representing many major land holding sectors. Its members actively address challenges associated with the ownership and management of both contaminated operational land and brownfield development sites. Building on more than a decade of experience, SAGTA is the authoritative voice of contaminated land from a land holder's perspective.





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1 Introduction

The UK Sustainable Remediation Forum (SuRF-UK) was set up to develop a sustainable remediation framework that leads to better remediation strategies and options appraisal, which are more explicitly linked to the goals of sustainable development. It is a collaboration of regulators, industry, academics and consultants. It was established in 2007, following the lead of SuRF in the USA. Since its inception it has been independently co-ordinated by CL:AIRE. This work has been funded by the Homes and Communities Agency, with support from SAGTA members and in-kind support from a large range of public and private sector organisations who have contributed time and effort to its goals via open meetings and consultations.

The SuRF-UK 'Framework for Assessing the Sustainability of Soil and Groundwater Remediation' was published by CL:AIRE in 2010 with widespread regulatory and cross-sectoral approval. In 2009 SuRF-UK also carried out a review of over 100 sets of sustainable development indicators (including 12 indicator sets with a relationship to contaminated land management) and published the findings in a report 'A Review of Published Sustainability Indicator Sets: How applicable are they to contaminated land remediation indicator-set development?'. This review was taken forward into the development of sustainability assessment for remediation.

The second phase of SuRF-UK began in late 2010 to:

- 1. Support the improvement of tools for sustainable remediation decision making (especially indicators);
- 2. Collate case studies of sustainable remediation in the UK;
- 3. Ensure linkage with related initiatives internationally; and
- Investigate training needs.

SuRF-UK has now produced a wide range of information to support the design and implementation of sustainable remediation, including the two aforementioned reports, all of which is available at the SuRF-UK website (www.claire.co.uk/surfuk).

2 Objectives of this Document

This short document summarises the SuRF-UK indicator categories following their further development and refinement through Phase 2 in worked case studies and discussion groups. A description of 15 categories of indicators (Box A1) spread over environmental, social and economic factors that can be used for sustainability assessment in support of remediation decision-making is presented. This document describes the function of these categories, their development and how they can be used to support the SuRF-UK Framework and the Key Principles (Box A2) underpinning sustainable remediation that this framework identifies.

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Box A1: What is an Indicator?

An *indicator* is a single characteristic that represents a sustainability effect which can be compared across options to evaluate their relative performance. Hence, indicators need to be measurable or comparable in some way that is sufficient to allow this evaluation, for example amount of recycled soil. An indicator which is measurable might also be called a *metric*, for example, tonnage of recycled soil. (From Network for Industrially Contaminated Land in Europe (NICOLE) 'Road Map for Sustainable Remediation', www.nicole.org).

3 How the Indicator Categories were Developed

A review of indicators carried out in Phase 1 of SuRF-UK's work found that no preexisting indicator set developed for contaminated land management adequately covered the three elements of sustainability (environmental, economic and social). As a first step towards developing suitable indicators, and to stimulating debate, the existing indicators from the various sources reviewed were equally grouped on the basis of similarities under 18 overarching headlines or categories. This was carried out to reduce complexity and provide a basis for discussion about what sustainability issues might be important when considering remediation, based on commonly occurring themes and ideas from already existing work.

In the discussions following this review (both in SuRF-UK and in other fora, such as NICOLE) it became clear that a generic and universal set of key performance indicators was neither feasible nor helpful, given the very specific context of projects and the stakeholders associated with them. However, it was generally acknowledged that some form of checklist of key issues might be helpful in supporting consistency across different remediation sustainability assessments.

SuRF-UK took the view that providing a matrix of overarching categories would be a good way in helping stakeholders frame and discuss their sustainability assessments and ensure their own selection of indicators considered a broad ranging checklist of issues. In all applications, the SuRF-UK Framework's Key Principles (see Section 3.2 of SuRF-UK Framework, 2010 and Box A2) underpinning sustainable remediation should be adhered to.

