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Regeneration of European Sites in Cities and Urban Environments

AUGUST 2004

GUIDANCE ON THE SUSTAINABLE MANAGEMENT OF CONTAMINATION AND REUSE OF SOILS AND DEBRIS In Brownfield Regeneration

Work Package 2 – Deliverable 2-1

This research project is supported by the European Commission under the fifth framework programme, action 4 "The City of tomorrow and Cultural Heritage" within the Specific Programme "Energy,Environment and SustainableDevelopment"

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CHAPTER 1.

INTRODUCTION

CHAPTER 1. Introduction

Site diagnosis, soil management and contamination treatment are key components to many successful brownfield regeneration projects. Workpackage 2 is one of two technical packages within the RESCUE research project whose aim is integration of sustainability into brownfield regeneration. It is part of the "engineering skills" element of the project which evaluates current practice in brownfield redevelopment and derives tools for delivering best practice – Fig 1.

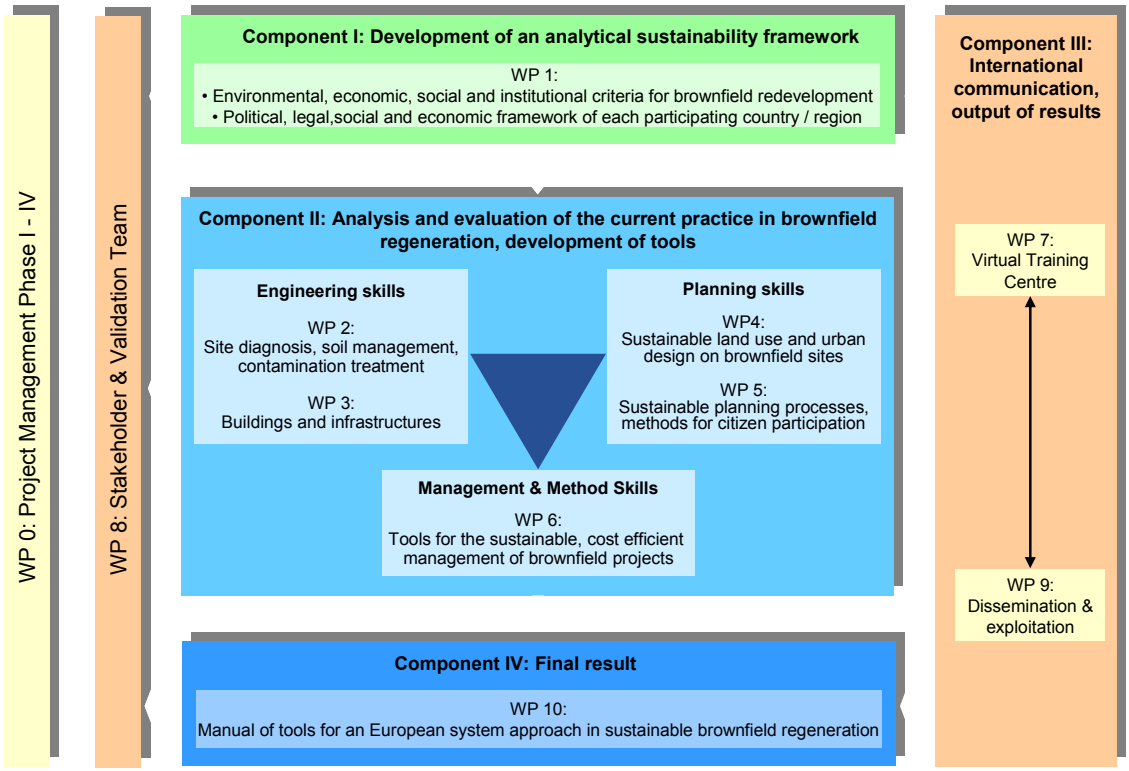

Fig 1: Relationship between WP2 and the overall RESCUE work.

The primary goal is the provision of guidance for the sustainable management of contamination in derelict land affected by contamination and the reuse of soils and debris. It should be borne in mind that contamination is not an issue at all brwonfield sites. Indeed a recent survey of brownfields in Austria found that only 8% were affected by contamination.

The first objective of this workpackage is to provide tools for the design of integrated land reclamation schemes that maximise the reuse of soil and other construction related waste.

The second objective is to identify decision criteria, databases and other tools concerning quality standards for underground conditions, recycled materials, consumption of natural resources, field test requirements, technology selection criteria, etc.

The third objective is the development of administrative tools (tax incentives, funding, fiscal measures, etc) to promote the reuse of soil and construction related waste. These are included in the deliverable D2.2.

The tools and recommendations developed in this report were identified using the Analytical Sustainability Framework – Deliverable D1.4, in association with predefined WP2-specific sustainability objectives and best practices.

This report was prepared by a team which includes the following participants:

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The management of contaminated soils and debris is a key issue in the redevelopment of many urban brownfield sites. Risk based management of land contamination is an integral component of many brownfield projects due to the potential cost of remediation, the perceived or real risk and other wider administrative and social issues. It may include reuse of decontaminated materials either onsite or offsite. It will often include further treatment or disposal of materials that are unusable or unsuitable after the decontamination process, including residues.

Decontamination techniques for contaminated soils have been well developed in recent years and at many contaminated sites a combination of remediation techniques is used. A sustainable approach entails identifying - during the initial preparation phase - the appropriate techniques to ensure protection of environmental receptors and minimisation of resource use and other wider environmental effects. The cost of decontamination can often be very high. Remediation can result in a transfer of contaminants to air and/or water, an intensive use of resources and the degree of decontamination can be inappropriate for the new use of a brownfield site. One critical step in the redevelopment of contaminated land is the selection of assessment criteria that determine the need for and extent of site remediation and, in consequence, the cost which - if excessive - can be a barrier to the marketing potential of a site.

Pre-existing buildings and infrastructures, when not adapted for new uses, are demolished and can represent an environmental problem if proper management of resulting wastes is not in place. Such management includes identification and segregation of materials and debris to allow for the reuse, recycling or disposal of separate components. If the site clearance, demolition and decontamination phases of a project are synchronised, the materials generated by each phase can be managed within an integrated recycling/recovery/reuse programme, minimising waste arising and the need for imported raw materials.

Policy development that simultaneously addresses environmental protection and spatial planning issues is a major positive trend. This combined approach, known as Risk Based Land Management (RBML), enables redevelopment strategies and plans to drive remediation objectives, remediation strategies/technologies and site investigation strategies/technologies.

Waste prevention is a strategic element in European waste policy. This policy emphasises the development of measures to promote recycling, recovery and

reuse, appropriate use of economic instruments, reduction of the hazardous nature of wastes, etc. However, the implementation of the EU Waste Framework Directive (and its definition of waste) has played - and continues to play - an ambiguous role in the management of contaminated soil (and in particular in the way excavated, treated and reused materials are regarded by regulatory authorities). As a consequence, a large percentage of excavated materials generated by brownfield redevelopment are persistently consigned to landfill disposal.

A significant amount of literature about contaminated land (EC research work and networks like CARACAS, CLARINET, CABERNET[1], NICOLE, US EPA documents, OECD survey, etc.) was used as a background to the project. The RESCUE approach - through its broader sustainable brownfield redevelopment focus – made further significant advances by identifying sustainability objectives and indicators, best practices and tools to link sustainability aspects to brownfield redevelopment issues.

The study is organised as follows:

Chapter 2 describes the methodology used to:

- Collect and analyse data from real projects in the four partner countries. Cross check data against RESCUE's sustainability objectives and indicators.
- Identify Strengths, Weaknesses and Gaps within the cross-checked data.
- Select additional projects to fill gaps in data.
- Identify Best Practices.
- Derive tools.

Chapter 3 presents the sustainability objectives and related indicators that were used to evaluate cross-checked data.

Chapter 4 summarises the evaluation of the four national approaches based on comparative analysis tables.

Chapter 5 highlights the Best Practices identified.

Chapter 6 identifies a number of tools and recommendations to help managers and developers to achieve the sustainability objectives. The guidance uses key questions to amplify the different sustainability components of a project, a selection of actions to be implemented and related tools that may be employed.

Chapter 7 presents a series of conclusions.

The results of this work were validated through a stakeholder and validation team (SVT). Their comments and/or suggestions are incorporated in the text or mentioned as footnotes.

[1] CABERNET is a network focusing on brownfield regeneration and strives to highlight the fact that contamiantion is a minor factor on the vast majority of brownfield sites.

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CHAPTER 2.

METHODOLOGY

CHAPTER 2. Methodology

The general methodology is similar in all RESCUE work packages 2 to 6 – Fig 2: Each work package worked along an interdisciplinary composition from the four partner countries (France, Germany, Poland and the United Kingdom). Each country provided two case studies to be analysed for their approaches and decision criteria regarding the management of contaminated soil and debris.

The methodology is based on a series of succeeding steps, which are as follows:

1) Development of an analytical framework (sustainability objectives and indicators)

2) Analysis of the eight RESCUE case studies
    a. Development of a questionnaire
    b. Collection of data and information / interviews
    c. Sustainability cross check
    d. Analysis of practices
    e. Additional information gathering / External examples
    f. Identification of good and best practices

3) Derivation of tools and recommendations

4) Validation of the results by an accompanying Stakeholder and Validation Team
    a. Objectives and Indicators
    b. Transferability check of practices resulting from the analysis
    c. Tools and Recommendations

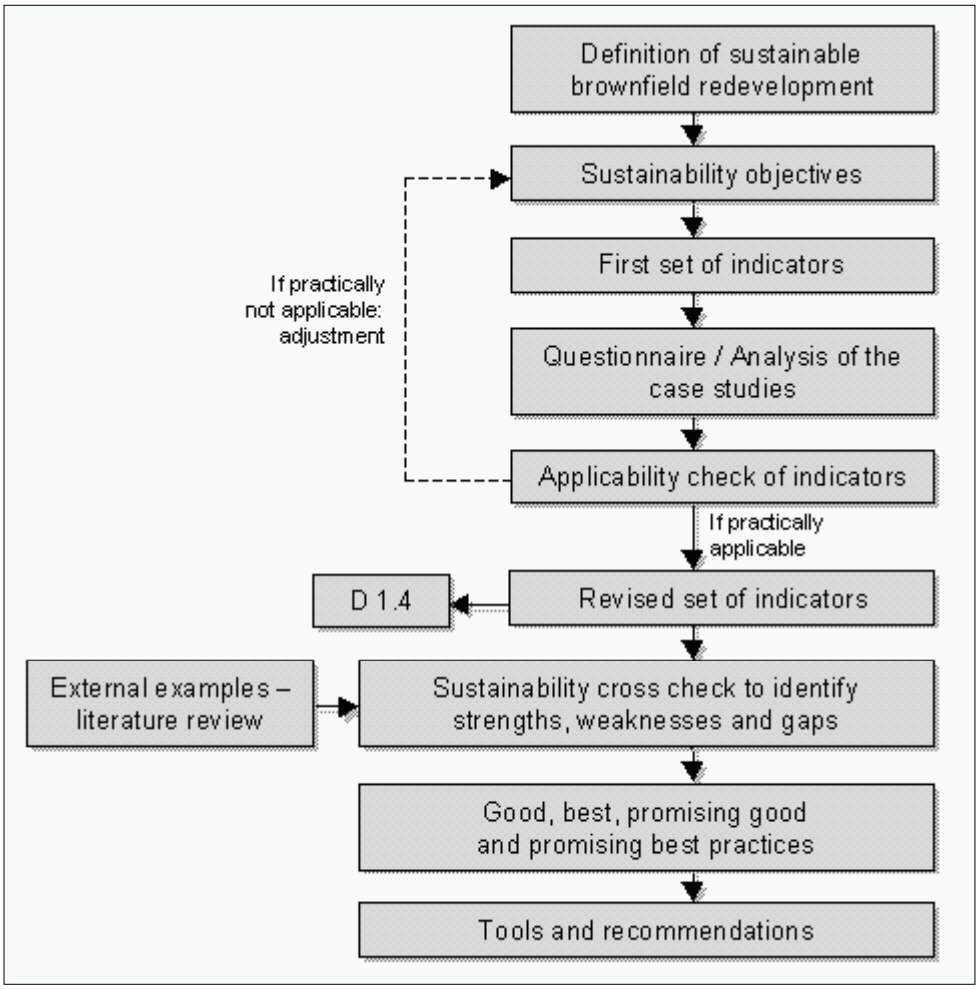

Fig 2 : The RESCUE methodology

The development of assessment factors needs quality goals. In the framework of the project sustainability objectives (=goals) and indicators (=to benchmark the success towards the accomplishment of the objective) were developed cross national as a first step for each workpackage.[2]

The gathering and review of the data from the eight RESCUE case studies have been done using a questionnaire developed for this work package (see annex II) which was part of an overall questionnaire for all work packages. On the basis of these questionnaires the national teams contacted the relevant people for the case studies and conducted personal and telephone interviews.

The collection of data, through literature and project files and interviews, was adapted according to the case study status (achieved, in progress or starting). The data were cross checked with the sustainable objectives and indicators developed during the first phase of the project (analytical framework). The objective of this sustainability crosscheck was mainly to identify good practices within the case studies. On the basis of the experiences made in the case

[2] see deliverable D 1.4: WP1: "Development of an analytical sustainability framework for the context of brownfield regeneration in France, Germany, Poland and the United Kingdom).

studies (availability and significance of data) the workpackages 2 to 6 adjusted their objectives and indicators where necessary and fed the results back into the project.
The next step consisted in the identification of the strengths (i.e. supporting the RESCUE sustainable objectives), weaknesses and gaps (missing information) of the sustainable management of contamination and reuse of waste by the national teams and in a cross check of all practices by the other partners. Obviously most of the work dealt with the strengths, however weaknesses and gaps were also considered for their learning potential. In this context, tools and procedures were regarded as:

'Strength' if they help reach the RESCUE objectives

'Weakness' if they contradicted the objective

'Gap' if information or instruments were missing to reach the objective.

It appeared that the use of external case studies was necessary to fill some information gaps to cover those 'Gaps'.

The best practices identification followed a clear definition of what is a good practice, a best practice or a promising good or best practice. The distinction was based on the transferability potential (environmentally and technically effective, legally and regulatory usable and economically viable) from one country (good practice) to several countries at European level (best practice), and on the demonstration of having helped reach a RESCUE sustainability objective. The following definitions were set:

- **A good practice** is a practice that has helped to reach a RESCUE sustainability objective and which is widely applicable at a national level (within one of the 4 RESCUE countries)

- **A best practice** is a good practice that is transferable and widely applicable at a European level (the 4 RESCUE countries + the SVT countries)

- **A promising good practice** is a practice that has not yet demonstrated to have helped to reach a RESCUE sustainability objective, but has a high potential for success on a national level (within one of the 4 RESCUE countries)

- **A promising best practice** is a practice that has not yet demonstrated to have helped to reach a RESCUE sustainability objective, but has a high potential for success on a European level (the 4 RESCUE countries + the SVT countries).

At last the WP2 team derived, compiled and developed from the previous work a set of tools and recommendations. The tools are attached to the relevant sustainable objectives and best practices.

The 'Stakeholder & Validation Team' accompanied the RESCUE team for the entire running time. This team was composed of experts from additional countries and fields of expertise and their main task was to check if the RESCUE results would be useful and applicable in their country / field of expertise.

Concerning this document the SVT validated the following outputs:

- Sustainability objectives and indicators
- Compilation of practices from the strength, weakness and gaps analysis + external examples
- Tools and recommendations

The validation results received were fed back into the WPs and incorporated in this document. More detailed information about the validation results can be found in the validation reports for each workpackage.

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CHAPTER 3.

SUSTAINABILITY OBJECTIVES AND INDICATORS

CHAPTER 3. Sustainability objectives and indicators

The approach adopted by RESCUE is an objective led approach that makes use of objectives against which the redevelopment strategy can be developed and evaluated. Presently site redevelopment requires definition of objectives which conform to the principles of sustainable development.

To achieve a successful integration of environment and redevelopment needs the redevelopment program should ensure that the defined objectives are sustainable. These objectives shall also enable a funding agency to assess the sustainability of a project proposal and help monitor the project implementation by using the corresponding sustainability indicators.

These objectives and indicators will also allow to measure how far sustainable redevelopment dimensions have been taken into account in priorities and strategies of redevelopment projects (see details in the Sustainability Assessment Tool document D 2-5.2).

Among the issues to be considered it is worth mentioning the following:

- if contamination levels may be a barrier in terms of technical solutions, it is mostly the cost of clean up that makes the main burden in terms of rehabilitation options and liability;
- the real or perceived risk for the stakeholders is one key constraint for the social acceptance;
- the characterisation phase but mainly the clean up phase can generate or disperse existing pollution worsening the environmental situation;
- the amount of wastes and polluted soils have to be managed; at last the use of decision support tools is a major approach to tackle the site issues globally and analyse the different options and their associated risks.

The WP2 RESCUE team proposes five sustainability objectives for integrating the concept of sustainable development in the management of the contamination and reuse of soil and debris. The purpose of these objectives is to integrate all components of sustainable development:

- the environmental dimension, considering its ecological and human health component (objective 1),
- the management of waste through recycling and reuse (objective 2),
- the economical dimension, considering the cost effectiveness of the technical approach in relation with the scope of remediation, costs (remediation, liabilities, etc.) and timing (objective 3),
- the social dimension considering the importance of communication (objective 4).

- Objective 5 covers the complexity and interdependence of all the factors involved in the contamination and wastes management of brownfield sites, and the necessity to produce decision making knowledge with the goal of being transparent and consistent in the balancing of the different sustainable dimensions.

These objectives will be used to develop practical policies to help make decisions today, but they can, through their respective indicators be used as criteria for monitoring the long-term sustainability of the redevelopment.

The indicators will help to measure the extent to which the brownfield redevelopment objectives are being achieved. They are the principal means of measuring the performance, in promoting sustainability, of the project and can be used to track or monitor trends.

OBJECTIVE 1: To reduce negative environmental impacts on the site and on the neighbourhood including human health risks

An important objective of a sustainable brownfield development is to improve the environmental situation on the site and in the neighbourhood affected by the site. The environmental amelioration can have a wide range of effects. To achieve all these effects as far as possible is one of the objectives of this work package.

One of the most direct coherence with the environmental situation is to the health and well being of humans as well as to animals and plants. Harmful substances or noise on or from the site can be a serious threat for human health and can lead to a deterioration of the natural environment.

In minor amount these emissions can at least worsen the quality of life on site and its surroundings. Furthermore, the concern about an unknown or uncertain risk situation, which can also be due to a lack of communication, can impose a psychological burden for potentially affected persons, leading to social disadvantages. These effects can also lead to a deterioration of the site's image, which makes the site and its neighbourhood less attractive for potential users and investors. Another aspect is to achieve the environmental improvement in an efficient way, based on a good risk management.

Indicators:

To control the achievement of these objectives there is plenty of useful experience. This includes the control of harmful substances in solid matter, water and air as well as the control of noise emissions. Furthermore there is an extensive set of experiences, which help to assess the quality of risk management methods. Also the impact on social communication and on the site's image can be investigated.

The three indicators used for the estimation of the achievement of the objective are in the following:

- **Pressure on Neighbourhood**: Number of complaints and incidents per year

The indicator is the comparison of the amount of public complaints and known incidents per year to local authorities before and after site redevelopment. This indicator enables evaluation of the sustainability of the management of the contamination and waste from a general point of view.

- **Ambient noise level**: Time percentage of excessive noise

The level of ambient noise is measured at the closest occupied building façade or building hosting employees working in the tertiary sector. This indicator enables evaluation of the reduction of the impacts on the neighbourhood

- **Dust and air quality impact**: Number of complaints during characterisation and remediation of the site

This indicator reflects changes in air quality and is one of the environmental indicators enabling the measurement of redevelopment progress.

OBJECTIVE 2: To minimise waste and maximise recycling and reuse of soil and debris

An important objective of sustainable brownfield regeneration is to apply waste re-use strategies, as suggested by European and international decisions at many conferences and summits. Most EU countries have adopted such strategies nationally for all waste streams, although the effort on soil re-use is more intensive in countries where the soil is seen as a resource or asset rather than a discard/waste; this appears to be mostly a cultural barrier. The use of the 'waste hierarchy' decision tool is generally common through Europe.