The SuRF-UK 2009 review was used as a starting point and then gradually developed through discussion and testing in worked example case studies undertaken over the period 2009 to 2011. The number of overarching categories was reduced to 15 and the remaining categories were rationalised and better described as a result of this consultation process, to provide the SuRF-UK Indicator Set for Sustainable Remediation Assessment (or 'SuRF-UK Indicator Set'), described in this document. The types of change that took place included:

- Clarifying category descriptions to ensure consistent interpretation between practitioners as to what the elements meant and how they could be applied;
- Working to eliminate gross duplications and identify interfaces between categories that needed further guidance to avoid duplications;

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- Providing a clearer philosophical rationale for the social category, which is now taken to include all human related effects (whereas the environment category contains effects that may be seen as detriments or benefits outside of human utility);
- Creating neutrality by avoiding terminology that might be leading towards a benefit or a detriment; and
- Providing a platform with wider applicability than UK use alone.

This last point is important in the context of the on-going discussions and the continuing possibility of an EU Soil Framework Directive and also because many organisations involved in SuRF-UK also have operations in other countries. One consequence of this is that the categories are organised equally between the three conventional elements (pillars) of sustainability: **social** (people), **economic** (profit) and **environmental** (planet), with the SuRF-UK Indicators Sets for each presented in Appendices A to C, respectively.

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Box A2: Key Principles of Sustainable Remediation.

It is important to be aware that the indicators described in this document *supplement* the six Key Principles that SuRF-UK associated with sustainable remediation, and which should be considered by practitioners in the design, implementation and reporting of sustainable remediation schemes. The balancing of environmental, social and economic costs and benefits in identifying the optimum remediation solution needs to be carried out while complying with the Key Principles.

These Key Principles are:

- Principle 1: Protection of human health and the wider environment. Remediation [site-specific risk management] should remove unacceptable risks to human health and protect the wider environment now and in the future for the agreed land-use, and give due consideration to the costs, benefits, effectiveness, durability and technical feasibility of available options.
- Principle 2: Safe working practices. Remediation works should be safe for all workers and for local communities, and should minimise impacts on the environment.
- Principle 3: Consistent, clear and reproducible evidence-based decision-making.
 Sustainable risk-based remediation decisions are made having regard to
 environmental, social and economic factors, and consider both current and likely future
 implications. Such sustainable and risk-based remediation solutions maximise the
 potential benefits achieved². Where benefits and impacts are aggregated or traded in
 some way this process should be explained and a clear rationale provided.
- Principle 4: Record keeping and transparent reporting. Remediation decisions, including the assumptions and supporting data used to reach them, should be documented in a clear and easily understood format in order to demonstrate to interested parties that a sustainable (or otherwise) solution has been adopted.
- Principle 5: Good governance and stakeholder involvement. Remediation decisions should be made having regard to the views of stakeholders and following a clear process within which they can participate.
- Principle 6: Sound science. Decisions should be made on the basis of sound science, relevant and accurate data, and clearly explained assumptions, uncertainties and professional judgment. This will ensure that decisions are based upon the best available information and are justifiable and reproducible.

² In certain projects it is recognised that non-optimum remediation decisions may be made because other factors are more influential in optimising the benefit from a wider development scheme. Considering regulatory implications and recording why such a decision was taken should be a minimum requirement for any decision making process.





Function of the Indicator Categories

The SuRF-UK Indicator Set is intended to:

- Allow sustainability assessors interested in sustainable remediation to check that the indicators they select are suitably holistic;
- Allow assessors to readily identify gaps in the coverage of the indicators that they are proposing;
- Provide an authoritative, independent and holistic listing that stakeholders could use to benchmark their own ideas and selections against, particularly to facilitate a consensus based approach to indicator selection;
- Provide a hierarchical framework to facilitate sustainability assessment tools such as qualitative decision matrices or quantitative methods such as cost benefit analysis; and
- Provide an approach that is "failsafe" in that the range of issues covered by the categories will prevent key considerations from being ignored (and equally allows stakeholders to proceed only with issues generally agreed as relevant for their project).

The SuRF-UK Indicator Set provides a benchmark to support greater consistency in sustainability assessment for remediation decision-making. It is wide-ranging and holistic and covers all sustainability issues that might arise in different types of project, and different levels of decision making. The Indicator Set is intended to facilitate and support the several levels of decision making for a range of contaminated land management contexts as described in the SuRF-UK Framework (see Section 4.3 of the SuRF-UK Framework, 2010).