Waste minimisation of construction and demolition spoil (C&D waste) by means of good recycling techniques will speed up the process of brownfield redevelopment, as long as there are no threats to health and safety in the environs, due to hazardous waste. However, hazardous waste may also be dealt with in the locality (by encapsulation or immobilisation), and therefore reduce external disturbances and risks, such as traffic movements and dust impacts. Re-use can significantly bring down regeneration costs, and make other environmental improvements that have less firm economic 'values'.

The impact of recycling and re-using of soil should also take into account the effects of a reduction in quarrying, treating and transporting 'virgin' aggregate upon the environment. This may have national and international consequences, rather than local. The soils may also be used within the development for landscape and amenity issues, rather than fulfilling a defined constructional purpose for which they are unsuitable. Debris may be transformed into re-usable material, crushed for secondary aggregate or returned into the local marketplace through secondary providers.

Information to assess the re-use / recycling gains should comprise both definable market economic costs and less directly certain social and environmental costing.

Indicator:

- **wastes, soils and debris management**: Existence of a waste management plan, recycling and reuse of soils and debris.

Existence of a rationale for dealing with all wastes arising such that the provisions of the "waste hierarchy" are considered with disposal as the last resort. This indicator provides a measure of the effectiveness of the recycling strategy and of the effectiveness of the waste management strategy.

OBJECTIVE 3: To ensure cost effectiveness and technical feasibility

The handling of the contamination on a brownfield is a typical showcase of balancing sustainability aspects as the amendment of the ecological situation is strongly intertwined with the economical burden (i.e. costs), which depends on the efficiency of the remediation approach. Also a reasonable approach of reusing soil and debris (contaminated or not) can affect considerably the economical and ecological balance of the site development. Many experiences (E. g. as a result from the qualitative evaluation of the experiences from a representative selection of brownfield development projects) have shown that the economical viability of a project itself aspect is a crucial issue deciding whether a brownfield will be redeveloped (and cleaned up) or not.

During the past decades the methods for contamination assessment and remediation have been developed considerably, resulting in a more efficient amelioration of the environmental impact and at the same time using the financial resources more efficiently - mostly resulting in substantially reduced costs.
However, in each project different approaches are being applied and often some of them are less advanced than others. Furthermore, standard approaches (if existing at all) may differ significantly between the European countries.

The various components of the redevelopment project related to contamination include: scope of remediation, best approach to conduct that remediation, cost of remediation, cost of the different liabilities, timing of the proposed remediation (including permits approval time).

Indicator:

- **Remediation performance verification:** existence of a "remediation performance verification report"

The remediation performance verification allows to evaluate the degree of compliance with the anticipated costs, schedule and quality during the course of the remediation.

- **Remediation post-validation:** Existence of a "post-remediation validation report"

The post validation study is paramount in the evaluation of the technical feasibility and cost effectiveness. This indicator documents the degree of success or failure in the remediation process.

OBJECTIVE 4: To improve social acceptance through identification of all stakeholders and risk communication

A good communication is essential to keep the public informed during the different steps of the redevelopment of the site (planning, characterisation, remediation, etc.) and to gather input from their reaction in order to match the regeneration process. The community is concerned not only with the benefits associated with redevelopment (reduction of risk to public health) but also by any potential impact encountered during the restoration process. The risk associated with brownfield redevelopment is mainly the potential risk of chemical exposure of the community surrounding the site.

The social acceptance will be strongly related to the manner the risk is presented, interpreted and the level of trust the public places in the project actors. This good communication is a key point for the sustainability of the project but also during an emergency response action. Risk is not an easy concept to understand and education and involvement of the public are of paramount importance for the acceptance of the site cleanup and reuse plans. The acceptance of a risk depends on many factors, and risk assessment has its inherent limitations such as the remaining uncertainties. Filling the gap between the experts and the public is a main objective of risk communication (voluntary or involuntary exposure to risks, cost-benefit appraisal, etc.).

The general topic of communication strategy and citizen participation is covered by WP5 but one is mentioned in this work package, as it is specifically tailored to contamination issues during the site characterisation. The two-way communication including risk communication should be maintained to keep the public aware of the site activities and chain of events and this communication will become crucial at the remediation step which will involve transportation of contaminated material, emission of gases and dust, etc.

Indicator:

The following indicator can be used to estimate the actions done for improving social acceptance:

- **Documented strategy:** existence of an informative public approach strategy

The involvement of the public during the regeneration process by means of an information approach will be documented. During the field works it is important to explain about the activities and associated risks, and to verify that the public is informed about the process that is taking place

OBJECTIVE 5: To provide decision support tools for risk based land management

Decision support being defined (CLARINET 2002) as "the assistance for, and substantiation and corroboration of, an act or result of deciding; typically this deciding will be at determination of optimal or best approach".

It has proven very useful to use acknowledged tools, which provide a time- and cost- efficient way for coming to the right decisions in brownfield development. Based on well-tried devices and experiences, some of them - e.g. as a kind of expert systems - can also be an important help to prevent wrong or inefficient decisions. Using electronic data processing these tools can also facilitate to manage, communicate and distribute relevant data.

These tools are available for a large range of tasks like risk assessment, process management, technical/economical optimisation or the management, concise presentation and visualisation of data. These tools can be provided in various ways, e.g. in the form of databases, handbooks, checklists, geographical information systems (GIS).

An objective for sustainable brownfield development is not only the use of available tools but also its intelligent application.

Indicators :

As in practice many decision support tools use several techniques to assist environmental decision-making, the indicators allowing to identify the best practice approach are the following three:

- **Surface and groundwater quality control**: Assessment of surface and groundwater management plan

This indicator is one of the environmental indicators that enable assessment of the quality of the surface and ground water system put in place on the site. This indicator assesses the water quality control related to groundwater and surface water (drainage pattern, treatment, monitoring, etc.).

This indicator concerns also the objective 2.1 "To reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works".

- **Risk management framework:** Existence and scope of a risk management framework

This indicator takes into account the tools already developed for assessing the potential risk. The definition of risk is a key step in the redevelopment process.

- **Decision support systems**

The objective is to understand and evaluate the decision making process. To check if the techniques of for example risk assessment or GIS have been applied.

The discussion about the RESCUE sustainable objectives and indicators can be found in the RESCUE deliverable D1.4 and more information about the indicators is available in the annex 4 of the present document.

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CHAPTER 4.

EVALUATION OF COUNTRY APPROACHES BASED ON COMPARATIVE ANALYSIS TABLES

CHAPTER 4. Evaluation of country approaches based on comparative analysis tables

4.1. General context

4.1.1. Introduction

Urban brownfield redevelopment projects can easily be natural resource consuming: in most cases, soiled ground is inappropriate to house sensitive activities, and is generally excavated to be replaced by clean soil. In addition to the risk of spreading contamination onto uncontaminated places (either by uncontrolled dumping or by developing new controlled treatment and storage facilities), this practice implies up-take of natural resource. Sustainable development approach aims at minimising the impact of brownfield redevelopment on natural resource, in the scope of preserving them for the future.

Hence, material reuse and recycling is promoted, in order to minimise export of contaminated soil, and import of clean ground. To achieve this, definition of quality standards for reused material can help the implementation of the practise, by providing outcome to potentially reusable material, and by bringing technical and even commercial added value to what used to be considered as waste. In parallel to this, national and regional regulation may be adapted in order to favour development of resource respectful practices.

4.1.2. Quality standards for underground conditions

The focus of this particular evaluation is to be the 'options' of considering the remediated material being replaced or retained in the ground under either (i) Risk Assessment evaluation or (ii) Prescribed Lists of Contaminants. It is understood that different options exist within certain countries, as well as between different States. However, the matter seems more complex than this simplistic alternative, because the definitions of "which standards?" and "what is waste?" would seem to vary from country to country. Is it just Human Health Risk Assessment, for which there are numerous Tools, or Ecological Risk Assessment, for which there seem to be no proven 'standards', or assessments forced to suit the new/coming Water Framework Directive 'catchment' aspects ?

Prescribed Lists appear to exist in some countries, for example Italy's Ordinance number DN471/99, and specific 'industry' agreements in France (e.g. Gaz de France), but these appear either to have been superseded by Risk evaluations, or have a particular legal/political context. Whilst much ecotoxological research underpins such Lists (in France, say), it is generally not a 'Tool' applicable to other countries' systems. Indeed, the rationale may not be common in France.

4.1.2.1. European risk assessment tools

There are numerous tools for human health risk assessment in use throughout the world (especially in US, Canada, Asia, Australasia). In order to make this study simple, only those tools in use in Europe have been considered, and even then there are over a dozen in specific use. This Study does not include those used for wider purposes than human health, such as ecological ones, considered to be too immature or region-specific to be applicable to brownfield sites.

There has very recently been a definitive comparative evaluation of European Risk Assessment models, funded by members of the NICOLE Network (www.nicole.org) and undertaken over the last 2 years. The Evaluation was conducted by Arcadis GMI of the UK, and its initial findings announced at CONSOIL 2003, and summarised at a NICOLE meeting in UK on 13/02/2004. Publication of the Executive Summary on the website happened in June 2004, with full availability to NICOLE members, at a nominal cost. It would seem sensible, given the report's scope and timing, that RESCUE does not re-invent the wheel in respect of this aspect of its work, and therefore refers to its results. The published work has been critically reviewed by the Dutch research organisation, SKB, who further elucidate the findings in the main Report.

In the summary at the NICOLE meeting in February 2004, NICOLE wrote that:
"*Over the last half dozen or so years, the philosophy of using a risk-based approach for addressing contaminated sites has found widespread acceptance throughout Europe. However, individual countries within the EU have developed national models for environmental risk assessment which vary with legislative requirements and are at different levels of development. Since risk-based clean-up targets will vary with each model, the credibility of risk assessment could be undermined if there is a lack of understanding on why the results differ.*"

The NICOLE study aims to benchmark and compare the models, their origins, explain where they are different, and to compare their results with actual field data. It does this by running 12 models against a generic (hypothetical) data set, and against five (real) case studies. It does not seek to 'rank' the models in terms of 'suitability' or 'confidence'. The RA models evaluated were: CLEA, JAGG, P20, RBCA, RISC, Risc-Human, ROME, SFT 99:06, UMS, Vlier-Human. The NICOLE Report lists their Authors, Websites, Origin, Age, Language, etc.

4.1.2.2. European Soil Remediation Controls

The information on national control mechanisms on land redevelopment, covered in specific detail in a paper at CONSOIL 2003 (Lowe, Vijgen & Summersgill), does not necessarily provide a full picture of how the national approaches impact on individual remediation projects. As a simple example, the regulatory systems in the UK and Denmark may allow exemptions for particular processes or scales of activity. It is not clear whether systems based on approval of site remediation plans actually apply in practice in all or any other countries.

The impact in practice of a national (waste) regulatory system will in part be determined by how easy it is to navigate through the administrative processes for applying for a permit or licence, and what other conditions may apply (with, for example, financial guarantees). The effectiveness of regulation will also depend on the particular approach of individual authorities within any state or country.

It should also be stressed that the overall administrative and policy framework is potentially wider than just these aspects of regulatory control. Some particular tax instruments have an impact on the choice of remediation approaches, but probably not all of them. The availability and basic pricing within the market of different approaches – particularly landfill costs/taxes – will also be critical.

The question of 'sustainability' is not often mentioned by the contacts so far in several countries; the chief driver in most countries remains economic. The major constraint in many countries appears to be legislative or administrative, not technical or intellectual.

General information about the legal and regulatory background can be found in Deliverable 1.1 (Report on different brownfield regeneration contexts: The case of France, Germany, Poland and the United Kingdom).

Information about the legal and regulatory aspects that act as incentives or obstacles for sustainable brownfield regeneration are described in Deliverable 2.5.2 (Incentives…).

4.1.2.3. United Kingdom

The UK legislation, as enshrined in the Environment Act 1990 and subsequent legislation, adopts the principle of risk-based assessment as the means to determine the acceptable levels of contamination that may remain in the ground or groundwater. The UK Environment Agencies have been at the forefront of developing suitable tools (such as the CLEA website) to allow for this risk-based evaluation. By adopting the Source-Pathway-Receptor model, then it may be possible to mitigate (or even nullify) risk by removing or modifying any of the three elements of the equation. Thus, in locations where a Receptor is not at risk of 'significant harm' or there is no evident short/medium-term Pathway, the contamination in the ground may not require any remediation and thus a 'Quality Standard' will be assessed that may be very different from that at another Site with similar pollution but sensitive or adjacent receptors.

There is a particular dichotomy being considered in the UK at present, related to 'quality standards' in the ground, where 'opposing' regulatory actions are causing difficulties. The problem is said to relate to European Directives being disharmonious, but it may be the British legal interpretation which is the problem. However, Scandinavia and Holland have reported a similar 'legal' hiatus and concern over soil standards in ground, as a result of the Landfill, Waste, Water and (forthcoming) Environmental Directives having differing wording/meanings.

To give a brief example, if a Risk Assessment deems the limit / target for a English site to be TPH of 2000 mg/kg, then any soil dug out from a zone where it is >2000 has to be treated to achieve a level below 1000 mg/kg before it can go back into the hole it came from. This is due to Hazardous Waste category having a target List (TPH=1000), not a risk figure; and Hazardous Waste cannot be placed 'into' a development (unless a Waste Licence Facility is created and licensed ad infinitum). This means biotreatment has to go on for much longer time/cost, and the ultimate result is that a clean(er) backfill is placed next to (not dug) hazardous soil left in the ground under a risk assessment agreed with the same Regulator.

4.1.2.4. France

France does not have specific legislation addressing the core aspects of environmental liability. Nevertheless, since the publication of a key Ministerial circular in December 1993, the French authorities have pursued a vigorous programme of identifying and cleaning up polluted sites. This has relied mainly on the 1976 law on classified installations and, to a lesser extent, a 1975 waste law (no. 75-633 of 15 July 1975), as amended by a 1992 law (no. 92-646 on waste disposal and classified installations) The whole regime has been supplemented by numerous pieces of secondary legislation, in the form of decrees and circulars.

Alongside the process of identifying and registering sites, considerable work has gone into a new national approach to risk assessment, including a scoring system based on the three elements of source, pathway and receptor, and progressively more invasive site investigation where initial data warrant it. One of the key circulars was a Ministerial circular of 10 December 1999 on contaminated sites and soils, and the principles for determining remedial objectives. Clean-up standards are based on current and future uses of the site and its surroundings, with four receptors considered: humans, water resources, eco-systems and buildings, and should be determined specifically for each site. Remedial objectives are intended to be both economically and technically realistic but, in order to police use-based requirements, administrative tools are being included to freeze future use of a site and require a new risk assessment if a change to a more sensitive use is proposed.

In principle, there are no formal exemptions for site developers and purchasers who wish to do physical work with a view to bringing it into a useful condition. However local enforcement authorities (DRIRE) are willing to reach voluntary agreements with such parties but, as in other countries, their legal position appears to be very unclear; for example, in the event of new pollution being discovered or arising. There is continuing discussion about policies to address brownfields issue.

4.1.2.5. Germany

In Germany, each federal state (Bundesland) has the regulatory responsibility for contaminated sites, including the registration, investigation and risk assessment of all abandoned sites suspected of contamination. Accordingly

each state has its own respective regulatory framework; however there are important nationwide legal underground quality standards. These were fixed in the Federal Soil Conservation Act[3] in 1998; followed by the technical and regulatory details in the Federal Soil protection and Contaminated sites Ordinance4 from July 1999, concerning soil protection, risk assessment and remediation.

This Ordinance includes threshold values (action, trigger and precautionary values) for parameters that have a sufficient scientific justification[5]: The set of parameters is continuously being expanded. Parameters which are not (yet) covered by the Federal Soil protection Ordinance are dealt with individually by each federal state. Contamination of groundwater is also dealt with in this Ordinance; however groundwater and water contamination as such are regulated by the Water Resources Act on federal and state level.

Concerning an obligatory forecast of contaminant leaching towards the groundwater, official recommendations exist (Sickerwasserprognose)[6] or are being developed. The general approach and quality standards for risk assessment and risk based land management are also fixed by this Ordinance. However, these details are regulated by each federal state, in consistence with the mentioned Act and Ordinance. The federal states also have fixed qualification standards for experts dealing with contaminated sites.The local authorities are normally the decision-makers; polluters and land owners are also involved. Individuals or institutions who may be affected by any remedial actions must be informed, and they may demand consultation and involvement in all stages of the decision-making process. Further regulatory aspects are covered by other laws and ordinances, e. g. the Closed Substance Cycle and Waste Management Act, which gives priority to recycling or energy recovery instead of dumping.

4.1.2.6. Poland

Today the situation, for the Polish sites, reflects the current situation for the Central European New Member States and illustrate the significant disparities between EU 25 countries. The State intervention aimed at developing the regions lagging behind or suffered from economical and social degradation resulting from declining of some branches of industry.

This issue has been recognised as a one of the priority of European Community policy since 1974 and thus has been supported widely by Structural Funds, namely by the European Regional Development Fund (ERDF). For the ERDF planning period of 1994-1999 the support has been provided within the

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[3] Several elements of these acts are regarded as very helpful for a sustainable brownfield regeneration, which were therefore described in (e. g. § 13 (4) and (5)) the „incentives deliverable" <or whatever its final name>.

[4] Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung) of Germany: http://www.bmu.de/en/1024/js/download/soil/b_federal2 (in English)

[5] As this list of scientifically acknowledged threshold values may be helpful for countries, where such values still don't exist these are included in the tools compilation (tool No. 14)

[6] see http://www.labo-deutschland.de/SiWaPro_%20OU_12092003.pdf (in German)

framework of Objective 2 - *Converting regions seriously affected by industrial decline* (as one of 6 objectives of Regional Policy). During this period a significant number of brownfield projects have been carried out allowing to develop expertise of the Member States in efficient management of this type of project, as well as to allow them to solve the most crucial brownfield cases.

For the New Member State this issues have already emerged and in most cases, it is not the first priorities for them due to significant demand for public funding resulting from investment related to framework directives connected with air quality, municipal waste-water and waste management. For instance, for Poland, this expenditure amounts to some 50 billion € for the next fourteen years with a majority of expenditure devoted to air and water. This situation requires to double the current country expenditure for the environmental projects. At present, in Poland some 2 billions € are dedicated to environmental investment, and only 5% of this goes to priority named "earth protection", which includes projects related to waste management and cleaning of contaminated sites, but mostly to municipal waste management projects.

4.1.3. Quality Standards for recycled material

4.1.3.1. European Situation

A Standard constitutes the template for what product properties need to be accounted for, how these properties shall be measured, and how different pre-treatment and manufacturing procedures have to be classified and described. To make a Standard meaningful in practice, it is necessary to give it acknowledged status so many parties become interested in joining and using it. Standards ensure product quality and facilitate comparison between products in order to make it possible for the customer to understand what is being offered, and to fulfil different safety and environmental demands more consequentially.

To recycle a resource, there is need of good waste separation, satisfactory logistics, enough material volume in the collection stage, efficient technologies in the treatment stage, and interested buyers in the outlet stage. Too often, the market represents the brake in this chain. There is now an understanding that standards for recycled materials are needed to really raise the interest in recyclates, when producing new and qualified products. It is impossible for recycled materials to compete with virgin materials on a wide front, if they do not become specified in a similarly adequate way.

European co-operation processes have started to produce standards for recycled tyre and plastic materials, respectively. As regards tyre materials, the European Tyre Recycling Association (ETRA) has prepared a basis document (CWA) for a standard, in close co-operation with a large number of organisations and companies. The final standard will be formulated by the European standardisation body (CEN). Concerning plastic materials, the work is completely channelled through CEN and started as late as in February, 2002. National mirror groups and expert groups contribute with the foundation material to the European working groups that CEN organises within the different areas, respectively. European directives are continuously bringing into force stricter controls to help minimise waste, and the most common

requirement has been to recycle wastes. Some extracts from the European directives where recycling targets have been imposed on member nations are presented below:

- Batteries Directive (91/157/EEC & 93/86/EEC): at least 55% of all materials contained in the collected spent batteries to be recycled.