SuRF-UK's approach to indicator selection is that this process should be sufficiently flexible to allow the stakeholders associated with particular situations to agree the most appropriate indicators themselves. SuRF-UK's recommendations are:

- To adhere to the overarching Six Principles of Sustainable Remediation (Box A2);
- To initially use the complete SuRF-UK Indicator Set of the 15 headline categories for each element of social, economic and environmental. The stakeholders may then agree that there are good reasons to disregard or add one or more categories. On all occasions, this decision should be justified and documented in the sustainability assessment report; and
- That the stakeholders involved in a decision should agree the sustainability indicators and categories to be used, in line with the SuRF-UK Framework's general view that if the premises of a sustainability assessment are not agreed by and/or are not obvious to all its users, its outcomes are also unlikely to be agreed.

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5 Using the SuRF-UK Indicator Set

It is important to remember that sustainability assessment considers both (negative) impacts and (positive) benefits. It may well be advantageous to take a wide view of sustainability, as SuRF-UK proposes, as benefits and impacts may accrue in categories that are not routine aspects of technical feasibility analysis.

A general difficulty with sustainability assessments is duplication of effects, or double counting (see Box A3). As far as possible the SuRF-UK Indicator Set has been designed to minimise this problem and to signpost users between categories to avoid this difficulty. Nevertheless, users should become fully aware of all the indicators before first use. In particular, users should realise that some impacts or benefits may be split over several indicators. Cross-referencing should be clearly reported in any sustainability assessment work.

A practical approach to indicator selection must also take into account the differing perceptions and technical perspectives of the stakeholders who might be involved in the sustainability assessment (see Section 4.4 of SuRF-UK Framework, 2010, as well as CL:AIRE 2007, 2008 and SNIFFER, 2010). An iterative approach is suggested by SuRF-UK, beginning with a broad listing that includes all of the possible sustainability effects of interest to stakeholders, and what indicators might be used to represent these.

Transparent and robust reporting of sustainability assessment, including the selection and use of indicators (one of the SuRF-UK Key Principles (Box A2)) is important. Further guidance on "Recording Decisions" is provided in Section 5 of the SuRF-UK Framework (2010), but the particular issues are outlined in Box A4, whilst Box A5 deals with intergenerational effects.

Box A3: Duplicated Effects.

Removal of duplications is important. It is also possible that different stakeholders may disagree about what is being duplicated depending on what is important to them. This is a significant issue. Therefore, in Phase 3 SuRF-UK will monitor the use of the Framework and develop guidance on dealing with duplications. Decisions about which indicators to select will have to be made on a project specific basis and clearly documented.

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Box A4: Recording Decisions.

Section 5 of the SuRF-UK Framework (2010) discusses this in more detail and should be referred to. However, the length and complexity of the report should be proportionate to the complexity of the project, but sufficient to explain the decision made to all stakeholders involved. It is likely to include the following:

- Sustainability assessment boundaries. This should include the space, time, system and lifecycle that are being considered. Other assumptions and areas of uncertainty should be specified and recorded. Without defining these it is likely that a different result will be found by different people.
- Sustainability indicators used. A list of sustainability indicators used and how these were considered relevant and applicable to the project should be shown. Data sources drawn upon should be presented so that the result can be justified.
- Sustainability method/technique used. Describe the method used (e.g. qualitative
 assessment, multi-criteria analysis, cost-benefit analysis) and/or tool (proprietary or inhouse tool) used for the assessment. Clarification should be made to its linkages with
 the conceptual site model, indicators and other assumptions.





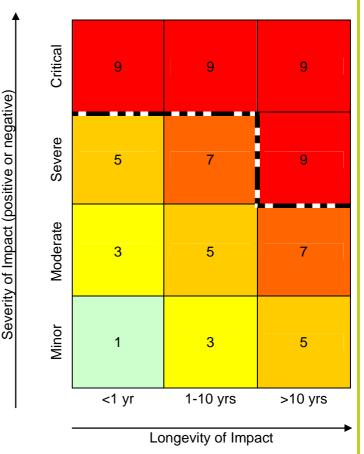
Box A5: Intergenerational Effects.