- Packaging and Packaging Waste Directive (94/62/EC): sets targets of 50% recovery and 25% recycling by 2001; proposed new targets for 2006 in the Directive: 60-75% target for recovery; 55-70% target for recycling;

- End of Life Vehicles (ELV) Directive (2000/53/EC):
  - by 1st January 2006, for all end of life vehicles, re-use and recovery shall be increased to a minimum of 85% by an average weight per vehicle and the re-use and recycling shall be increased to a minimum of 80% by an average weight per vehicle;
  - by 1st January 2015, for all end of life vehicles, the re-use and recovery shall be increased to a minimum of 95% by an average weight per vehicle and the re-use and recycling shall be increased to a minimum of 85% by an average weight per vehicle and further targets will be set for the years beyond 2015;

- Proposals for a Waste Electrical and Electronic Equipment (WEEE) Directive: setting of recovery and recycling targets according to product category; targets divided into overall recovery element, of which a certain amount must be achieved through recycling, component or substance re-use (as opposed to, for example, incineration with energy recovery); targets range from 50% - 80%;

- Construction and Demolition (C&D) Waste:
  A working document has been produced for the Commission, which makes a series of proposals for interventions to boost prevention, re-use and/or recycling. These proposals suggest overall re-use and recycling rates of between 50% and 75% in 2005 and between 70% and 85% in 2010.

4.1.3.2. United Kingdom

The UK government is encouraging greater use of recycling, where this represents the Best Practicable Environmental Option for particular waste streams. This is achieved by encouraging development of recycling infrastructures, continuing the producer responsibility initiative, and reviewing manufacturing and purchasing standards to ensure that they do not unnecessarily discriminate against recycled materials (government baseline statement: Making Waste Work, 1995). The government is also encouraging a number of voluntary organizations which offer a range of services in recycling industry by providing matched funding. Examples are: "Cash from trash", "Buy recycled", and "Waste watch".

An example of a materials exchange within the UK is the DEFRA's Materials Information Exchange (hosted by the Building Research Establishment (BRE)), which allows the construction industry to buy and sell used, second-hand and unused construction materials over the internet.

Also an increasing number of community organisations are also active in promoting the re-use of items that would otherwise end up as waste. These include for example:

The Furniture Recycling Network - the umbrella organisation for around 300 furniture recycling projects throughout the UK :

- CREATE ("Community Recycling Enterprise and Training for Employment") - a charitable trust that refurbishes and sells white goods

- WRAP – The Waste and Resources Action Programme
  WRAP was established in 2001 in response to the UK Government's Waste Strategy 2000 to promote sustainable waste management. WRAP gained additional responsibilities in 2003 as a result of the Government's response to the review of waste policy undertaken last year by the Prime Minister's Strategy Unit ('Waste Not, Want Not: a Strategy for Tackling the Waste Problem in England'). WRAP is set up as a not-for-profit company limited by guarantee by DEFRA, the DTI, and the devolved administrations of Scotland, Wales and Northern Ireland.

WRAP's initial programmes of work concentrate on:

- creating stable and efficient markets for recycled materials and products for the 100 million tonnes of waste accounted for by commercial, industrial and municipal waste (this includes waste from houses, offices and factories)

- specific work in five material streams: aggregates, glass, organics, paper, plastics, and wood, supported by work in three generic areas: financial mechanisms, procurement, and standards.

Thus one aspect of WRAP's programme (aggregate recovery) has direct relevance to RESCUE matters, and others have peripheral relevance. Other initiatives run in parallel in the regions. The Wales Environment Trust Ltd was established in 1996 as a private company limited by guarantee and was originally incorporated to fulfil the role of an Environmental Body as defined by ENTRUST. The Wales Environment Trust offers expert advice and support to private, public and community organisations to develop sustainable waste solutions for Wales. The company has grown steadily and set itself a mission:

'to position Wales internationally as a nation innovative and effective in the minimisation of the environmental impacts of waste'.

4.1.3.3. France

In France, there are no specific environmental quality standard for soil or recycled material, the only condition being that their use should not add any additional health risk to the population (in some instance environmental risk is also considered). Hence, health risk and sometimes also environmental risk-based approach should be undertaken each time, which is expensive and time consuming. As a consequence, unless all this process is integrated from the

very beginning of the project, and with a particular will to achieve this, soil recycling is seldom invoked: too small added value for too much cost.

The situation is quite different for deconstruction material, where specialised processing plants tend to develop, and for which added value makes dumping too expensive. In addition, there is a more directed will from public administration (mainly locally, but within a national regulatory framework that favours it) and from corporate organisations, to enhance recycling of such material: concrete, brick and earthen material, iron. Recyclable material exchange facilities are hosted in the web by different corporate organisations (mainly major waste processing companies, or corporate institutions such as Regional Offices for Trade (Chambres de Commerce Régionales).

Existing standards can be found in two places: administrative and corporate directories.

They mainly concern technical properties, rather than chemical or environmental (unless these latter directly act on technical properties). In general, conditions are set up to evaluate pollution potential of candidate reused material, through leaching tests and phase speciation. Compensatory measures may also be included, if necessary (specific collection and treatment of leachates, surface and underground water survey…

4.1.3.4. Germany

The reuse of recycled matter (including soil and debris) is generally subject of each federal state. Therefore several guidelines or quality standards exist in several states. Some of the standards are based on voluntary agreements, e.g. between a building industry association and a state government.

An overview of some threshold values for several parameters (including those from the LAGA Z-values as well as several ordinances and conventions) is given in the description of tool no. 26 : Guidebook for controlled deconstruction: characterisation, valorisation and management of contaminated debris (Arbeitshilfe Kontrollierter Rückbau: Kontaminierte Bausubstanz Erkundung, Bewertung, Entsorgung) of the federal state of Bavaria (Bayerisches Landesamt für Umweltschutz), downloadable at http://www.bayern.de/lfu/bestell/rueckbau_arbeitshilfe.pdf . This guideline describes e. g. different standards for a material reuse for road building (with and without impermeable cover), landfilling or mining overburden.

Standards for 21 parameters, which are valid for all states were issued in 2003 by the Länderarbeitsgemeinschaft Abfall: (Länder Cooperation Waste – supplied by the Environmental Ministries of the German federal states) in the Threshold values (Z-Zuordnungswerte or Einbauklassen) within the LAGA guideline "Anforderungen an die stoffliche Verwertung von mineralischen Abfällen – Technische Regeln" (Requirements for the recycling of mineral wastes – technical rules" - used for soil disposal / reuse classification) (see tool no. 2.14)[7].

[7] threshold values:
http://europa.eu.int/comm/environment/waste/studies/compost/landspreading_annexes3.pdf

4.1.3.4. Poland

The Act of 27 April 2001 on Environmental Law (Journal of Law, No. 62, item 627 with later amendments), and the Act of 27 April 2001 on wastes stimulated a market for services related to waste management generated by the construction industry. The transposition of the requirements of the Landfill Directives to Polish legislation creates a good condition for companies, which are specialised in the demolishing of buildings and the processing of rubbles into aggregates for reuse.
A number of companies, having a core business related to this field, has been established. Most of them hold quality management certificates (ISO 9000 series and Environmental Management System series 14000).

Such aggregates are used mainly for the construction of roads, but such usage required the elaboration of detailed technical plans of the roads.

The wastes generated during demolishing works are classified as group 17 according to the European Waste Catalogue. They might be either hazardous or neutral depending on their physical and chemical characteristics. The base for such classification is the Regulation from the Minister of Environment of 13 May, 2004 on condition for classification of waste as hazardous (Journal of Law, No. 129, item 1347). The Regulation from the Minister Environment of 9 September 2002 on the quality standards of soil and the quality standards of earth (Journal of Law, No. 165, item 1359) is used for the determination of the usage of soil.

Currently there is no specific environmental quality standard for recycled materials in Poland apart from product standards. However, a Material Recycling Centre of Excellence has been established at the Wroclaw University of Technology.

The Centre is supported by partners from 14 EC states, and 6 other European states. The activities of the Centre are focused on logistics, technology and economy of re-use, recovery and recycling of waste materials generated by different sectors:
It involves three complementary strategies:

- eliminating waste at source by improving product design;
- encouraging the recycling and re-use of waste;
- reducing the pollution caused by the wastes incineration.

The research projects and dissemination of knowledge co-ordinated by the center will be focused on the implementation of new products and the training at a pan-European level. The Network is focused on searching for innovative recycling technology, efficient and cost effective waste management systems and enhancing the market value of the products made of recycled materials.

(screen pages 7 and 8)

Framework: http://www.laga-online.de/mitteilungen/docs/AllgTeil%20Endfassung%20031106.pdf

(0,6 MB, in German; English translation under development)

4.2 The case studies

4.2.1. Objective 1: To reduce negative environmental impacts on the site and on the neighbourhood including human health risks

The tables presented in annex 5 summarise the comparative analysis of the different case studies in relation with the sustainable objectives and their respective indicators. Due to the spread out over 15 years of the different case studies, it appeared necessary to discuss what could have changed in the achievement of these projects in the present context (different approaches, legal context, etc.). The following discussion summarise the findings and the update of this analysis.

4.2.1.1. France

During fieldwork, no specific practices regarding noise or dust emission have been developed for the sites. At the time of the projects development, no legal obligation existed: the level of ambient noise has not been measured and no complaint recorded. This can be however explained by the fact that at this time there was no residential area nearby.

4.2.1.2. Germany

In both German sites, noise had little relevance because there were no neighbours very nearby. However a few complaints about smell has been recorded in one case.

There were a few legal changes since case studies analysis. A new federal law about air immission, noise, vibration and similar processes (Bundes-Immissionsschutzgesetz) has been enforced in 26th of September 2002. Several relevant ordinances also were enacted meanwhile.

4.2.1.3. United Kingdom

There has always been a requirement to monitor and report environmental impacts, but it is the case that the Public are now more 'active' about reporting any perceived problems. So the measurement becomes more complex, comprehensive and wider ranging. However, it must be recognised that one of the UK sites has only just commenced sitework, and the other site is nearing the end of sustained construction, where the project has been running for ten years. During this period, some quite substantial legal changes occurred (European Directives in Water & Waste, CDM and H&S Regulations amended). These have been adopted into contracts as and when legal changes were enforced.

4.2.1.3. Poland

Polish environmental law complies with European Union legislation regarding air emissions, noise, vibration and environmental standard. Transposition of EU requirements started back from the early nineties resulting in gradual cohesion of this law. Currently the main problem is the enforcement of this environmental law and the build up of the institutional capacity for its implementation.

Due to the nature of activity located on the Polish case study sites, soil contamination was not actually a major concern. This was the case for the external case study, where chemical activities left over contamination of soil and threats to the under-ground water.

4.2.2. Objective 2:To minimise waste and maximise recycling and reuse of soil and debris

4.2.2.1. France

The waste management (reuse of soil and debris) was not considered as formal issue on both sites, but:

- For the big leisure place development project, 200 000 m^3 of chalk coming from the digging of the lake were re-used for erecting the artificial ski slope;
- For the urban project, the small amount of contaminated soils removed during field works, were diluted with other materials before evacuation to an appropriate landfill.

4.2.2.2. Germany

The §31 of the Waste Law of the state of North-Rhine Westphalia (1988 - 1998) made it possible to deposit contaminated soil on the site. This possibility was later adopted in the § 13 (5) of the Federal Soil protection act (Bundes-Bodenschutzgesetz), which partly replaced the state law. Since then this practice is possible all over Germany.

Several legal and administrative changes have taken place since the beginning of the works on the German case studies, the most important regarding remediation being the enactment of the Federal Soil protection act (Bundes-Bodenschutzgesetz) in 17th of March 1998 and of the Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung in 12th of July 1999). Other changes concerned waste depositing and recycling, such as the Waste Avoidance and Management Act (Kreislaufwirtschafts- und Abfallgesetz) of 27th of September 1994.

4.2.2.3. United Kingdom

As the individual projects were Contractor-led, the decisions on waste minimisation were always cost-driven and unable to be environmentally 'cost-

amended'. There is now, since introduction of Aggregate Levy and Landfill Tax in the UK in the last 3-5 years, a driver to implement waste management issues on construction sites in UK. It appears to have been necessary to introduce an economic instrument to change constructional practices in the UK.

4.2.2.4. Poland

Waste management principles required by the Act of 27 April 2001 on Environmental Law (Dz.U. 2001.62.627 of 20 June 2001 with later amendments) and the Act of 27 April 2001 on Waste (Dz.U.2001.62.628 of 20 June 2001 with later amendments) have been applied for both Polish sites.

4.2.3. Objective 3: To ensure cost effectiveness and technical feasibility

4.2.3.1. France

No systematic approach has been considered for the two case studies.

For the small scale project with little health incidence potential, the absence of post remediation analysis (post-validation budget and report, post-remediation monitoring data…) this can easily be explained. For the larger scale project with long term potential exposition of the population to pollution, different levels of land use restrictions were defined, and a ground-water quality monitoring was implemented.

4.2.3.2. Germany

There was a steady progress concerning the efficiency and effectiveness of risk assessment, site investigation and remediation techniques. The gathered experiences were also used as a base for several guidelines, which were updated several times and used at both sites.

Since 1995 the Contaminated Site Management Method of Saxony (Sächsische Altlastenmethodik SALM), systematic approach for risk assessment and remediation planning had to be followed on this site. This helped to improve effectiveness and efficiency, to avoid mistakes and to standardise the entire process. However meanwhile parts of the former SALM are outdated and replaced by other rules, mainly due to the federal soil legislation.

4.2.3.3. United Kingdom

No consistent construction cost directory yet exists for remedial or brownfield projects, although there is a well-established cost-evaluation business in the UK, based on a 'profession' of quantity surveying and a plethora of published data books. On the Gateshead project, the nature of the iconic structures was such that cost-estimation, which had to be made professionally for the public grant applications, was still found to be inaccurate. This applied to visible above-ground structures, so would have been similarly applicable to remedial

groundworks. Decisions made by Contractors on site, about technical options for soil treatment, are still being made on comparability with disposal cost to landfill (but this is about to be changed as the Landfill Directive is implemented, and landfill availability and costs substantially alter upwards).

4.2.3.4. Poland

Several feasibility studies have been prepared in both case study sites for the selection of cost effectiveness of measures for the project execution. These studies have been audited through the procedures applied by environmental funds Agencies, which support the financing of the project. In the case of first phase of a former mining site redevelopment, the demolition works have been supervised by the High Mining Authorities within the framework of the State Hard Coal Industry Restructuring, with a follow up from the World Bank. For the second phase of this site redevelopment, a conceptual study was prepared and approved by the Municipality. Currently there are additional studies under preparation allowing its qualification by Silesian Marchal Office, as a pilot project financed by the Governmental Programme dedicated to brownfield redevelopment (The Programme has been approved by Government on 28 of April 2004). This programme is at its initial stage.

4.2.4. Objective 4: To improve social acceptance through identification of all stakeholders and risk communication

4.2.4.1. France

For both sites, no documented strategy existed but conflicts were managed through a the strong driving project leadership.

The urban redevelopment program was based on the partition of the site into different soil parcels: roadway systems and two major pieces of public equipment, theatre and University. The Town Council carried out the marketing of the soil parcels to public and private promoters. Public attitude was indifferent since there are only few dwellings around this former industrial site.

The only reported external reaction concerned the leisure project in Noeux les Mines, where an ecological association ("Noeux-Environnement") wondered about the potential consequences of pumping ground water to supply the new lake. The complaint was rejected by the Commissioner of the Government.

4.2.4.2. Germany

Concerning this objective no major legal or other framework is known regarding contamination or remediation, nor are any known changes.

4.2.4.3. United Kingdom

Active risk communication has always been the case on the two UK projects, as they are substantially public-led and require community acceptance. No significant change in risk communication would appear to have occurred at Gateshead over the past decade, and there has been detailed consultation about options at Markham with the various stakeholders. The UK public perception of 'risk' over the past decade has been a continuing, and becoming less rational with time, requirement for 'risk' to be removed completely from their local environment. This has probably been due to irresponsible mainstream press reporting of some events, but also a loss of confidence in scientific pronouncements on several national issues. Such reaction has NOT been evident in public participation at the two UK RESCUE sites.

4.2.4.4. Poland

In both Polish sites the elaboration of an Environmental Impact Assessment is required by the Construction Code and is considered as the primary tool to achieve social acceptance and communicate on environmental risk. Web page, newspaper articles and public meeting in Town Halls have also been used to inform public on project execution.

4.2.5. Objective 5: To provide decision support tools for risk based land management

4.2.5.1. France

The present French approach to contaminated-land management was developed in the mid 1990's. Before that period, no formal decision support tool was clearly identified for the management of contaminated sites (the two case studies started in the 80's).

It is mainly for this reason that many specific data such as noise, air quality, waste and debris management, risk communication,… are often not well, documented.

One more urban brown field project has been chosen as representative of the 1990 situation, where the official decision support set of tools for risk based land management was used : Preliminary Site Investigation, Simplified Risk Assessment, Detailed Site Investigation, Detailed Risk Assessment.

This project has reached the Detailed Risk Assessment step, and the remediation phase has not begun yet. Hence, only objective 5 is relevant to this project, as objectives 1 to 4 are mainly dealing with remediation.

4.2.5.2. Germany

Several tools were used in the German case study sites, however not always from the beginning of the projects.

4.2.5.3. United Kingdom

Different level decision support systems were used according to the relevance of the situation, from a "normal" feedback between projects on site and Council "control" using standardised software as tool (Gateshead), to a standardised risk-based approach (Markham), applying the risk assessment and option appraisal mechanisms as suggested in the draft Model Procedures, produced by the Environment Agency (2003). On neither site could the decision support tools utilised be considered innovative or advanced, or brownfield-related.

4.2.5.4. Poland

Decision support tools are in use in all Polish case study sites. Regulation issued from the Ministry of Environment (2003) is based on Dutch standards. Prior to this, the guidelines prepared by the State Environmental Inspectorship were in use.

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CHAPTER 5.

GOOD/BEST PRACTICE DISCUSSION

Chapter 5. Good/best practice discussion

This chapter presents the results of the analysis of the 8 RESCUE case studies which resulted in the classification of identified interesting (in the terms of sustainable brownfield redevelopment) practices into: "promising good"," good", "promising best" or "best" according to the following definitions set by the RESCUE team:

- A good practice is a practice that helped to reach a RESCUE sustainability objective and which is widely applicable at a national level (within one of the 4 RESCUE countries)

- A best practice is a good practice that is transferable and widely applicable at a European level (the 4 RESCUE countries + the SVT countries)

- A promising good practice is a practice that has not yet demonstrated to have helped to reach a RESCUE sustainability objective, but has a high potential for success on a national level (within one of the 4 RESCUE countries)

- A promising best practice is a practice that has not yet demonstrated to have helped to reach a RESCUE sustainability objective, but has a high potential for success on a European level (the 4 RESCUE countries + the SVT countries).

The analysis was based on the data collected from interviews and going through project documents. The sustainability objectives (Chapter 3) served as the framework for this investigation. They operate and specify the definition of sustainable management of brownfield projects and were therefore the standard whereof the practices / data had been checked. This method guaranteed a structured and purposeful approach, assessing all case studies against a general yardstick.

Taking into account that neither the objectives and indicators nor the case study sites can always and fully cover the whole topic of brownfield redevelopment additional external examples were included if the data available in the 8 case study sites were too scarce.

The preliminary "estimation of transferability" of an interesting practice to other European counties was cross-checked by the other RESCUE WP2 partners and the Stakeholder and Validation Team (SVT) and resulted in their final allocation. The results of this cross-check are presented in
annex VII.

Objectives – per wp	Practices	Sustainability dimensions			
		Social	Environmental	Economical	Institutional
To reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works	2.1.1. To undertake sufficient measurement to assess all environmental impacts	++++	++++	++++	
To minimise waste and maximise recycling and reuse of soil and debris	2.2.1. To implement an on site waste management platform	++++	++++	++++	
	2.2.2. To adopt a waste management plan to optimise recycling and reuse of soil and debris		++++	++++	
	2.2.3. To use the economies of scale to deal with non-economic size (cluster approach)		++	++	
	2.2.4. To minimise transport needs of contaminated soil and waste material i.e. To manage slightly contaminated material on site or nearby		++++	++++	
To ensure cost effectiveness and technical feasibility	2.3.1. To apply a model procedure for verification of the entire remediation process			++++	++++
	2.3.2. To use a directory of costs and services for contaminated sites redevelopment			++++	
To improve social acceptance through identification of all stakeholders and risk communication	2.4.1. To apply public communication and participation	++++			
	2.4.2. To set up an awareness-raising campaign to avoid social resistance	++++			

Objectives – per wp	Practices	Sustainability dimensions			
		Social	Environmental	Economical	Institutional
To provide decision support tools for risk based land management	2.5.1. To adopt effective decision support tools for risk based land management	++++	++++	++++	++++
	2.5.2. To adopt a step-wise site investigation and evaluation procedure	+++	+++	+++	+++
	2.5.3. To use standard risk assessment and option appraisal procedures	++++	++++	++++	++++
	2.5.4. To implement digital soil masses modelling in order to reduce soil transport		++++	++++	
	2.5.5. To use gis / gps as a tool for absolute reference of sampling points, in order to keep trace of them after site / area reorganisation		++++		

Best practice	++++
Good practice	+++
Promising best practice	++
Promising good practice	+

5.1. Discussion

The tables in annex VI show in detail how each project has integrated the RESCUE sustainability objectives.

Objective 2.1: To reduce negative environmental impacts on the site and on the neighbourhood including human health risks

The practice "To undertake sufficient measurements to assess all environmental impacts" concerns two complementary objectives, Objective 1 and Objective 5. A transferability check analysis showed that this practice is completely transferable to other countries. According to RESCUE definitions it is therefore considered as Best Practice.
This practice corresponds to the environmental and social dimensions of the 4 dimensions of sustainability for the following reasons;

- The practice helps with monitoring of the environmental condition of the site (air, surface water, groundwater and soils). As is shown within the case studies, it uses standards to control and to manage potential environmental impacts coming from the site during fieldwork;

- Since the practice includes the record of complaints and incidents during characterisation and remediation phases, and/or the number of measurements excessive noise, the social aspect is covered.

Objective 2.2: To minimise waste and maximise recycling and reuse of soil and debris

The case studies analysis identified the four following practices to address objective 2:

- Practice: To implement an on site waste management platform;
- Practice: To adopt a waste management plan to optimise recycling and reuse of soil and debris
- Practice: To use the economies of scale to deal with non-economic size (cluster approach)
- Practice: To minimise transport needs of contaminated soil and waste material i.e. to manage slightly contaminated material on site or nearby

These four practices aim to minimise waste and to maximise recycling and reuse of soil and debris, but the way to reach this objective is different. According to RESCUE definitions, the first and second practices are Best Practice, whereas the third and the fourth ones are Promising Best Practices.

Comparing the two first practices, the first one can be complementary to the second one: the implementation of a one-site waste management platform could be a part of a waste management plan. The second practice is a planning concept (all options are planned before the beginning of works), whereas the first one is principally based on site material recycling, which can be adapted

during fieldwork according to different situations depending on the type and quantity of material produce.

The first two practices integrate the environmental and economical dimensions of the 4 dimensions of sustainability: First, they reduce pressure on environment by waste minimisation (limitation of soil and water contamination, reduction of transport of wastes…); Second, debris recycling and reuse of soils bring economic values to the project.
The cluster approach is based on the concept of temporary soil treatment centres to recover contaminated materials to a standard such that they are suitable for use at particular sites. These temporary remediation centres are a way to reduce environmental impacts coming from contaminated soils and wastes treatment. Economic aspects are considered since the pre-treatment required for all hazardous wastes before landfill disposal allows a reduction in costs (landfill disposal costs, treatment costs, transport costs,…).
The final practice, which aims to minimise the transport needs of contaminated soil and waste material is similar to the second one, and can easily be included in a waste management plan.

Objective 2.3: To ensure cost effectiveness and technical feasibility

The case studies presented in the analysis identified two practices to illustrate objective 3:

- Practice: To apply a model procedure for verification of the entire remediation process
- Practice: To use a Directory of Costs and Services for contaminated sites redevelopment

Both practices ensure cost effectiveness and technical feasibility of the project. The transferability check analysis indicated that both are transferable to other countries. Consequently, according to RESCUE definitions, they are considered as Best Practices.
Comparison of these practices shows that the first one integrates two dimensions of sustainability :
- Economic – The use of standard procedures reduces the cost of project management, and
- Institutional – It requires the retention of formal records of previous site activities and makes possible a sustainability check of the project management.

The second practice is a tool for better and easier cost estimation, and covers economic aspects only.

Objective 2.4: To improve social acceptance through identification of all stakeholders and risk communication

To support objective 2.4 two practices are identified:

- Practice: To apply public communication and participation.
- Practice: Awareness – raising campaign to avoid social resistance.

Those practices support a social dimension of sustainable remediation and both are recommended as completely transferable, and from this point of view are considered as Best Practices.

The importance of the first practice, as a general approach toward full integration of all directly and indirectly involved stakeholders in the remediation project, has to be highlighted.

The second practice is a complex tool which aims to obtain social acceptance for project.

Comparing these practices, the second one can be complementary to the first: the implementation of an awareness-raising campaign could be a part of a holistic communication and citizens' participation strategy.

Objective 2.5: To provide decision support tools for risk based land management

The case studies analysis identified the five following practices that address objective 2.5:

- Practice: To adopt effective decision support tools for risk based land management
- Practice: To adopt a step-wise site investigation and evaluation procedure
- Practice: To use a standard risk assessment and option appraisal procedure
- Practice: To implement a digital soil masses procedure in order to reduce soil transport
- Practice: To use GIS / GPS as a tool for absolute reference of sampling points, in order to permanently record their location after site / area reorganisation

All listed above practices exemplify decision support tools for risk based land management.

The first three practices are fundamental measures aimed at optimising costs, environmental protection, public health and safety, and accountability. Hence, they are multidimensional and cover all four sustainability dimensions The fourth practice is an operational procedure that aims at cost reduction and reduced transport movement. Hence, it integrates environmental, social and

economic dimensions. The fifth practice is a monitoring measure that aims at reliability of records. It therefore covers only environmental aspects.

These practices have all been subjected to a transferability check analysis, which indicated that they are all transferable to other countries. Consequently, according to the RESCUE definitions, they are considered as Best Practices.

RESCUE
www.rescue-europe.com
Regeneration of European Sites in Cities and Urban Environments

CHAPTER 6.

TOOLS AND RECOMMENDATIONS

Contents

2.5. Tool n° 16: ECO guidebook for professional: building works (ECO Guide Professionnel: Chantiers du bâtiment)
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2.7. Tool n° 18: Environmental Restoration Waste Management Guide
2.8. Tool n° 19: Local Plans for construction waste management (Schémas Territoriaux de Gestion des déchets de construction)
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2.11. Tool n° 22: Ground engineering spoil: good management practice
2.12. Tool n° 23: Characterisation Of Building-Related Construction And Demolition Debris In The United States
2.13. Tool n° 24: Construction and Demolition (C&D) Waste Management Guide
2.14. Tool n° 25: Demolition Protocol
2.15. Tool n° 26: Guidebook for controlled deconstruction: characterisation, valorisation and management of contaminated debris (Arbeitshilfe Kontrollierter Rückbau: Kontaminierte Bausubstanz Erkundung, Bewertung, Entsorgung)
2.16. Tool n° 27: Guidelines for Preparing Waste Reduction Strategy for Construction
2.17. Tool n° 28: Environmental Handbook for building and civil engineering projects. Part 3: demolition and site clearance
2.18. Tool n° 29: ECO-LIVE: a software for construction waste management

Objective 3: To ensure cost effectiveness and technical feasibility

3.1. Tool n° 30: Model Procedures for the management of land contamination (Contaminated Land Report 11)
3.2. Tool n° 31: US EPA Triad approach
3.3. Tool n° 32: ASTRES Data base (Banque de données)
3.4. Tool n° 33: SITE Superfund Innovative Technology Evaluation
3.5. Tool n° 34: Innovative Remediation and Site Characterization Technologies Resources
3.6. Tool n° 35: RefAS : catalogue of references of contaminated site remediations (Referenzkatalog Altlasten / Schadensfallsanierung)
3.7. Tool n° 36: Site investigation Cost-Benefit Analysis calculator
3.8. Tool n° 37: Directory of Costs and Services for contaminated sites redevelopment (Leistungsbuch Altlastensanierung & Flächenentwicklung)

Objective 4: To improve social acceptance through identification of all stakeholders and risk communication

4.1. Tool n° 38: risk communication program for consulting and individual assessment on contaminated sites (Risikokommunikationsprogramm zur Beratung und Einzelfall-prüfung auf kontaminierten Standorten)
4.2. Tool n° 39: Environmental management dashboard; environmental perform-ance indicators, management and communication tools (GERMAINE Project). [Votre tableau de bord de gestion environnementale; Les indicateurs de per-formance environnementale outil de gestion, outil de communication (Projet GERMMAINE)]

4.3. Tool n° 40: Best Practice Guidelines on Public Engagement for the Waste Sector
4.4. Tool n° 41: Guideline on Community Consultation and Risk Communication
4.5. Tool n° 42: A Standard Land Condition Record

Objective 5: To provide decision support tools for risk based land management

5.1. Tool n° 43: Assessing Risks from Contaminated Sites: Policy and Practice in 16 European Countries
5.2. Tool n° 44: Risk Assessment for Environmental Professionals
5.3. Tool n° 45: Risk Assessment for Contaminated Sites in Europe. Volume 1 Scientific Basis
5.4. Tool n° 46: The CLEA model for human health risk assessment (Contaminated Land Re-ports CLR 7-10)
5.5. Tool n° 47: NORISC (Network Oriented Risk assessment by In-situ Screening of Contaminated sites) Decision Support System
5.6. Tool n° 48: Contaminated Land Management: Ready Reference
5.7. Tool n° 49: Polluted Sites Management (Gestion des Sites Pollués)
5.8. Tool n° 50: Review of Decision Support Tools for Contaminated Land Management, and their Use in Europe. A report from the Contaminated Land Rehabilitation Net-work for Environmental Technologies
5.9. Tool n° 51: Guidelines on Remediation of Contaminated Sites
5.10. Tool n° 52: The REC decision support system for comparing soil remediation alternatives
5.11. Tool n° 53: Environmental balancing of soil remediation measures (Umweltbilanzierung von Altlastensanierungsverfahren)
5.12. Tool n°54: US EPA Data Quality Objective Process
5.13. Tool n° 55: The Integrated Risk Information System (IRIS)
5.14. Tool n° 56: Valorisation system for post-industrial terrains and Regional System on Spatial Information for planning of restructuring and emergency response for Silesian Voivodship (RSIP)

6.1. Introduction

This important chapter of the guidance document provide advice on the type of questions the project developers and managers should be asking themselves when managing contaminated land and wastes, the type of actions they should consider in order to maximise the opportunities to reach the sustainable objectives and the relevant tools they can use.

The identified tools and recommendations, deriving from the case studies and external examples or from the literature review, aim at supporting project managers and project developers and inform other stakeholder about the type of information, context and decision making in the characterisation and remediation phases of the brownfield redevelopment project.

The following list of tools is not an exhaustive list of existing tools, but rather a selection of what was judged as most illustrative tools regarding sustainable objectives achievement.

The tools are presented using a template that contain the relevant key information about the particular tool (e.g. type of tool, field of application, brief description, possible restrictions, availability / references).
An overview of the tools is presented in the following tables. They are organised according to the sustainable objective they will contribute to achieve and according to the phase of the project they are relevant to.

The tools attached to each objective belong to different types such as: standards, databases, decision criteria, best practices guidelines, handbook, check lists, procedures, etc.

As RESCUE aims to develop a systematic holistic approach to sustainable regeneration of European brownfield sites, the tools and recommendations which are presented here will be brought together within the manual with the results of the technical and management related disciplines and acting levels.

In order to facilitate the reading, the different tools have been distributed according to the main subject (but it is clear that a few tools contribute to the achievement of several objectives which are mentioned in the tool template).
In a few cases one can find several similar tools but originating from different countries, this was done on purpose in order to ease the access to French, German or English speakers.

As a complementary set of information to the content of this chapter, it is worth noting that a number of European networks were or continue to support research and development and best practices in contaminated land and its redevelopment. For further information visit the respective web sites of these projects:

CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) is a European multidisciplinary expert network that is working to facilitate sustainable solutions for urban brownfields which enhance social wellbeing, environment quality and economic regeneration.

CABERNET's vision is to: '*Enhance rehabilitation of brownfield sites, within the context of sustainable development of European cities, by the provision of an intellectual framework for coordinatedresearch and development of tools*. The network consists of members from 21 countries across Europe. The network is focusing on four objectives: improving awareness and enhancing understanding across the professional disciplines, developing a conceptual model for brownfield issues, identifying research gaps and identifying best practices for practitioners. For further information is available at www.cabernet.org.uk.

CLARINET (www.clarinet.at) is a Concerted Action within the Environment & Climate Programme of the European Commission DG Research, and is co-ordinated by the Austrian Environment Agency.
CLARINET brings together the combined knowledge of academics, government experts, consultants, industrial land owners and technology developers. Overall, 16 European Countries are participating in this project with various types of stakeholders
The primary objective of the Concerted Action CLARINET is to develop technical recommendations for sound decision making concerning the rehabilitation of contaminated sites in Europe.

CLARINET analysed current approaches on scientific, environmental and socio-economic topics related to contaminated land management. This primary objective can be broken down into three activities:
to analyse key-issues in decision making processes and to identify research needs relevant for the sound management of contaminated land problems in Europe. This analysis should integrate risk assessment, decision support issues and remediation technologies in a "system" approach, considering various underlying policy aspects. CLARINET developed the concept of Risk Based Land Management (RBML) as a step forward towards an integration of sustainable soil quality, protection of water and land use management in environmental policy.

NICOLE (www.nicole.org) is a leading forum on contaminated land management in Europe, promoting co-operation between industry, academia and service providers on the development of sustainable technologies. NICOLE's objectives are to:

- Provide a European forum for the dissemination and exchange of good practices, practical and scientific knowledge and ideas to manage contaminated land in a sustainable way.
- Stimulate co-ordinated, interdisciplinary projects on collaborative research and knowledge transfer to address identified needs.
- Develop new relationships and strengthen existing relationships with other networks.

CARACAS (www.caracas.at) co-ordinates research activities all over Europe in order to improve the existing scientific knowledge on contaminated land risk assessment. The achieved results will help in focusing future research and development programmes and will strengthen the collaboration between European scientists in this environmental field.

6.2. Overview Tables

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Objective 1: To reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works						
Practices: To undertake sufficient measurement to assess all environmental impacts						
SITE MANAGEMENT						
Tool 1.: Manual for quality assurance of contaminated site investigations (Arbeitshilfe für die qualitätsicherung bei der Altlastenbearbeitung)	x	x	x	x	x	
Tool 2.: Requirements concerning remediation investigations and the remediation plan (Annex 3 of the German Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung - BBodSchV)	x	x	x	x	x	
Tool 3.: Added Environmental Value – A tool to help understand the effects of remedia-tion of land contamination within the context of sustainable development	x	x	x	x	x	

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
SOIL						
Tool 4.: Database for chemicals concerning soil and environment protection - STARS – (Stoffendatenbank für bodenschutz-/umweltrelevant Stoffe)	x	x	x	x		
Tool 5.: Action, trigger and precautionary values.	x	x	x	x	x	
Tool 6.: Guideline to soil and groundwater protection (for the Application of "Regulations for the Planning and Implementation to Reclaim adverse Soil Changes and Groundwater Pollution" for Federal Real Estates (Arbeitshilfen Boden- und Grundwasserschutz))	x	x	x	x	x	X
NOISE						
Tool 7.: Position paper on dose response relationships between transportation noise and annoyance	x	x	x	x		

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Tool 8.:Position paper on guidelines for the application of the European Parliament and Council Directive 2000/14/EC on the approximation of the laws of the members states relating to the noise emission in the environment by equipment for use outdoor	x	x	x	x	x	
AIR and GAS						
Tool 9.: Economic Evaluation of Air Quality Targets for CO and Benzene	x	x	x	x	x	
Tool 10.: Economic Evaluation of Air Quality Targets for PAHs	x	x	x	x	x	
Tool n° 11.: Risk Assessment for methane and other gases from the ground	x	x	x	x	x	
Objective 2: To minimise waste and maximise recycling and reuse of soil and debris						
Practices: To implement an on site waste management platform To adopt a waste management plan to optimise recycling and reuse of soil and debris To use the economies of scale to deal with non-economic size (cluster approach)						

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
RECYCLING						
Tool 12.: AggRegain – the sustainable aggregates information service from Wrap (the Waste and Resources Action Programme)	x	x	x	x	x	
Tool 13.: CWMre (Creating Welsh Markets for recyclate)	x	x	x	x	x	
Tool 14.: LAGA Requirements for Re-use of Mineral Residues and Wastes Threshold values (Z-Zuordnungswerte or Einbauklassen) and Guidelines within the LAGA guideline "Anforderungen an die stoffliche Verwertung von miner-alischen Abfällen – Technische Regeln" (Requirements for the recycling of mineral wastes – technical rules" - used for soil disposal / reuse classification)	x	x	x	x	x	
Tool 15.: Construction and Demolition Material Recycling	x	x	x	x	x	
Tool 16.: ECO guidebook for professional: building works (ECO Guide Professionnel: Chantiers du bâtiment)	x	x	x	x	x	

Tools	Project phases					
	Initiating phase, project preparation	Characterisation phase	Planning / design phase: preparation of project implementation	Implementation phase: demolition, remediation	implementation phase: local public infrastructure construction, development	Project closure
WASTE AND DEBRIS MANAGEMENT						
Tool 17.: Guidebook to best practices for solid waste reduction (Guide Des Meilleures Pratiques En Matière De Réduction Des Déchets Solides)	x	x	x	x	x	
Tool 18.: Environmental Restoration Waste Management Guide	x	x	x	x	x	
Tool n° 19.: Local Plans for construction waste management (Schémas Territoriaux de Gestion des déchets de construction)	x		x	x	x	
CASE STUDIES AND REFERENCES						
Tool 20.: Demonstrating waste minimisation benefits in construction	x	x	x	x	x	
Tool 21.: Miscellaneous web-links and guide books related to soil, waste and debris reuse	x	x	x	x	x	
Tool 22.: Ground engineering spoil: good management practice	x	x	x	x	x	

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
DEMOLITION						
Tool 23.: Characterisation of Building-related Construction and demolition Debris in the United States	x	x	x	x	x	
Tool 24.: Construction and Demolition (C&D) Waste Management Guide	x	x	x	x	x	
Tool 25.: Demolition Protocol	x		x	x	x	
Tool 26.: Guidebook for controlled deconstruction: characteri-sation, valorisation and management of contaminated debris (Arbeitshilfe Kontrollierter Rückbau: Kontaminierte Bausubstanz Erkundung, Bewertung, Entsorgung)	x	x	x	x	x	
Tool 27.: Guidelines for Preparing Waste Reduction Strategy for Construction	x	x	x	x	x	

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Tool 28.: Environmental Handbook for building and civil engineering projects. Part 3: demolition and site clearance	x	x	x	x		
Tool n° 29.: ECO-LIVE: a software for construction waste management					x	
Objective 3: To ensure cost effectiveness and technical feasibility						
Practices: To apply a model procedure for verification of the entire remediation process To use a Directory of Costs and Services for contaminated sites redevelopment						
MANAGEMENT APPROACH						
Tool 30.: Model Procedures for the management of land contamination (Contaminated Land Report 11)	x	x	x	x		
Tool 31.: US EPA Triad approach	x	x	x	x	x	
TECHNOLOGY/ CASE STUDIES						
Tool 32.: ASTRES Data base (Banque de données)				x		

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Tool 33.: SITE Superfund Innovative Technology Evaluation	x	x	x	x		
Tool 34.: Innovative Remediation and Site Characterisation Technologies Resources	x	x	x	x		
Tool 35.: RefAS : catalogue of references of contaminated site remediations (Referenzkatalog Altlasten / Schadensfallsanierung)	x	x	x			
COST						
Tool 36.: Site investigation Cost-Benefit Analysis calculator	x	x	x	x		
Tool 37.: Directory of Costs and Services for contaminated sites redevelopment (Leistungsbuch Altlastensanierung & Flächenentwicklung)	x	x	x	x		

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Objective 4: To improve social acceptance through identification of all stakeholders and risk communication						
Practices: to apply public communication and participation. Awareness-raising campaign to avoid social resistance						
Tool 38.: RISKOM : risk communication program for consulting and individual assessment on contaminated sites (Risikokommunikationsprogramm zur Beratung und Einzelfall-prüfung auf kontaminierten Standorten)	x	x	x	x		
Tool 39.: Environmental management dashboard; environmental perform-ance indicators, management and communication tools (GERMAINE Project). [Votre tableau de bord de gestion environnementale; Les indicateurs de per-formance environnementale outil de gestion, outil de communication (Projet GERMMAINE)]	x	x	x	x	x	x
Tool 40.: Best Practice Guidelines on Public Engagement for the Waste Sector	x	x	x	x	x	
Tool 41.: Guideline on Community Consultation and Risk Communication	x	x	x	x		
Tool 42.: A Standard Land Condition Record	x	x	x	x	x	x

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Objective 5: To provide decision support tools for risk based land management						
Practices: To adopt effective decision support tools for risk based land management To adopt a step-wise site investigation and evaluation procedure To use standard risk assessment and option appraisal procedures						
RISK ASSESSMENT						
Tool 43.: Assessing Risks from Contaminated Sites: Policy and Practice in 16 European Countries	x	x	x	x		
Tool 44.: Risk Assessment for Environmental Professionals	x	x	x	x		
Tool 45.: Risk Assessment for Contaminated Sites in Europe. Volume 1 Scientific Basis	x	x	x	x		
Tool 46.: The CLEA model for human health risk assessment (Contaminated Land Re-ports CLR 7-10)	x	x	x	x		
Tool 47.: NORISC (Network Oriented Risk assessment by In-situ Screening of Contaminated sites) Decision Support System	x	x	x	x		

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
LAND MANAGEMENT						
Tool 48.: Contaminated Land Management: Ready Reference	x	x	x	x		
Tool 49.: Polluted Sites Management (Gestion des Sites Pollués)	x	x	x	x		
Tool 50.: Review of Decision Support Tools for Contaminated Land Management, and their Use in Europe. A report from the Contaminated Land Rehabilitation Net-work for Environmental Technologies	x	x	x	x	x	
Tool 51.: Guidelines on Remediation of Contaminated Sites		x	x	x		
Tool 52.: The REC decision support system for comparing soil remediation alternatives	x	x	x	x		
Tool 53.: Environmental balancing of soil remediation measures (Umweltbilanzierung von Altlastensanierungsverfahren)	x	x	x	x		

Tools	Project phases					
	Initiating phase, project preparation	**Characterisation phase**	**Planning / design phase: preparation of project implementation**	**Implementation phase: demolition, remediation**	**implementation phase: local public infrastructure construction, development**	**Project closure**
Tool 54.: US EPA Data Quality Objective Process	x	x	x	x		
Tool 55.: The Integrated Risk Information System (IRIS)	x	x	x	x		
Tool 56.: Valorisation system for post-industrial terrains and Regional System on Spatial Information for planning of restructuring and emergency response for Silesian Voivodship (RSIP)	x	x	x	x		

6.3. Tools and recommendations

Objective 1: To reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works

Indicators:

2.1 Pressure on Neighbourhood
2.2 Ambient Noise level
2.3 Air and dust quality impact

Practice:

- **To undertake sufficient measurement to assess all environmental impacts**

How to achieve the objective 1: Did you consider the following important aspects?