Intergenerational effects can be a difficult issue to grapple with when assessing the sustainability of a remediation project. This is because some issues may be short term, whilst others may be longer term. Different stakeholders may have different points of view on how significant various issues are. For example, a local community may be extremely worried about short term dust or lorry movements, whilst worrying little about any ongoing pollution of a water course that they are probably not even aware is happening. Many environmental issues in particular have short term as well as long term impacts. Such issues are embedded in the SuRF-UK Indicator Set.

How the assessor actually considers these issues will be down to the project in question and what agreement is made between the stakeholders involved. Scoring or ranking could be used to help assess the likely impact on the category, for example as shown in the table to the right. Here, impacts that occur over the longer term are generally considered worse than those that only persist for short durations.

However, care will have to be taken that all stakeholders agree on the impact and how it is scored, especially ensuring that no party considers that its views are unimportant or are being ignored.

In all cases, the report should present a transparent and robust justification for the type of scoring or ranking used so that others may understand the process and be able to repeat it should they so wish.







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Appendix A: SuRF-UK Social Indicator Set for Sustainable Remediation Assessment

Category		Issues that you may need to consider	Cross-reference to other Indicators
SOC 1	Human Health & Safety	 Risk management performance of the project (long term) in terms of delivery of mitigation of unacceptable human health risks Risk management performance of project (short term) in terms of duration of remediation works, incl. consideration of: Site workers, site neighbours and the public Remediation works and ancillary operations (incl. process emissions such as bioaerosols, allergens, PM10, impacts from operating machinery/traffic movements, excavations, etc) Consider both chronic and acute risks 	ENV 1 for issues related to e.g. dust which do not relate to effect on humans SOC 3 for issues affecting humans (not related to health concerns e.g. amenity)
SOC 2	Ethics & Equality	 How is social justice and/or equality addressed? Is spirit of 'polluter pays principle' upheld with regard to distribution of impacts/benefits? Are the impacts/benefits of works unreasonably disproportionate to particular groups? What is the duration of remedial works and are there issues of intergenerational equity (e.g. avoidable transfer of contamination impacts to future generations)? Are the businesses involved operating ethically (e.g. sustainability of supply chains for inputs to remediation work, lack of transparency in procurement processes)? Does the treatment approach raise any ethical concerns for stakeholders (e.g. use of genetically modified organisms, illegal labour, bribery or corruption issues)? 	None
SOC 3	Neighbourhood & Locality	 Impacts/benefits to local areas (tangible amenity changes), including: Effects from dust, light, noise, odour and vibrations during works and associated with traffic, including both working-day and night-time/weekend operations Wider effects of changes in site usage by local communities (e.g. reduction in antisocial activities on a derelict site) Changes in the built environment, architectural conservation, conservation of archaeological resources 	ENV 1 for issues related to e.g. dust which do not relate to humans ENV 4 for impacts of light, noise & vibration on ecology SOC 1 for anything related to human health considerations SOC 4 for changes to way community functions & services they can access
SOC 4	Communities & Community Involvement	 Changes in the way the community functions and the services they can access (all sectors – commercial, residential, educational, leisure, amenity) Quality of communications plan Effect of the project on local culture and vitality Inclusivity and engagement in decision making process Transparency & involvement of community, directly or through representative bodies Compliance with local policies/spatial planning objectives 	SOC 3 for tangible changes to neighbourhoods & regions ECON 2 for compliance with national policies, legislation, regulatory standards, best practice
SOC 5	Uncertainty & Evidence	 Robustness of sustainability appraisal for each option considered Quality of investigations, assessments (incl. sustainability) and plans, and their ability to cope with variation. Accuracy of record taking and storage Requirements for validation/verification Degree to which robust site-specific risk-based remedial criteria are established (justified & realistic CSM versus unnecessarily conservative and/or precautionary assumptions/data) 	None

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Appendix B: SuRF-UK Economic Indicator Set for Sustainable Remediation Assessment