In most European countries, existing health and occupational regulation, and/or industrial rules provide both recommendations and technical guidance to achieve data collection. Those information may be used to help proposing actions to reduce and to monitor inconveniences at the works scale. However, legal recommendations (regarding either health and occupation, or industrial activity) are not necessarily compulsory regarding particular works, as they can only be enforced within a well defined legal framework. Thus, reference to existing recommendations out from their legal framework is only a means to work out proposals for minimising the impact of dust and noise.

Different types of tools should be considered:

- Guidance to help determine acceptable levels for dust and noise
- Technical guidance for measuring dust in air and noise.
- Charters and corporate recommendations may also be used to help proposing for noise and dust inconveniences minimisation.

For the Project Manager

- Does the developer wish to pro-actively manage the inconveniences generated by the works?
- Are the works done according to a timing aiming at minimising the effects of inconveniences (noisiest work during day time activity for example)?

- Are the works organised to minimise the impact of heavy vehicle traffic (pathway definition, travelling distances, in and out going traffic…)?
- Have the selected techniques been selected with noise reduction and dust emission in mind?
- Is there a plan to monitor noise and dust produced during activity
- Is there a book available to record complains of the surrounding population on dust and noise?

For the Project Developer

- Are you considering it important to minimise the effect of dust and noise generated by the works on the surrounding population?
- Does your project manager have worked out a plan to monitor noise and dust produced during works?
- Have the works been phased in order to reduce the impact of noise and dust generation during activity?
- Are the proposed techniques the best available to minimise dust and noise generation?
- Will reducing the impact of dust and noise lead to unbearable overcost

Actions to be derived

A selection of suggested actions, which could be implemented or integrated into projects financed under this practice include:

- Today, no specific document focuses specifically on demolition/construction and site rehabilitation nuisances on the neighbourhood. Often however, noise or dust generating activities, such as airport, traffic…are regulated by national or local regulations. Interesting information may be derived from the approach retained to monitor theses activities: monitoring strategies and equipment, level values…
- Public Health Code regarding noise measurement and noise level is the most common reference in this matter, when no specific source of information is available
- Implementation of noise measurement and monitoring may be inspired from what is done regarding specific activities, such as airport or road traffic.
- Fewer data exist on air quality (no recommendation for smell, only European guidelines for nitrogen dioxide, particles in suspension, lead, sulphur dioxide, ozone, carbon dioxide and benzene). Here again, common practice in this respect is to refer to health and occupational recommendations.
- Local regulation may set particular recommendations regarding noise and air quality. These recommendations may be set up by the Prefect, or by the Mayor.
- Corporate or thematic guide books may bring valuable information on key topics related to mastering nuisance.

Ilustration of tools

Examples of tools to help managing nuisances generated by works are given hereafter, and are all available from the Internet. The examples given are not an exhaustive list of available tools.

SITE MANAGEMENT

1.1. Tool n° 1: Manual for quality assurance of contaminated siteinvestigations (Arbeitshilfe für die Qualitätssicherung bei der Altlastenbearbeitung)

Title of the tool: **Manual for quality assurance of contaminated siteinvestigations** **(Arbeitshilfe für die Qualitätssicherung bei der Altlastenbearbeitung)**
Year of development (+ update if important): May 2002
Author / Developer: ALA - Altlastenausschuss in der LABO - Bund-/Länderarbeitsgemeinschaft Bodenschutz (ALA - contaminated sites committee of the LABO - federal and states working committee for soil protection)
Type of tool: Quality assurance manual; technical instructions for the examination of contaminated sites.; requirements for accredited experts; requirements for examination centers (471 pages, advanced level)
Field of application: Quality assessment at contamination risk assessment and remediation investigations
Potential users: All stakeholders dealing with contamination issues, especially analytical laboratories, consulting engineers and the respective authorities in charge
Brief description (aim, content): **Aim:** Guidelines Generally acknowledged by all German federal states Content: General structure and content: Investigation strategy Sampling of soil, soil air and groundwater Sample conditioning on site chemical analysis chemical-analytical laboratory procedures Interpretation and appraisal of examination results Simulation of groundwater flow and transport processes Annex: Biological procedures at contaminated sites laboratory analysis Requirements for accredited experts; Requirements for examination centres
DoW objective; contribution to sustainable brownfield development: Field test requirements; Technology selection criteriaGuideline for quality management, chiefly for site investigation, and here chiefly chemical analysis
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works

Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Unknown.
Usability restrictions: None; however this tool is only useful if a complementary strategic framework for risk based land management is provided (e. g. the respective German standards)
Language: German
Availability / reference: Online: http://labo-deutschland.de/labo-arbeitshilfe-qualitaetssicherung-12-12-2002.pdf (2,2 MB, in German)

1.2. Tool n° 2: Requirements concerning remediation investigations and the remediation plan [Annex 3 of the German Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung - BBodSchV)]

Title of the tool: **Requirements concerning remediation investigations and the remediation plan [Annex 3 of the German Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung - BBodSchV)]**
Year of development (+ update if important): 12 July 1999, extension planned
Author / Developer: Federal Government of Germany
Type of tool: remediation investigations and the remediation plan (3 pages, basic level)
Field of application: remediation of contaminated sites
Potential users: All persons involved in remediation investigations and the remediation plan of contaminated sites. Mainly consulting engineers and authorities in charge
Brief description (aim, content): **Aim:** uses standardised, generally accepted and scientifically based methods for remediation investigations and the remediation plan **Main content:** The tool consists of 3 pages of a sort of checklist The following could be integrated (somehow) into our recommendation checklists: **1. Remediation investigations** Remediation investigations in the case of contaminated sites are to identify the measures that are suitable, necessary and appropriate for the fulfilment of duties specified in … the Federal Soil Protection Act. Measures that qualify must be represented, taking into account combinations of measures and necessary accompanying measures. The study must examine in particular: – the suitability of methods with respect to pollutants, soil, material and location – the technical feasibility – the time requirement – the effectiveness with regard to the remediation objective – a cost estimate as well as the proportion of costs and effectiveness – the impacts on the parties concerned as defined by Article 12 first sentence of the Federal Soil Protection Act as well as on the environment – the requirement of licences – the generation, recovery and disposal of waste – industrial safety

- duration of the effect of the measures and possibilities for monitoring them
- aftercare requirements and
- possibilities for subsequent improvement.

The study must be conducted making use of available data, in particular from investigations pursuant to Article 3 of this Ordinance, as well as on the basis of any other reliable findings. Where such information does not suffice, especially for allowing a reliable delimitation of polluted areas or for assessing the suitability of remediation methods in the individual case, supplementary investigations must be conducted to verify the suitability of the method in question.

The results of the study and the concept of measures to be given preference in view of these results must be represented.

2. Remediation plan

A remediation plan must contain the information listed under Nos. 1 to 5 below as well as the information and documents necessary for it to be declared binding pursuant to … the Federal Soil Protection Act.

1. Statement of the initial situation, in particular with regard to

- the local conditions (among others, geological, hydrogeological situation; current use and use admissible under planning law)
- the hazard situation (summary of the investigations pursuant to Article 3 of this Ordinance with a focus on the pollutant stock, which specifies pollutant type, amount and distribution, as well as on affected pathways and resources and needs requiring protection)
- the remediation objectives
- the decisions taken by authorities and the public-law contracts concluded (notably with regard to the concept of measures) which will have an effect on the fulfilment of duties pursuant to Article 4 of the Federal Soil Protection Act, and
- the results of the remediation investigations.

2. Description in text and drawing of the measures to be carried out and provision of proof of their suitability, in particular with regard to

- the area of impact of the contaminated site and the land that will be needed for the planned measures
- the area covered by the remediation plan
- the elements and the course of the remediation with regard to
    - the construction schedule
    - earthwork (in particular excavation, separation, re-placing, shifting of soil in the area covered by the remediation plan)
    - demolition work
    - intermediate storage of soil material and other materials
    - waste disposal during operation of installations
    - the use of soils and the deposition of waste in landfills and
    - industrial safety and immission control measures
- specific technical calculations regarding
    - on-site soil treatment facilities
    - in-situ measures
    - installations for the collection and treatment of landfill gas or soil gas
    - groundwater treatment facilities
    - installations and measures for the collection and treatment of leachate in particular
- the amounts to be treated and the transport routes in the case of soil treatment at off-site installations
- the technical planning of securing measures and accompanying measures, in particular of
    - surface, vertical and base sealings
    - surface covering layers
    - intermediate storage and/or disposition depots
    - accompanying passive pneumatic, hydraulic or other measures (e.g. drainage of the construction field, drainage of the excavated material, encasement, exhaust air collection and treatment) and

– the requirements in connection with official licences for the measures to be carried out. 3. Description of the internal control measures to check the correct execution and effectiveness of the planned measures, in particular – the monitoring concept with regard to - soil management in cases involving excavation, separation and re-placing - soil and groundwater treatment, degassing or soil gas extraction - industrial safety and immission control - the accompanying sampling and analyses and – the investigation concept for materials and construction components in building construction. 4. Description of the internal control measures within the scope of aftercare including monitoring, in particular with regard to - the requirement and design of facilities or installations for the collection and treatment of groundwater, leachate, surface water, soil gas or landfill gas which are intended for long-term operation, as well as requirements with respect to their monitoring and maintenance - monitoring measures (e.g. measuring stations) and - function control with regard to compliance with remediation requirements and maintenance of securing structures or facilities 5. Description of time schedule and costs.
DoW objective; contribution to sustainable brownfield development: Quality standards for underground conditions standardised, generally accepted and scientifically based methods for remediation investigations and the remediation plan
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.4: to improve social acceptance through identification pf all stakeholders and risk communication
Tool in general use? Obligatory in Germany
Usability restrictions: Concerning the scientific and technical aspects the threshold values are not bound to national conditions; however their application may be limited to the national legal regulatory framework.
Language: German
Availability / reference: Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung) of Germany Download: http://www.bmu.de/en/1024/js/download/soil/b_federal2 - annex 3 (0,3 MB, pages 57…59, in English)

1.3. Tool n° 3: Added Environmental Value – A tool to help understand the effects of remediation of land contamination within the context of sustainable development

Title of the tool: **Added Environmental Value – A tool to help understand the effects of remediation of land contamination within the context of sustainable development**
Year of developmentdevelopment (+ up date if important):: 1999
Author / developer: RP Bardos, CP Nathanail and A Weenk
Type of tool: Workshop and report (intermediate level)
Field of application: Remediation of contaminated land

Potential users: The report will be of interest to researchers, environmental consultants, industrialists and problem holders with an interest in methodologies for evaluating the environmental impacts of remediating contaminated areas of land.
Brief description (aim, content): Given the level of interest in achieving sustainable development amongst the stakeholders of contaminated sites within the UK, and given the fundamental importance of achieving sustainable development, the Environment Agency commissioned the authors to develop guidance on how to assess the wider environmental impacts of remediation. The qualitative approach for assessing the wider environmental effects of remediation is useful in providing: - A technical basis for discussion about the wider environmental effects of remediation; - A framework that allows different stakeholders to discuss on a common basis differing points of view and agendas for wider environmental impacts; and - A comparison of the wider environmental impacts, at least as a ranking for different remedial approaches being considered for particular sites.
Contribution to sustainable brownfield development: The approach for assessing the wider environmental value of remediating contaminated sites was developed following consensus building workshops with stakeholders. Remediation of contaminated areas of land is carried out on a project specific basis – the tool enables stakeholders to consider what impact the different redevelopment options will have on the wider environment.
Sustainability objective affected by the tool: 2.1 To reduce negative environmental impacts on site / in neighbourhood including human health risks 2.4 To improve social acceptance through identification of all stakeholders and risk communication
Tool in general use? Unknown
Usability restrictions: Unknown
Language: English
Availability / reference: Report PR P5/023/01 available from: Environment Agency, Olton Court, 10 Warwick Road, Olton, Solihull B92 7HX.

1.4. Tool n° 4: Database for chemicals concerning soil and environment protection - STARS – (Stoffdatenbank für bodenschutz- / umweltrelevante Stoffe)

Title of the tool: **Database for chemicals concerning soil and environment protection STARS – (Stoffdatenbank für bodenschutz- / umweltrelevante Stoffe)**
Year of development (+ up date if important): 1999, continuous updates, Version 4.0 to be published in June 2004
Author / Developer: Principal: federal environmental agency (UBA), Berlin and Oberfinanzdirektion (OFD, regional tax office), Hannover Author: Stoller Ingenieurtechnik GmbH, Dresden, Mull und Partner Ingenieurgesellschaft mbH, Hannover

Type of tool: (Online) Database (advanced level)

Field of application: Risk assessment and remediation planning

Potential users: stakeholders dealing with contamination risk assessment and remediation targets, chiefly consulting engineers, remediation companies and respective public administration

Brief description (aim, content):

Aim:

Facilitate the evaluation of chemical substances on (suspected) contaminated sites.

Content:

STARS contains information about 1.100 substances, among others for the following topics:

Substance specific information:

- Description of physical and chemical properties (e.g. boiling and melting point, partition coefficient)
- Environmental behaviours (e.g. biological and chemical decomposition behaviour and stability in soil, water and air; bioaccumulation)
- Ecotoxicology (concerning aquatic and terrestrial systems)
- Toxicology (e. g. human, mammalian and environmental toxicity, gene toxicity, cancerogenity, tolerable body doses)
- Material-specific conventions (e. g. standards for drinking water, hazardous substances or working conditions)
- Occupational safety (material storage; dangerous reactions; health risks; individual preventive measures; first aid measures)
- Federal Soil Protection and Contaminated Site Ordinance
- Standards of the German federal states
- chemical analysis methods
- threshold values of the German Bundes-Bodenschutz- und Altlastenverordnung
- other threshold values (also from other countries)
- background concentrations in soil

STARS can be used in combination with the programs ALV (database of known and suspected contaminated land sites) and XUMA-Amor Analysenplan (database for planning of chemical analyses).

DoW objective; contribution to sustainable brownfield development:

Quality standards for underground conditions; Quality standards for recycled materials

Sustainability objective affected by the tool:

Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works

Objective 2.5: to provide decision support tools for risk based land management

Tool in general use? Standard tool for the administration and management of federal sites

Usability restrictions:

This program can be used in combination with XUMA-Amor and ALV or separately.

Windows 98/2000/XP/NT, Windows Emulation Mac; ≥ 350 MB free disk space

Language: German, partly in English

Availability / reference: CD-ROM: for public authorities: 35 Euros (package price, including the databases STARS, XUMA-Amor and ALV). for enterprises: 230 Euros, price of the above package: 322 Euros Online access: from 35 Euro for 1 month http://www.substancedata-stars.com/ or http://www.stoffdaten-stars.de/ Stoller Ingenieurtechnik GmbH; Email: info@stoller-dresden.de; phone: +49-351-2123930 UBA: Jeannette Mathews; Email: Jeannette mathews@uba.de; +49-30-8903-3302

1.5. Tool n° 5: Action, trigger and precautionary values

Title of the tool: **Action, trigger and precautionary values**
Year of development (+ update if important): 12 July 1999, extension planned
Author / Developer: Federal Government of Germany
Type of tool: Threshold values (6 pages, advanced level)
Field of application: • investigation and evaluation of contaminated and contamination suspected sites, • the determination of trigger values, action values and precautionary values (including the permissible additional pollution load)
Potential users: All persons involved in investigation, assessment and remediation of contaminated and contamination suspected sites. Mainly consulting engineers and authorities in charge
Brief description (aim, content): **Aim:** use standardised, generally accepted and scientifically based trigger values, action values and precautionary values for soil contamination **Main content:** 1. Soil - human health pathway (direct contact) differentiated by the site's use: playgrounds, residential areas, parks and recreational facilities or plots of land used for industrial and commercial purposes (Action values and Trigger values) 2. Soil – plant pathway Differentiated by the site's use: agriculture, vegetable garden or grassland (Action and Trigger values) Trigger and action and values - agricultural land and vegetable gardens with regard to plant quality Action values - green areas with regard to plant quality Trigger values - agricultural land with regard to impairments of the growth of cultivated plants 3. Soil – groundwater pathway Trigger values to rate the soil – groundwater pathway 4. Precautionary values for soils Precautionary values for metals Precautionary values for organic substances 5. Permissible additional annual pollutant loads through all pathways

DoW objective; contribution to sustainable brownfield development: Quality standards for underground conditions, (Quality standards for recycled materials) standardised, generally accepted and scientifically based trigger values, action values and precautionary values for soil contamination. Field test requirements. Quality standards for underground conditions (physically and environmentally). These standards may facilitate quality control, speed up a project and reduce costs by limiting investigation efforts and liability risks.
Sustainability objective affected by the tool: Objective 2.1 environment Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.4: to improve social acceptance through identification pf all stakeholders and risk communication
Tool in general use? Obligatory in Germany
Usability restrictions: Concerning the scientific aspects the threshold values are not bound to national conditions; however their application may be limited to the national legal regulatory framework. For countries that don't have such values this tool may be helpful; otherwise only the tool's general idea may be interesting.
Language: German
Availability / reference: Federal Soil Protection and Contaminated Sites Ordinance (Bundes-Bodenschutz- und Altlastenverordnung) of Germany Download: http://www.bmu.de/en/1024/js/download/soil/b_federal2 - annex 1 (0,3 MB, pages 50…56, in English)

1.6. Tool n° 6: Guideline to soil and groundwater protection [for the Application of "Regulations for the Planning and Implementation to Reclaim adverse Soil Changes and Groundwater Pollution" for Federal Real Estates (Arbeitshilfen Boden- und Grundwasserschutz)]

Title of the tool: **Guideline to soil and groundwater protection [for the Application of "Regulations for the Planning and Implementation to Reclaim adverse Soil Changes and Groundwater Pollution" for Federal Real Estates (Arbeitshilfen Boden- und Grundwasserschutz)]**
Year of development (+ update if important): 1996, June 2002
Author / Developer: Editors: former Federal Ministry for Regional Planning, Building and Urban Development and the Federal Ministry of Defence (in co-operation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and the Federal Ministry of Finance)
Type of tool: manual (650 pages, mainly basic level)
Field of application: contaminated site investigation, risk assessment and remediation
Potential users: chief focus group: administration and clients for investigation and remediation services (e.g. project managers); however also helpful as general information source for other stakeholders

Brief description (aim, content):

aim: standardise and facilitate investigation and remediation process, save cost

content: among other topics:

- Stepwise approach of investigation and remediation
- tasks and responsibilities of the different stakeholders (building owner, engineering services, administration)
- performance catalogue for engineer and laboratory services
- checklists for building owners and structural engineering services
- model contracts
- overview about geophysical investigation methods
- guideline concerning military sites
- leaflets of selected remediation techniques specifying each procedure, required infrastructures and scope of application, necessary approval procedures, follow-up control measures and rough cost estimates
- requirements for sampling and chemical analyses
- etc.

DoW objective; contribution to sustainable brownfield development:

Valuable information, documents and material for the planning and implementation to reclaim adverse changes of soil quality and groundwater pollution, which facilitates the tasks of responsible persons and provides a uniform and cost-saving procedure.

Sustainability objective affected by the tool

Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works

see also: 6.2 facilitate project management, 6.3 transparency

Tool in general use? no, because too recent

Usability restrictions: Originally targeted to federal properties with German administration as chief focus group; partly based on German standards etc.; however also helpful as general information source for other stakeholders and countries

Language: German, English (overview)

Availability / reference:

Oberfinanzdirektion Hannover - Landesbauabteilung

http://www.ofd-hannover.de/BGWS/BGWSDocs/Arbeitshilfen/Kurzfassung_Englisch.ASP (summary in English)

http://www.ofd-hannover.de/BGWS/BGWSDocs/Arbeitshilfen/Kurzfassung_Deutsch.ASP (summary in German)

download pdf file (10 MB, in German) from:

http://www.ofd-hannover.de/BGWS/BGWSDocs/Downloads/Arbeitshilfen_Altlasten/AH_BogwS_Dezember2003.pdf

or from: http://www.ofd-hannover.de/BGWS/downloads.asp?thema=Arbeitshilfen+Boden%2D+und+Grundwasserschutz

online version: http://www.arbeitshilfen-bogws.de/HTML/index.htm (in German)

NOISE

1.7. Tool n° 7: Position paper on dose response relationships between transportation noise and annoyance

Title of the tool: **Position paper on dose response relationships between transportation noise and annoyance**
Year of development (+ up date if important): 2002
Author / Developer: The European Community
Type of tool: Book, 40 pages, basic level
Field of application: This position paper was prepared by a working group of noise experts set up by the European Commission in order to provide guidance on the dose-effect relations to be used for the assessment of numbers of people annoyed by noise (rail, road and air).
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** To support the European Commission with the development of the dose-effect relations for the proposed framework directive on the Assessment and Management of Environmental Noise. **Content**: This Position Paper summarises the recommended descriptors of noise exposure and of annoyance and recommends dose-effect curves, together with formulae. These curves are recommended for use in the context of the proposal for a Directive on the Assessment and Management of Environmental Noise2.
DoW objective; contribution to sustainable brownfield development: Nuisance reduction plan. Field tests requirements
Sustainability objective affected by the tool: 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works
Tool in general use? Unknown
Usability restrictions: Applies to noise only
Language: English
Availability/Reference: http://europa.eu.int/comm/environment/pubs/urban.htm Office for Official Publications of the European Communities ISBN 92-894-3894-0 Catalogue number: KH-44-02-690-EN-N

1.8. Tool n° 8: Position paper on guidelines for the application of the European Parliament and Council Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors

Title of the tool: **Position paper on guidelines for the application of the European Parliament and Council Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors**
Year of development (+ up date if important): 2002
Author / Developer: The European Community DG Environment
Type of tool: Report, 132 pages, basic level
Field of application: Noise reduction of outdoor equipment
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** To help potential users of Directive 2000/14 who would be subject to the laws of the Member States by creating a document close to the original source document adopted by the European Parliament and Council in May 2000. **Content:** Part 1 — General Part 2 — Flow charts Part 3 — Comments on the directive clause by clause Annex to Part 3 — Relationship with the machinery directive Part 4 — Determination and maintenance of the guaranteed sound power level Annex A to Part 4 — Basic statistical instruments Annex B to Part 4 — Basic definitions for uncertainty due to measurement procedure Appendix to the guidelines — Useful addresses
DoW objective; contribution to sustainable brownfield development: Nuisance reduction plan. Field test requirements
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works
Tool in general use?
Usability restrictions: None
Language: English, also available in all EEC languages
Availability/Reference: Catalogue Number KH-42-02-319-EN-C ISBN 92-828-6706-4 (Version in English) Information Centre (BU-9 0/11) Directorate-General for the Environment European Commission B-1049 Brussels Fax (32-2) 29-96198 E-mail: ENV-PUBS@cec.eu.int Free download from: http://europa.eu.int/comm/environment/pubs/urban.htm

AIR and GAS

1.9. Tool n° 9: Economic Evaluation of Air Quality Targets for CO and Benzene

Title of the tool: **Economic Evaluation of Air Quality Targets for CO and Benzene**
Year of development (+ up date if important) :2000
Author / Developer: European Commission DG XI Report
Type of tool: Report study, 101 pages + 36 pages annexes, basic to advanced level
Field of application: Urban environment works (nuisances, waste, communication)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): The objective of the study was to identify and estimate the costs and benefits of meeting ambient air quality standards for CO and benzene. The analysis specifically accounts for areas of peak concentration ('hot-spots') as well as areas where 'urban background' conditions apply.
DoW objective; contribution to sustainable brownfield development: Provides air quality guidelines. Field test requirements
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.4: To improve social acceptance through identification of all stakeholder and risk communication
Tool in general use? Not documented
Usability restrictions: If the main objectives of this report is an economic analysis, useful information on air quality standards for Carbon monoxide and benzene may be found
Language: English
Availability/Reference: KH-27-00-403-EN-C ISBN 92-828-8712-X Free download from: http://europa.eu.int/comm/environment/enveco/studies2.htm#7 (Text and Annexes)

1.10. Tool n° 10: Economic Evaluation of Air Quality Targets for PAHs

Title of the tool: **Economic Evaluation of Air Quality Targets for PAHs**
Year of development (+ up date if important): 2001
Author / Developer: M R Holland and H H Jones (AEA Technology), J Berdowski A Bleeker and A J H Visschedijk (TNO) for European Commission DG Report
Type of tool: Report study, 129 pages, basic level
Field of application: Urban environment works (nuisances, waste, communication)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): The objective of the study was to identify and estimate the costs and benefits of meeting ambient air quality standards for PAHs. The study deals with global air quality targets, and the implication for industry to meet the criteria
DoW objective; contribution to sustainable brownfield development: Provides air quality guidelines. Field test requirements
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.4: To improve social acceptance through identification of all stakeholder and risk communication
Tool in general use? Not documented
Usability restrictions: If the main objectives of this report is an economic analysis, useful information on air quality standards for PAHs in air may be found
Language: English
Availability/Reference: Report Number AEAT/ENV/R0593, available from European Commission DG Environment This document has been prepared by AEA Technology plc in connection with a contract to supply goods and/or services and is submitted only on the basis of strict confidentiality. The contents must not be disclosed to third parties other than in accordance with the terms of the contract.

1.11. Tool n° 11: Risk Assessment for methane and other gases from the ground

Title of the tool: **Risk Assessment for methane and other gases from the ground**
Year of development (+ up date if important): 1995
Author: NJ. O'Riordan & CJ Milloy of ARUP, for CIRIA
Type of tool: Book on general Sale. (advanced level)
Field of application: Guidance for Designers and Managers

Potential Users: Technical Advisors
Brief description (aim, content): To enable the Client or Designer to make a rational comparison of risks for a wide range of construction situations concerning ground gases, in particular methane and carbon dioxide Short written Case Studies, and Checklists for Client, Designer & Contractor (in conjunction with several other publications and Papers that constitute a body of work on the subject in UK …
DoW objective; contribution to sustainable brownfield development: Gathers all information into one Document. (needs update for 2000+ emphasis on flow measurement)
Sustainability objective affected by the tool: Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Yes, by Designers and by Sites.
Usability restrictions: Open document able to be purchased by all. Specific UK applications related to UK law.
Language: English
Availability/Reference: CIRIA Publications, London ISBN 0 86017 434 4 Construction Industry Research and Information Association (CIRIA), Classic House, 174-180 Old Street, LONDON EC1V 9BR Tel: +44(0)207 549 3300. Fax: +44(0)207 253 0523. www.ciria.org/publications

Objective 2: To minimise waste and maximise recycling and reuse of soil and debris

Indicator:

2.4 Waste, soils and debris management

Practices:

- **To implement on site waste management platform**
- **To adopt a waste management plan to optimise recycling and reuse of soil and debris**
- **To use the economy of scale to deal with non-economic size (cluster approach)**
- **To minimise transport needs of contaminated soil and waste material i.e. to manage slightly contaminated material on site or nearby**

How to achieve the objective 2: did you consider the following important aspects?

Waste transport to dump sites or treatment plants may lead to significant increase in cost. In addition to over-cost, waste transport is energy consuming and generates additional air and noise nuisances. Hence, the goals of this objective are:

- To reduce nuisances
- To reduce costs
- To favour re-use of material

An important objective of sustainable brownfield regeneration is to apply waste re-use strategies, as suggested by European and International directives. The use of the 'waste hierarchy' decision tool is generally common through Europe. The minimisation of construction and demolition spoil by means of good recycling techniques will speed up the process of brownfield redevelopment, as long as there are no threats to health & safety in the environs. Re-use can significantly bring down regeneration costs, and make other environmental improvements that have less firm economic 'values'.

For the Project Manager

- Does the Developer wish to pro-actively manage the site resources?
- Does the site have space, and the project time to follow all options
- Have all the potential re-use options for the material been explored
- Have all the market opportunities in the area (import/export) been identified
- Would the operation distort the local market for C&D material,

For the Project Developer

- Does your project manager have sufficient experience in reuse/recycling
- Have all the tax advantages and grants been considered/used
- Is there scope to use the minimisation of import/export as a public 'good'
- Will the use of recycled material have a financial effect (good/bad)
- Is there a public perception problem – does waste re-use have to be 'sold'

Actions to be derived

A selection of suggested actions, which could be implemented or integrated into projects financed under this practice include:

- Many innovative actions in construction/deconstruction waste management, recycling and reuse originate from corporate initiatives, generally in conjunction with local incentives
- Look for existing local, regional or national charter or memorandum of understanding, regarding debris management according to sustainable objectives
- Consider the opportunity of reusing material directly on site, or externally. Debris processing plants may be available to turn debris into valuable raw material
- Consider sorting debris on site, in order to facilitate reuse or recycling: concrete, brick and earth, iron are getting more widely recycled. Contaminated waste should be sorted according to level of contamination, in order to facilitate reuse (possibly as backfill material) and minimise landfill disposal.
- When dismantling contaminated building, or when displacing contaminated soil, organise works in such a way not to spoil uncontaminated area
- Consider future use of the area before deciding to bring clean material from the outside, if future works imply removing it (underground construction for example)
- Before doing any construction, demolition, or landscaping activities, identify the types of wastes that will most likely be generated during the activity.
- Identify what can be recycled: contact your local solid waste program to determine which of the expected wastes can be recycled.
- Source separation: Identify and accumulate materials in separate containers or locations to keep materials cleaned and sorted
- Recycle: make sure collected materials get to the recycling site
- Have you considered the full environmental effects of off-site treatment
- Does the Public Authority have a specific control mechanism for recycling
- Can the Contract Conditions be written to ensure re-use predominates
- Is there scope to co-ordinate this project with other, local Contract needs.

RECYCLING

2.1. Tool n° 12: AggRegain – the sustainable aggregates information service from Wrap (the Waste and Resources Action Programme)

Title of the tool: **AggRegain – the sustainable aggregates information service from Wrap (the Waste and Resources Action Programme)**
Year of development (+ up date if important): 2004
Author / Developer: The Waste and Resources Action Programme
Type of tool: source of practical information – website – basic level
Field of application: Use of recycled and secondary aggregates
Potential users: anyone interested in specifying, purchasing or supplying these types of products.
Brief description (aim, content): Aim: to provide a unique 'one-stop' source of practical information on the use of recycled and secondary aggregates Content: *The information on the AggRegain site has been compiled from many different sources. By clicking on one of the quick links you will gain access to:* • Detailed case studies illustrating the use of recycled and secondary aggregates in a range of construction projects, including housing developments, commercial buildings and infrastructure projects • Technical notes to assist in the specification of recycled and secondary aggregates • A comprehensive directory of over 250 suppliers of recycled and secondary aggregate products at 350 locations throughout England
DoW objective; Contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. This tool helps specifiers and buyers to choose the right aggregate for the right application, detailed technical notes, purchase orders and case studies are available. <I don't quite understand this, do you?>
Sustainability objective affected by the tool:. Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Unknown.
Usability restrictions: More specifically to be used in Great Britain
Language: English
Availability / reference: The Old Academy, 21 Horse Fair, Banbury, Oxon, OX16 0AH http://www.aggregain.org.uk/

2.2. Tool n° 13: CWMre (Creating Welsh Markets for recyclate)

Title of the tool: **CWMre (Creating Welsh Markets for recyclate)**
Year of development (+ up date if important): 1999
Author / Developer: The Wales Environment Trust Ltd
Type of tool: initiative – website – basic level
Field of application: recyclate
Potential users: stakeholders, developer, businesses
Brief description (aim, content): **Aim:** It aims to reduce the barriers to the development of efficient and effective recyling loops for recyclate in Wales. **Content:** The Wales Environment Trust Ltd provides two key services under the brand of CWMre: • Researching and providing information on recycling in Wales and specific types of recyclable material • Specialised advice and support to new and existing Welsh recycling businesses It carries out comprehensive research into: - the current recycling infrastructure (i.e. recycling loop) - levels of recycling in Wales - potential uses and barriers for increasing recycling for their specific material - existing and potential businesses that are operating / could operate in the recycling loop From this research, a number of actions that can be taken to increase levels of recycling are identified. Existing and potential Welsh businesses approach / are approached to carry out these actions. These tend to be those that have the capacity to reprocess or utilise recyclate in a manufacturing process as this is the stage of the recycling loop which most often assists in the development of markets. However, those at other stages of the recycling loop (suppliers of recyclate, collectors, merchants and end users) are also incorporated into proposed solutions.
DoW objective; Contribution to sustainable brownfield development:
Sustainability objective affected by the tool: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies
Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use?
Usability restrictions: none in Great Britain
Language: English
Availability / reference: http://www.walesenvtrust.org.uk

2.3. Tool n° 14: LAGA Requirements for Re-use of Mineral Residues and Wastes Threshold values (Z-Zuordnungswerte or Einbauklassen) and Guidelines within the LAGA guideline "Anforderungen an die stoffliche Verwertung von mineralischen Abfällen – Technische Regeln" (Requirements for the recycling of mineral wastes – technical rules" - used for soil disposal / reuse classification)

Title of the tool: **LAGA Requirements for Re-use of Mineral Residues and Wastes** **Threshold values (Z-Zuordnungswerte or Einbauklassen) and Guidelines within the LAGA guideline "Anforderungen an die stoffliche Verwertung von mineralischen Abfällen – Technische Regeln" (Requirements for the recycling of mineral wastes – technical rules" - used for soil disposal / reuse classification)**
Year of development (+ up date if important): 2003
Author / developer: Authors: Länderarbeitsgemeinschaft Abfall: (Länder Cooperation Waste – fed by the Environmental Ministries of the German federal states) Editor: Länderarbeitsgemeinschaft Abfall
Type of tool: Guidelines and threshold values for reuse of slightly contaminated material (52 pages, advanced level)
Field of application: Reuse of Slightly contaminated soil waste (mainly remediation (planning) phase)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **aim:** To determine admissible chemical properties for reusable material (e. g. soil) **content:** Threshold allocation values of 21 parameters (solid matter and eluate), incorporated into technical regulations concerning the requirements for recycling of mineral waste: Material below Z0 can be recycled in any way (the Z0 values = upper limits of the geogenic variation of natural soils) Material below Z1 can be used for any land reclamation and landscaping purposes. The Z2-values for limited recycling with technical safety measures) have been developed specifically in relation to the protection of groundwater. Material classified Z3…Z5 has to be deposited on waste disposal facilities: z3 / z4 material on landfills of "Waste from Human Settlements" Landfill category I respectively II. z 5 has to be deposited on facilities for waste requiring particular supervision..
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. Waste minimisation
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Yes

Usability restrictions: Partly based on German norms and regulations; however for countries that don't have such guidelines / Threshold values these may be helpful; otherwise only the general idea may be interesting.
Language: German, English under development
Availability/Reference http://europa.eu.int/comm/environment/waste/studies/compost/landspreading_annexes3.pdf (screen pages 7 and 8) Framework: http://www.laga-online.de/mitteilungen/docs/AllgTeil%20Endfassung%20031106.pdf (0,6 MB, in German; English translation under development)

2.4. Tool n° 15: Construction and Demolition Material Recycling

Title of the tool: **Construction and Demolition Material Recycling**
Year of development (+ up date if important): 2000
Author / developer: Office of Environment and Energy - Environment, Energy, & Employee Safety Division AEE-200 - 202-267-3553
Type of tool: Practical brochure, 2 pages, basic level
Field of application: Waste management and minimisation, cost evaluation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Contents**: What can be recycled – end markets- recommendations
DoW objective; contribution to sustainable brownfield development: Waste minimisation and management. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: None
Language: English
Availability/Reference http://www.aee.faa.gov/aee-200/dem.pdf http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.5. Tool n° 16: ECO guidebook for professional: building works (ECO Guide Professionnel: Chantiers du bâtiment)

Title of the tool: **ECO guidebook for professional: building works (ECO Guide Professionnel: Chantiers du bâtiment)**
Year of development (+ up date if important): 2001
Author / Developer: Institut européen pour le conseil en environnement (Eco Conseil, European Institute for environmental Consulting), Adème, Conseil Régional de Picardie
Type of tool: Brochure, 63 pages, basic level
Field of application: Managing construction works (including nuisance aspects)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** To provide useful tips for contractors **Content**: Daily managing of works, practical recommendations and data, regulatory
DoW objective; contribution to sustainable brownfield development: Waste and nuisance reduction plan. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works
Tool in general use? Not documented
Usability restrictions: This booklet is intended to be use regionally in France (Picardie): some data and addresses are specific for this region. However, the global approach may be extended to other French regions, and abroad.
Language: French
Availability/Reference: ECO-Conseil, Institut européen pour le conseil en environnement 7 rue Goethe 67000 STRASBOURG Tél: (0)3 88 60 16 19 - Fax: (0)3 88 61 07 12 Internet: http://www.ecoconseil.org

WASTE AND DEBRIS MANAGEMENT

2.6. Tool n° 17: Guidebook to best practices for solid waste reduction (Guide Des Meilleures Pratiques En Matière De Réduction Des Déchets Solides)

Title of the tool: **Guidebook to best practices for solid waste reduction (Guide Des Meilleures Pratiques En Matière De Réduction Des Déchets Solides)**
Year of development (+ up date if important): 2001
Author / developer: Franklin Associates Prairie Village, KS for Association canadienne de la construction (Canadian Association of construction)
Type of tool: Corporate Document (guidebook, 41 pages, basic level)
Field of application: Waste management and minimisation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** The Canadian Association of construction (ACC) prepared this Guide of the best practices regarding reduction of solid waste for the companies which wish to include reduction, re-use and waste recycling to their activities of construction.. **Content**: Waste: a resource of construction / Reduction, re-use and recycling: possibilities and restrictions / Checking of waste / Waste management during the process of execution / Scheme of work of management of waste / Conclusions / Annexes
DoW objective; contribution to sustainable brownfield development: Waste and nuisance reduction plan. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works
Tool in general use? Not documented
Usability restrictions: Part of the document is specific to Canadian rules
Language: French
Availability/Reference Association canadienne de la construction 400-75, rue Albert Ottawa, Ontario, Canada K1P 5E7 Tél.: (613) 236-9455 Téléc.: (613) 236-9526 www.cca-acc.com Downloadable on: http://www.cca-acc.com/documents/electronic/cca81/acc81.pdf http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.7. Tool n° 18: Environmental Restoration Waste Management Guide