Category		Issues that you may need to consider	Cross-reference to other Indicators
ECON 1	Direct Economic Costs & Benefits	 Direct financial costs and benefits of remediation for organisation Consequences of capital and operation costs, and sensitivity to alteration e.g.: Costs associated with the works (incl. operation and any ongoing monitoring, regulator costs, planning, permits licences) Uplift in site value to facilitate future development or divestment Liability discharge 	None
ECON 2	Indirect Economic Costs & Benefits	Long term or indirect costs and benefits, e.g.: Financing debt Allocation of financial resources internally Changes in site/local land/property values Fines and punitive damages (e.g. following legal action, so includes solicitor and technical costs during defence) Financial consequences of impact on corporate reputation Consequences of an area's economic performance Tax implications	SOC 4 for compliance with local policies/spatial planning objectives
ECON 3	Employment & Employment Capital	 Job creation Employment levels (short and long term) Skill levels before and after Opportunities for education and training Innovation and new skills 	None
ECON 4	Induced Economic Costs & Benefits	 Creating opportunities for inward investment Use of funding schemes, ability to affect other projects in the area/by client (e.g. Cluster) to enhance economic value 	None
ECON 5	Project Lifespan & Flexibility	 Duration of the risk management (remediation) benefit, e.g. fixed in time for a containment system) Factors affecting chances of success of the remediation works and issues that may affect works, incl. community, contractual, environmental, procurement and technological risks Ability of project to respond to changing circumstances, including discovery of additional contamination, different soil materials, or timescales Ability to respond to changing regulation or its implementation Robustness of solution to climate change effects Robustness of solution to altering economic circumstances Requirements for ongoing institutional controls 	None

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Appendix C: SuRF-UK Environmental Indicator Set for Sustainable Remediation Assessment

Category		Issues that you may need to consider	Cross-reference to other Indicators
ENV 1	Air	 Emissions that may affect climate change or air quality, or considerations that may allow overall reduction in impact on climate change, e.g.: Greenhouse gases (e.g. CO₂, CH₄, N₂O, O₃, VOCs, ozone depleting substances, etc.) NO_x, SO_x Particulates (especially PM5 and PM10) 	SOC 1 for issues associated with human health SOC 3 for issues affecting humans (not related to health concerns)
ENV 2	Soil & Ground Conditions	 Changes in physical, chemical, biological soil condition that affects the ecosystem function, goods or services provided by soils (these may be improvements OR deteriorations). May include: Soil quality (chemistry) Water filtration and purification processes (incl. sediment generation or reduction) Soil structure and/or organic matter content or quality Erosion and soil stability (incl. drainage) Geotechnical properties (incl. compaction) Impact/benefits to sites of special geological interest e.g. SSSIs and geoparks 	ENV 4 for Ecology within this ecosystem
ENV 3	Groundwater & Surface Water	 Changes in the release of contaminants (including nutrients), dissolved organic carbon and/or silt/particulates (these may be improvements OR deteriorations), affecting: Suitability of water for potable or other uses (based on long-term protection of available water resources) Legally binding environmental objectives e.g. Water Framework Directive Biological function (aquatic ecosystems) and chemical function Mobilisation of dissolved substances Marine, brackish/transitional, freshwater waters Effects/benefits of water abstraction resulting from the remediation process or its outcome, e.g. Changing river levels or water tables Issues associated with flooding (e.g. increase risk of, or protection from, flooding 	ENV 4 for Ecology within this ecosystem ENV 5 for any water abstraction use or disposal issues
ENV 4	Ecology	 Effects on ecology (excluding ecological impacts considered in ENV 2 and 3), including effects on the following (these may be benefits OR impacts): Flora, fauna and food chains (esp. protected species, biodiversity, SSSIs, alien species) Significant changes in ecological community structure or function Effects of disturbance (e.g., light, noise and vibration) on ecology Use of equipment that affects/protects fauna (e.g. bird/bat flight, or animal migration) 	ENV 2 & ENV 3 for soil and aquatic ecosystems SOC 3 for impacts of light, noise & vibration on humans
ENV 5	Natural Resources & Waste	 Impacts/benefits for: Land and waste resources Use of primary resources and substitution of primary resources within the project or external to it (including raw and recycled aggregates) Use of energy/fuels taking into account their type/origin and the possibility of generating renewable energy by the project Handling of materials on-site, off-site and waste disposal resources Water abstraction, use and disposal 	ENV 3 for issues associated with Groundwater and Surface Water not linked to abstraction use or disposal

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