Title of the tool: **Environmental Restoration Waste Management Guide**
Year of development (+ up date if important): 2000
Author / developer: U.S. Department of Energy - Office of Environmental Policy and Guidance – RCRA/CERCLA Division (EH-413)
Type of tool: Brochure, 118 pages, basic level
Field of application: Waste management and minimisation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Content:** **Introduction:** Background / Scope of Document / Regulatory Basis for Environmental Restoration Waste Management **Systematic Environmental Restoration Waste Planning Approach**: Systematic Uncertainty Management / Environmental Management Waste Planning Matrix **Characterisation of Environmental Restoration Wastes** / Drivers of Characterisation for Environmental Restoration Wastes / Specific Questions Project Managers May Require Characterization to Answer / Timing and Data Quality Issues / Requirements For Characterizing Various Waste Types **Management of Contaminated Groundwater During Environmental Restoration Projects:** Summary of Major Requirements For Groundwater / Summary of Ground Water Management Technologies / Basic Management Requirements During Pre-Treatment, Treatment, and Post Treatment Phases for Hazardous Waste / Basic Management Requirements During Pre-Treatment, Treatment, and Post-Treatment Phases for Radioactive Waste / Basic Management Requirements During Pre-Treatment, Treatment, and Post-Treatment Phases for Mixed Waste / Alternate Compliance Options **Management of Contaminated Soil During Environmental Restoration Projects**: Summary of Major Requirements / Concepts and Definitions / Summary of Soil Treatment Technologies / Basic Management Requirements During Pre-Treatment, Treatment, and Post-Treatment Phases for Hazardous Soil Environmental Restoration Wastes / Basic Management Requirements During Pre-Treatment, Treatment, and Post-Treatment Phases for Radioactive Soil Environmental Restoration Wastes / Basic Management Requirements During Pre-Treatment, Treatment, and Post-Treatment Phases for Mixed Waste / Managing PCB- and Asbestos-Containing Soil Wastes / Compliance Options for Managing Soil Environmental Restoration Wastes **Management of Contaminated Debris During Environmental Restoration:** Actions / Summary of Major Requirements / Concepts and Definitions / Management Options for Hazardous Debris / Management of Radioactive, Mixed Waste, and Other Types of Debris / Exemptions For Managing Debris
DoW objective; contribution to sustainable brownfield development: Waste and nuisance reduction plan. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works
Tool in general use? Not documented

Usability restrictions: Recycle material table is of general use
Language: English
Availability/Reference DOE/EH-413-0005 http://homer.ornl.gov/oepa/guidance/cercla/erwmg.pdf http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.8. Tool n° 19: Local Plans for construction waste management (Schémas Territoriaux de Gestion des déchets de construction)

Title of the tool: **Local Plans for construction waste management (Schémas Territoriaux de Gestion des déchets de construction)**
Year of development (+ up date if important): February 2000
Author / developer: French regional administration
Type of tool: Incitative agreement between administration and stakeholders, based on a regulatory disposition, document size variable, basic to advanced level
Field of application: Developers and Managers.
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): The building Owners and the professionals of construction works have the responsibility for the waste disposal of construction activities. The State chose to bring to them a help by the development of a Departmental Plan of Construction Waste, including: A quantification of waste / a census of texisting channels of treatment with their capacity / a determination of the new installations necessary / the installation of tools of information / the search for reduction of waste to the source and the definition of a structure of follow-up and evaluation of the plan
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Yes, in France
Usability restrictions: None, if such agreement possibilities exist
Language: French

Availability/Reference: Content of régulation, description of the local plans: http://aida.ineris.fr/textes/circulaires/text4128.htm Example of (1) local plan, (2) associated memorundum of understanding, and (3) guidelines to accomodate public markets (Nord-Pas de Calais region, France): (1) http://www.nord.equipement.gouv.fr/Eau_environnement-risques/plan_gestion_dechets_chantier_btp/doc_pdf/dechets_btp_diag_propositions.PDF (2) http://www.nord.equipement.gouv.fr/Eau_environnement-risques/plan_gestion_dechets_chantier_btp/doc_pdf/dechets_btp_charte_qualite_gestion.PDF (3) http://www.nord.equipement.gouv.fr/Eau_environnement-risques/plan_gestion_dechets_chantier_btp/doc_pdf/dechets_btp_guide_recommandations.PDF These documents are available for each region at the Regional Prefectorates in France

CASE STUDIES AND REFERENCES

2.9. Tool n° 20: Demonstrating waste minimisation benefits in construction

Title of the tool: **Demonstrating waste minimisation benefits in construction**
Year of development (+ up date if important): 2001
Author / developer: S.Coventry, B.Shorter & RM.Kingsley, for CIRIA (Construction Industry Research and Information Association), London
Type of tool: Case Studies of 10 live projects. In Book and Loose Sheet (Cases) Report C536, on general sale. (advanced level) Also a Training Pack (C555), which includes Notes, Video & CD to allow internal dissemination.
Field of application: For specific display; to inform Clients, Developers and Managers. As a Training Guide to Designers.
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): By learning from defined Case Studies, with live demonstrations or textual descriptions, the basic tenets of material re-use and scrap reduction are taught. However, this is more concerned with construction rather than destruction. Inform rather than Solve.
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility plus relevant WP3 and WP6 objectives
Tool in general use? Yes, C555 is a CIRIA 'best seller'

Usability restrictions: None, can be purchased openly. Obviously some UK site practices may vary from European.
Language: English
Availability/Reference: CIRIA - Classic House, 174-180 Old Street, LONDON EC1V 9BR Tel: +44(0)207 549 3300. Fax: +44(0)207 253 0523. www.ciria.org/publications

2.10. Tool n° 21: Miscellaneous web-links and guide books related to soil, waste and debris re-use

Title of the tool: **Miscellaneous web-links and guide books related to soil, waste and debris reuse**
Year of development (+ up date if important): n/a
Author / developer: Misc
Type of tool: Miscellaneous web-links
Field of application: Soil, waste end debris reuse and recycling
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** To provide end market suggestions and quality criteria for reusable material.
DoW objective; contribution to sustainable brownfield development: Waste minimisation and management.Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: 2.2 recycling, 2.1 environment, 2.3 waste
Tool in general use? N/A
Usability restrictions: Collection from UK, France, Denmark, Australia, the USA…
Language: English / French
Availability/Reference • Corporate documents: http://www.creargos.com/cgi-bin/imfra/prescripteurs/home/index.jsp http://catalogue.setra.equipement.gouv.fr/cgi-bin/form_recherche.pl • Regional technical guides: Guide technique pour l'utilisation des matériaux d'Ile de France: bétons et produits de démolition recyclés. (Technical Handbook for material reuse in Ile de France: concrete and recycled demolition material), UNICEM, 1996 http://www.ile-de-france.drire.gouv.fr/ssol/sitecd77/ressourc/guide.htm others guide books exist in other region (Aquitaine for example) available from UNICEM http://www.unicem.fr/fr/content.php?catID=6 • Charters: UNICEM charter: Charter of the Comité Régional de Gestion et de Valorisation des déchets du BTP (Nord Pas de Calais) (Regional Committee for managing and valorising building and public works) http://www.unicem.fr/fr/content.php?catID=5,6

- Guidebooks: Guide d'utilisation en travaux publics - graves de recyclage matériau de recyclage de démolition et mâchefer (Handbook to using recycled material in public works; demolition recycled material and clinker)

http://www.rhone-alpes.equipement.gouv.fr/route/observatoire

- Normalisation: AFNOR (French normalisation): dozens of documents (definition, elaboration, characterisation, lboratory tests ans assys…) on granulate, concrete, soil

http://www.boutique.afnor.fr/ALL_home_main.asp

- Official boards on embankments, road making…

http://www.equipement.gouv.fr/bulletinofficiel/boaccueil.htm

- Resources for Architects: Building Materials Sustainable Resource Guide

http://habitatdesigns.com/sbmrg/csi/csistart.htm

http://www.ecoconstruction.org

http://ecospecifier.rmit.edu.au/flash.htm

http://www.bdp.asn.au

http://www.qub.ac.uk/tbe/arc/research/gbd

http://www.greenguide.com

http://www.bre.co.uk

http://oikos.com

http://www.ciria.org.uk

http://www.metrokc.gov/linkup

http://www.ciwmb.ca.gov/ConDemo/Products

- Recycled products databases

http://www.wrap.org.uk

http://www.nrf.org.uk/buy-recycled/index.html

http://www.designinsite.dk

http://ecospecifier.rmit.edu.au/flash.htm

http://www.ciwmb.ca.gov/RCP

http://www.wrap.org.uk

http://www.kingston.ac.uk/rematerialise
http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.11. Tool n° 22: Ground engineering spoil: good management practice

Title of the tool: **Ground engineering spoil: good management practice**
Year of development (+ up date if important): 1997
Author / developer: J.Kwan et al, CIRIA Construction Industry Research and Information Association (CIRIA), Classic House, 174-180 Old Street, LONDON EC1V 9BR
Type of tool: Case Studies of 40 projects, 6 in detail. In Book Report R179, on general sale. (advanced level)
Field of application: To inform Developers and Managers. As a Guide to Designers.
Potential Users: Project Managers and Financiers
Brief description (aim, content): By learning from defined Case Studies, with live demonstrations or textual descriptions, the basic tenets of material re. However, this is more concerned with clean spoil rather than contaminated.
DoW objective; contribution to sustainable brownfield development: Simple Instruction, for use in the field and office (and by designers/managers) Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. Waste minimisation and management
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility plus relevant WP3 and WP6 objectives
Tool in general use? Yes, R179 was a CIRIA 'best seller'
Usability restrictions: None, can be purchased openly. Obviously some UK site practices may vary from European.
Language: English
Availability/Reference: CIRIA Publications, London. £100 & £295. ISBN 086017 5367 & 5553 Construction Industry Research and Information Association (CIRIA), Classic House, 174-180 Old Street, LONDON EC1V 9BR Tel: +44(0)207 549 3300. Fax: +44(0)207 253 0523. www.ciria.org/publications

DEMOLITION

2.12. Tool n° 23: Characterisation Of Building-Related Construction And Demolition Debris In The United States

Title of the tool: **Characterisation Of Building-Related Construction And Demolition Debris In The United States**
Year of development (+ up date if important): 1998
Author / developer: Franklin Associates Prairie Village, KS for The U.S. Environmental Protection Agency - Municipal and Industrial Solid Waste Division - Office of Solid Waste
Type of tool: Report, 98 pages basic level
Field of application: Waste management and minimisation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim**: The purpose of this report is to characterise the quantity and composition of building related construction and demolition (C&D) debris generated in the United States, and to summarise the waste management practices for this waste stream. **Content**: Qualitative and quantitative data on debris produced by construction and demolition of buildings, along with overview of management practices in the US
DoW objective; contribution to sustainable brownfield development: Waste and nuisance reduction plan. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: Most of document is of general use, but part is specific to Illinois
Language: English
Availability/Reference Report No. EPA530-R-98-010 Internet: http://www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.13. Tool n° 24: Construction and Demolition (C&D) Waste Management Guide

Title of the tool: **Construction and Demolition (C&D) Waste Management Guide**
Year of development (+ up date if important): On line tool
Author / developer: US / EPA
Type of tool: Electronic Guidebook and practical tool for calculation and conversion (basic to advanced level)
Field of application: Waste management and minimisation, cost evaluation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Contents**: C&D Waste Characteristics / C&D Waste Management Options / Deconstruction / Calculate Waste Reduction Potential / Waste Material Exchanges / Recycling Equipment and Tax Incentives / Gypsum Drywall & Wood Recycling / Asphalt Shingle Recycling / All About Mercury In Buildings / Information Resources Includes practical tools in the Calculate Waste Reduction Potential: Conversion factors / Computing waste amounts / Potential savings calculation
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. Waste minimisation
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: Some parts of the tool are US specific
Language: English
Availability/Reference http://peakstoprairies.org/p2bande/construction/c&dwaste/index.cfm

2.14. Tool n° 25: Demolition Protocol

Title of the tool: **Demolition Protocol**
Year of development (+ up date if important): 2003 / 2004
Author / developer: London Remade, a business advisory service in UK for recycling initiatives EnviroCentre Ltd, in conjunction with Cory, Cleanaway and Institution of Civil Engineers
Type of tool: Three reports; Executive Summary (6 pages) and 2 Detailed Reports (Implementation document (97 pages) and Final main (140 pages basic to advanced level)
Field of application: Direct by Designer and Contractor
Potential Users: Project Managers and Assessors (governmental)
Brief description (aim, content): Full review of UK and European markets, with ideas for improvement of process, and Checklist Tools
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. Waste minimisation and management Important new initiative in UK (Remade) being launched locally/regionally; also 'live' in Scotland, Kent, Essex and Cornwall. Aimed exclusively at facilitating business opportunities, with government backing and some regional development funding.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility plus relevant WP3 and WP6 objectives
Tool in general use? Still to be adopted nationally – probably in use for London Boroughs / LDA
Usability restrictions: national application to UK only construction-wide application, not just brownfield
Language: English
Availability/Reference: download: http://www.londonremade.com/publications_research.asp - Demolition Protocol

2.15. Tool n° 26: Guidebook for controlled deconstruction: characterisation, valorisation and management of contaminated debris (Arbeitshilfe Kontrollierter Rückbau: Kontaminierte Bausubstanz Erkundung, Bewertung, Entsorgung)

Title of the tool: **Guidebook for controlled deconstruction: characteri-sation, valorisation and management of contaminated debris (Arbeitshilfe Kontrollierter Rückbau: Kontaminierte Bausubstanz Erkundung, Bewertung, Entsorgung)**
Year of development (+ up date if important): 2003
Author / developer: Authors: LGA Institut für Umweltgeologie und Altlasten, Nürnberg Editor: Bayerisches Landesamt für Umweltschutz, Augsburg (Bavarian state office for environmental protection)
Type of tool: Manual (practical guideline) (106 pages, intermediate level)
Field of application: Dismantling investigation, planning and execution (all relevant phases)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** To facilitate an systematic, cost-efficient and eco-friendly building dismantling and to help managing deconstruction debris **Content**: Deconstruction strategy / contamination characterisation/ managing debris/ valorisation Among others: Regulation framework and responsibilities concerning existing buildings, dismantling and waste disposal; frequent hazardous substances (asbestos, artificial mineral fibres, pesticides, wood preservatives, polychlorinated biphenyl (PCB), polycyclic aromatic hydrocarbon (PAH); metals; contaminations due to building use, biological hazards). Stepwise process of building investigation (sampling, technical examination, construction part specific examination). Health & safety measures. Assessment of hazards and disposal options. Setup of a dismantling and disposal plan; Methods for pollutant separation. Checklists, templates, properties of pollutants.
DoW objective; contribution to sustainable brownfield development: Waste and nuisance reduction plan. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: Most of document is of general use
Language: German
Availability/Reference Online: http://www.bayern.de/lfu/bestell/rueckbau_arbeitshilfe.pdf Bayerisches Landesamt für Umweltschutz - Bürgermeister-Ulrich-Str. 160 - 86179 Augsburg Tel: 08 21/90 71-0 - or 08 21/92 14-0 / Fax 08 21/90 71-55 56 E-mail: poststelle@lfu.bayern.de ISBN: 3-936385-43-2

2.16. Tool n° 27: Guidelines for Preparing Waste Reduction Strategy for Construction

Title of the tool: **Guidelines for Preparing Waste Reduction Strategy for Construction**
Year of development (+ up date if important): 2000
Author / developer: Office of Environment and Energy - Environment, Energy, & Employee Safety Division AEE-200 - 202-267-3553
Type of tool: Practical brochure, (4 pages advanced level)
Field of application: Waste management and minimisation, cost evaluation
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): Aim: To help you prepare waste reduction strategy. The guidelines are applicable to any building project, big or small Who can use these guidelines: Developers, builders and sub-contractors. Content: 1. Project Planning 2. Pre-Construction 3. Off-Site Activities 4. On-Site Activities Includes a useful check list
DoW objective; contribution to sustainable brownfield development: Waste minimisation and management. Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: None
Language: English
Availability/Reference. http://www.ecorecycle.vic.gov.au/asset/1/upload/Guidelines_for_Preparing_a_Waste_Reduction_Strategy_for_Const.pdf

2.17. Tool n° 28: Environmental Handbook for building and civil engineering projects. Part 3: demolition and site clearance

Title of the tool: **Environmental Handbook for building and civil engineering projects.** **Part 3: demolition and site clearance**
Year of development (+ up date if important): *2000*
Author / developer: R. Venables et al, for CIRIA (Construction Industry Research and Information Association), London
Type of tool: Book Form. Report C529, on general sale
Field of application: Client and Designer Information
Potential users: Developer and Designer Information
Brief description (aim, content): To provide a focus on the key areas of concern in site demolition and clearance processes. Concentrates on Legislation &Policy, Project Planning, Environmental Management.
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies. Set of Handbooks to assist all parties in construction projects
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility plus relevant WP3 and WP6 objectives
Tool in general use? Yes
Usability restrictions: UK national application only, but more widely applicable to general basis of European activities. Applicable to all construction, not just brownfields
Language: English
Availability/Reference: CIRIA Publications, London. £ 80. ISBN 086017 5294 CIRIA - Classic House, 174-180 Old Street, LONDON EC1V 9BR Tel: +44(0)207 549 3300. Fax: +44(0)207 253 0523. www.ciria.org/publications Also available from (down load): http://www.environment-agency.gov.uk/commondata/105385/managing_waste.pdf

2.18. Tool n° 29: ECO-LIVE: a software for construction waste management

Title of the tool: **ECO-LIVE: a software for construction waste management**
Year of development (+ up date if important): 2000
Author / developer: société ADATIRE
Type of tool: Works waste management software (advanced level)
Field of application: Waste management and cost evaluation
Potential users: Developers and Managers, economists, undertakers, craftsmen…
Brief description (aim, content): Works: description of works Buildings: type / size / number Undertakers: Action / Schedule Material: type / amount / aim Waste: nature / amount / origin / channels of elimination Costs: synthesis of all waste produced, and of costs, according to the channels of elimination retained
DoW objective; contribution to sustainable brownfield development: Quality standards for recycled materials. Quality standards concerning the consumption of natural resources. Databases on case studies and technologies.
Sustainability objective affected by the tool: Objective 2.2: to minimise waste and maximise recycling and reuse of soil and debris Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? Not documented
Usability restrictions: Requires Windows 98 (costs are indicated for France)
Language: French
Availability/Reference: A shareware of version 3 is downloadable from: http://perso.wanadoo.fr/adatire/ecolive/presentation/telechargement.htm

Objective 3: To ensure cost effectiveness and technical feasibility

Indicators:

2.5 Remediation performance verification
2.6 Remediation post validation

Practices

- **To apply a model procedure for verification of the entire remediation process**
- **To use a directory of costs and services for contaminated sites redevelopment**

How to achieve the objective 3: did you consider the following important aspects?

Cost effectiveness and technical feasibility analysis consists in looking in every details at the entire remediation process:

- Are the selected techniques technically and economically efficient
- Has resources and energy consumption been taken into account when evaluating technique effectiveness
- Is the best technique easily available

For the Project Manager

- Does the Developer considering long term and global economies?
- Have you analysed different technical solution before?
- Have you weighed the "pro" and "con" of the different possible solutions in terms of
  - ✓ Technical efficiency
  - ✓ Cost of action
  - ✓ Resource and energy consumption
  - ✓ Nuisance generation

For the Project Developer

- Does your project manager have sufficient experience in treatment technologies?
- Has your project manager shown an analysis of the best available techniques
- Are the selected techniques economical in terms of resource and energy consumption?

- Has your project manager consulted different sources of information on remediation techniques?

Actions to be derived

A selection of suggested actions, which could be implemented or integrated into projects financed under this practice include:

- Consultation of technical and economical databases on existing remediation techniques
- Generation of a detailed feed-back report analysing the choice retained, the application procedure, the results obtained and the gap between the expected results (in terms of technical and economical efficiency, and in terms of sustainable development efficiency)

MANAGEMENT APPROACH

3.1. Tool n° 30: Model Procedures for the management of land contamination (Contaminated Land Report 11)

Title of the tool: **Model Procedures for the management of land contamination (Contaminated Land Report 11)**
Year of development (+ up date if important): + update if important: 2003
Author / developer: UK Environment Agency
Type of tool: Risk management framework (199 pages intermediate level)
Field of application: The basic technical process can be adapted to apply in a range of regulatory and management contexts, subject to the specific constraints set by these contexts.
Potential users: Intended to assist all those involved in "managing" the land – in particular landowners, developers, industry, professional advisers, financial service providers, planners and regulators.
Brief description (aim, content): The Model Procedures provide a risk-based framework to inform decisions for dealing with contaminated land. They are intended to: provide a structured technical basis for contaminated land decision-making encourage universal and comparable output documents – written records from the process should contain details of specific project objectives, decisions taken and assumptions made, as well as making specific recommendations
Contribution to sustainable brownfield development: Provides a 'model procedure' for verification of the entire remediation process. The purpose of verification is to: Design remediation treatment that is fully compatible with other aspects of project Carry out the remediation in a safe and effective manner Verify that the remediation has been completed in accordance with the design (including any subsequent amendments) Ensure that the requirements of regulators, insurers and funders are met.
Sustainability objective affected by the tool: 2.3 – To ensure cost effectiveness and technical feasibility
Tool in general use? Currently in draft version
Usability restrictions: Tool is tailored for use within the UK legal and regulatory framework – adaptation and development of the procedures would be necessary to be adopted elsewhere in Europe.
Language: English
Reference: http://www.environment-agency.gov.uk/commondata/105385/model_procedures_550969.pdf

3.2. Tool n° 31: US EPA Triad approach

Title of the tool: **US EPA Triad approach**
Year of development (+ up date if important): + update if important: 2003
Author / developer: US Environmental Protection Agency
Type of tool: Integrative method, collection of documents (intermediate level)
Field of application: Site characterisation and Remediation
Potential users: Regulators, environmental consultants and people involved with site cleanup procedures
Brief description (aim, content): The Triad approach integrates systematic planning, dynamic work plans, and field analysis to achieve more cost-effective site characterization and cleanup strategies. A key output of the Triad approach is the development of an accurate conceptual site model that can support correct decisions about the magnitude of risk and the design of effective risk reduction strategies. A conceptual site model identifies what is already known and what more must be known in order to remediate contamination at a site and thus reduce risk to acceptable levels.
Contribution to sustainable brownfield development: Improves cost effectiveness of site characterisation and remediation
Sustainability objective affected by the tool: 2.3 To ensure cost effectiveness and technical feasibility
Tool in general use? Yes
Usability restrictions: The tool is tailored for use within the USA legal and regulatory framework therefore adaptation and development of the procedures into a European context would be necessary.
Language: English
Availability / reference: http://www.epa.gov/tio/triad/

TECHNOLOGY/ CASE STUDIES

3.3. Tool n° 32: ASTRES Data base (Banque de données)

Title of the tool: **ASTRES Data base (Banque de données)**
Year of development (+ up date if important): 2004 (version 3)
Author / developer: Isabelle Le Hécho, Fabienne Marseille, Louise Noël. Pôle de Compétences Sites et Sédiments Pollués / Centre National de Recherche sur les Sites et les Sols Pollués
Type of tool: CD-ROM decision support tool (intermediate level)
Field of application: Technology profiles and directory of companies
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim:** Description and evaluation (technical, cost) site treatment technologies and directory of companies that may apply them **Content:** Data base on technologies and companies for soil, sediment and under ground water cleaning
DoW objective; contribution to sustainable brownfield development: Helps selecting best available technologies in terms of technical, economical and sustainable development efficiency. Databases on technologies and case studies. Technology selection criteria
Sustainability objective affected by the tool: Objective 2.3 To ensure cost effectiveness and technical feasibility Objective 2.5 To provide decision support tools for risk based land management
Tool in general use? Getting more and more used
Usability restrictions: Available rehabilitation techniques according to contaminants are applicable everywhere. Address book covers only France.
Language: French
Availability/Reference: Freely available on request from • Pôle de Compétences Sites et Sédiments Pollués: 17, rue Edouard Delesalle F 59800 Lille www.polessp.org • Centre National de Recherche sur les Sites et les Sols Pollués: Boulevard Lahure BP 517 F 50505 Douai Cedex www.cnrssp.org Also usable from the internet at http://www.polessp.org/f_nav.asp (in French)

3.4. Tool n° 33: SITE Superfund Innovative Technology Evaluation

Title of the tool: **SITE Superfund Innovative Technology Evaluation**
Year of development (+ up date if important): August 2000 (periodically up-dated)
Author / Developer: US EPA Office of Research and Development, Washington DC 20460 ref EPA/540/C-99500
Type of tool: CD ROM
Field of application: Technology profiles
Potential users: Brownfield remediation undertakers
Brief description (aim, content): **Aim:** Description and evaluation (technical, cost) of innovative technologies applied in real case studies
DoW objective; Contribution to sustainable brownfield development: Databases on technologies and case studies Tool particularly useful to choose the most adapted available technology, based on the analysis of field case studies, with insight on technical and economical performance. Databases on technologies and case studies. Technology selection criteria
Sustainability objective affected by the tool: Objective 2.3 To ensure cost effectiveness and technical feasibility Objective 2.5 To provide decision support tools for risk based land management
Tool in general use? In the US; not in Europe
Usability restrictions: US case studies
Language: English USA
Availability / reference: Online: US EPA Office of Research and Development, Washington DC 20460

3.5. Tool n° 34: Innovative Remediation and Site Characterization Technologies Resources

Title of the tool: **Innovative Remediation and Site Characterization Technologies Resources**
Year of development (+ up date if important): January 2001 (periodically up-dated)
Author / Developer: US EPA Soil, waste and emergency response (5102G) ref EPA 542-C-01-001
Type of tool: CD ROM
Field of application: Technology profiles
Potential users: Brownfield remediation undertakers

Brief description (aim, content): **Aim:** Description and evaluation (technical, cost) of innovative technologies applied in real case studies
DoW objective; Contribution to sustainable brownfield development: Tool particularly useful to choose the most adapted available technology, based on the analysis of field case studies, with insight on technical and economical performance. Technology selection criteria. Databases on technologies and case studies
Sustainability objective affected by the tool: Objective 2.3 To ensure cost effectiveness and technical feasibility Objective 2.5 To provide decision support tools for risk based land management
Tool in general use? In the US; not in Europe
USABILITY RESTRICTIONS: None
Language: English USA
Availability / reference: Online: US EPA Soil, waste and emergency response (5102G) ref EPA 542-C-01-001 www.epa.gov/tio www.clu-in.org

3.6. Tool n° 35: RefAS : catalogue of references of contaminated site remediations (Referenzkatalog Altlasten / Schadensfallsanierung)

Title of the tool: **RefAS Referenzkatalog Altlasten / Schadensfallsanierung** **(catalogue of references of contaminated site remediations)**
Year of development (+ up date if important): 1997 (Version 1.1)
Author / Developer: Principal: LfU Landesanstalt für Umweltschutz Baden-Württemberg Authors: Arcadis, Trischler & Partner GmbH, Karlsruhe
Type of tool: (online) database (intermediate level)
Field of application remediation of contaminated sites (feasibility study and later)
Potential users: designed for federal and partly for state administration, private use can be allowed
Brief description (aim, content): **Aim**: Help to chose suitable, efficient and effective remediation technologies **Content:** Data base containing information about 1.023 remediation cases. The information was collected from about 2.100 information sources, by a task force formed by representatives of municipal and environment administration, from several federal states and the federal environment agency. Search criteria: Federal state; post code; type of polluting site use; remediation technology; pollutants; type of subsoil / rock; affected site use.. Main output (normally as short keywords): state, town and post code of the site; type of polluting site use; remediation technology; pollutants; type of subsoil / rock; affected site use; literature references (title, author, source of information, year, page)

DoW objective; contribution to sustainable brownfield development: database on technologies and case studies Helps to chose suitable, efficient and effective remediation technologies. Databases on technologies and case studies. Technology selection criteria
Sustainability objective affected by the tool Objective 2.3: to ensure cost effectiveness and technical feasibility Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Unknown.
Usability restrictions: Windows 3.x / Windows NT 4.0 / Windows 95 / 98 Only site references in Germany
Language: German
Availability / reference: online version: http://www.xfaweb.baden-wuerttemberg.de/alfaweb/progs/refas/refas.html (in German) also available as CD ROM (in 1999: 69,60 DM incl VAT.)

COST

3.7. Tool n° 36: Site investigation Cost-Benefit Analysis calculator

Title of the tool: **Site investigation Cost-Benefit Analysis calculator**
Year of development (+ up date if important): 2004 (Draft) - Full version in 2006
Author / developer: M. Ashmore and C.P. Nathanail
Type of tool: Database (intermediate level)
Field of application: Site investigation
Potential users: Project managers, Site investigators, Risk assessors and Environmental consultants
Brief description (aim, content): Given site-specific conditions and aims, the CBA will aid the development of a coherent drilling, sampling and analysis strategy with regard to cost and appropriateness.
Contribution to sustainable brownfield development: Improves the cost-effectiveness of site investigations
Sustainability objective affected by the tool: 2.3 To ensure cost effectiveness and technical feasibility 2.5 To provide decision support tools for risk based land management
Tool in general use? No
Usability restrictions: Not available for use yet
Language: English
Availability / reference: Matt Ashmore (e-mail : enzma@gwmail.nottingham.ac.uk)

3.9. Tool n° 37: Directory of Costs and Services for contaminated sites redevelopment (Leistungsbuch Altlastensanierung & Flächenentwicklung)

Title of the tool: **Directory of Costs and Services for contaminated sites redevelopment (Leistungsbuch Altlastensanierung & Flächenentwicklung)**
Year of development (+ up date if important): 1997/98; Publication of the extended version planned in 2004; also a computer database is planned
Author / Developer: Authors: Federal Environmental Agency of North Rhine-Westphalia (Landesumweltamt NRW) Editor: ECOS Umwelt GmbH, Aachen and Many contributors
Type of tool: book or text file (439 pages, extended update planned), website (partly) (intermediate level)
Field of application: project planning, remediation planning
Potential users: stakeholders in charge of investigation and remediation planning or project planning: mainly less experienced planners, consulting engineers and specialized authorities in charge
Brief description (aim, content): **aim:** standardized cost assessment for examination and planning services for contaminated sites **content:** Description of engineering services relevant for site remediation and construction using a systematic structure. Naming of the respective costs for most of these services. In addition more than 300 measures relevant for site remediation refuse dump were evaluated and the associated services were divided into approx. 44 independent and combinable service group. As far as possible the document was laid out to be in concordance to the official contracting terms for the award of construction performance contracts (Verdingungsverordnung für die Vergabe von Bauleistungen VOB/C). Therefore the document's structure is oriented by the German standard performance book for civil engineering (StLB). For all services prices and factors influencing the prices are indicated.
DoW objective; contribution to sustainable brownfield development: Technology selection criteria. More reliable cost estimations and economic viability calculations, being a main issue and obstacle for brownfield regeneration
Sustainability objective affected by the tool Objective 2.3: to ensure cost effectiveness and technical feasibility
Tool in general use? not known, but tool seems still to be unknown
Usability restrictions: In the of the existing version many of the prices are outdated by now due to economical and technological changes etc. Furthermore more advanced technologies (e. g. direct push, reactive systems, Monitored Natural Attenuation) are not covered yet. The planned version will have sampled information from all German states and not only from NRW. This showed that there were quite little differences between the states, but big differences between different companies inquired. Can give valuable information about costs, which are not (yet) covered by own experience.
Language: German

Availability / reference:

Download of the present version:
http://www.lua.nrw.de/veroeffentlichungen/malbo/malbo5_web.pdf (2,6 MB, in German)
Publication of the extended version planned in 2004; creation of a digital database intended
http://www.leistungsbuch-altlasten.de

Objective 4: To improve social acceptance through identification of all stakeholders and risk communication

Indicators:

2.7 Documented strategy

Practices:

- **To apply public communication and participation**
- **To set up an awareness-raising campaign to avoid social resistance (*see description in WP5 document)***

How to achieve the objective 4: did you consider the following important aspects?

Social resistance may spoil a project, if this factor is not taken into consideration. One means to tackle with social resistance to the project is by communicating on it. Within the WP2 package, only communication towards explaining the technological choices retained and the criteria used (mainly risk based) are taken into consideration. For more advanced features on communication and social acceptance please refer to WP 5 Work package.

For the Project Manager

- Do you plan to elaborate and implement strategy of public involvement?
- Do you plan establish public and private partnership?
- Do you integrate stakeholders into all steps of the process?
- Do you support equal access to (critical) information?
- What means of communication are the most appropriate taken into account socio-economical environment?
- Is the communication message easily understandable by anyone that is not an expert?
- Will recourse to a communication expert or department be necessary?
- What are expected benefits for a citizens and for local community
- Is the Developer willing to communicate on the project?

- Have you all the skills to manage communication?
- Do you integrate stakeholders into all steps of the process
- Have you all the technical information, arguments and analysis available to communicate to public
- Make sure the Developer takes its part of the communication

For the Project Developer

- Does your project manager have sufficient experience in public communication?
- Are the technical information, arguments and analysis available to prepare communication supports?
- Make sure that communication is well balanced between technical aspects (Project manager, WP2) and socio-economical aspect (Project developer, WP5)
- Do you prepare a conflict management strategies

Actions to be derived

In WP2 work package, only communication on the technical aspects of the project is considered

Communication on technical aspects of the project should not only be a complement to the global communication program of the project developer, but can also be in a pedagogic purpose, in order to show that:

- The preoccupation of the public are known and well understood by the project manager
- The risk on health and environment are well mastered by the project manager, and by the actions taken during works

Exhibitions, brochures and site visits for the public may favour social acceptance of the project.

- Improve the quality of the information itself (WP5: objective 5.1)
- Improve the quality of the information flow inside the decision-making process and a more efficient use of information (WP5: objective 5.2)
- Improve the quality of discussion process and a resolution of conflicts (WP5: objective 5.3)
- Improve the legitimacy of the decision-making process (WP5:objective 5.4)
- Improve the efficiency of the process in terms of duration and costs (WP5: objective 5.5)
- empower citizens, especially those representing non-organised interests (WP5: objective 5.6)
- delegate responsibility to lower decision level and to stimulate a sense of ownership (WP5: objective 5.7)

- Elaborate and implement strategy of citizen`s participation
- Identify stakeholders: co-workers, area residents, elected officials, civic organizations, health care providers, media, regulatory agencies, environmental activists, contractors, other.
- Prepare characteristics of stakeholders: concerns, attitudes, levels of interest levels of involvement, histories, levels of knowledge, opinions, reasons for interest, types of involvement. Are they potential supporters or potential adversaries?
- Establish of public-private partnership

4.1. Tool n° 38: risk communication program for consulting and individual assessment on contaminated sites (Risikokommunikationsprogramm zur Beratung und Einzelfall-prüfung auf kontaminierten Standorten)

Title of the tool: **RISKOM : risk communication program for consulting and individual assessment on contaminated sites (Risikokommunikationsprogramm zur Beratung und Einzelfall-prüfung auf kontaminierten Standorten)**
Year of development (+ up date if important): 1998
Author / developer: IFUA GmbH / CEMLOG GbR Editor: Deutsche Bundesstiftung Umwelt (German Federal Environmental Fund), city of Osnabrück, IFUA GmbH
Type of tool: Risk communication consulting program (intermediate level)
Field of application: risk communication; consulting; individual assessment
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim**: Calculates and visualises individual risk of affected persons **Content**: Based on existing examination data the program calculates a prognosis and model of the individual pollutant exposition of persons living on a contaminated site. This includes many types of consequences (e. g. usability restrictions, safety and remediation measures and psychological issues) The visualised output is the basis for the further risk communication and consulting. Steps: 1. Elevation of individual data of the site and of the persons affected by the contamination (mostly done by a consultant) 2. Calculation and comparison of the exposition / of the individual risk 3. Display of the results as tables, bar charts and maps. Additional information is available, e. g. about pollutants or about site use scenarios. More details: http://www.osnabrueck.de/verkehr/8140.html; http://www.osnabrueck-net.de/Umwelt/wueste.html See also practice no.?? 2.4a: "To set up efficient public communication"
DoW objective; contribution to sustainable brownfield development: This software helps to communicate to affected persons risks due to a site contamination and the resulting consequences.
Sustainability objective affected by the tool: 2.4 social acceptance, 5.1 quality of information, 5.3 discussion & conflict solving, 5.7 delegation, 2.1 environment
Tool in general use? Not documented
Usability restrictions: By now only the tool is only tailored for a specific site, but further dissemination is planned. Anyway the general idea may be inspiring.
Language: German
Availability/Reference IFUA-Projekt-GmbH, Bielefeld, Monika Machtolf, Email: monika.machtolf@ifua.de, Phone: +49-521-97710-0

4.2. Tool n° 39: Environmental management dashboard; environmental perform-ance indicators, management and communication tools (GERMAINE Project). [Votre tableau de bord de gestion environnementale; Les indicateurs de per-formance environnementale outil de gestion, outil de communication (Projet GERMMAINE)]

Title of the tool: **Environmental management dashboard; environmental perform-ance indicators, management and communication tools (GERMAINE Project). [Votre tableau de bord de gestion environnementale; Les indicateurs de per-formance environnementale outil de gestion, outil de communication (Projet GERMMAINE)]**
Year of development (+ up date if important): Not documented
Author / Developer: Institut Eco-Conseil (Belgium)
Type of tool: Two brochures (2 x 16 pages, intermediate level) Guide books, brochures
Field of application: Nuisances, waste, communication
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): This brochure helps at understanding the utility of environmental performance indicators / setting up an environmental management dashboard / making aware of the interest of systematic environmental managing modes.
DoW objective; contribution to sustainable brownfield development: Proposes guidelines and performance indicators to set up and to control sustainable development projects
Sustainability objective affected by the tool: 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works 2.2: To minimise waste and maximise recycling and reuse of soil and debris 2.4: To improve social acceptance through identification of all stakeholder and risk communication
Tool in general use? Not documented
Usability restrictions: The tool is more specifically designed for production and service activities
Language: French
Availability/Reference: http://www.ecoconseil.org/ Home page http://www.eco-conseil.be/biblio/tableau_de_bord/gestion_durable/indicateurs2.pdf: sustainable development indicators http://www.eco-conseil.be/biblio/tableau_de_bord/gestion_environnementale/Germainefr.pdf Environmental management of works http://www.ecoconseil.org/add/eg_batiment.pdf Urban building works

4.3. Tool n° 40: Best Practice Guidelines on Public Engagement for the Waste Sector

Title of the tool: **Best Practice Guidelines on Public Engagement for the Waste Sector**
Year of development (+ up date if important): September 2003
Author / developer: The Environment Council
Type of tool: Guidebook (36 pages intermedaite level)
Field of application: Quality of management, public involvement
Potential users: Local authorities, developers, project managers,
Brief description (aim, content): Community and stakeholder engagement in the waste sector is being driven from several directions. There is the need to put local plans and strategies in place; meeting targets set at national and EU levels; the need to change attitudes and behaviour towards waste; and the controversy that often surrounds new developments. Though the need for engagement as a means to address these issues is generally accepted, how to do it is still a mystery to many. These Guidelines hope to provide a clear starting point. The core message of the Guidelines is that each engagement process is unique. This makes advancing 'good practice' difficult, but there are principles that should underlie all engagement processes, and stages of planning that all such processes should go through. The principles include inclusiveness, transparency, independence and accountability, underpinned by commitment, accessibility, proper resourcing and productivity. The Guidelines outline the major engagement techniques and their uses.
DoW objective; contribution to sustainable brownfield development: The implementation of sustainable waste management strategies and projects is complex and sensitive. As such there are likely to be many aspects of the development and implementation of such strategies and projects that can benefit from engagement. In some cases some form of engagement is a legal requirement; in others it is simply good practice. Stakeholder engagement in waste sector decisions is driven from several directions: the need to meet targets and policies set out in national waste strategies; the need for planning permission to be given to waste management companies for new facilities where they accord with the development plan; the need to identify sites in preparing Waste Local Plans; the fact that waste facilities are often seen as unwanted neighbours; and the overarching need to meet societal demands for safe waste management at an acceptable cost. But beyond all of these, (perhaps because waste touches the lives of all of us), there is a fundamental need to involve communities in responsibility for the decisions we make as a society about how we use our resources. Engaging people on waste helps stimulate that more fundamental discussion and promotes understanding and action.
Sustainability objective affected by the tool: 2.4: To improve social acceptance through identification of all stakeholder and risk communication
Tool in general use? Not documented
Usability restrictions: No usability restrictions
Language: English

Availability/Reference: The Environment Council Tel: 020 7836 2626 info@envcouncil.org.uk www.the-environment-council.org.uk

4.4. Tool n° 41: Guideline on Community Consultation and Risk Communication

Title of the tool: **Guideline on Community Consultation and Risk Communication**
Year of development (+ up date if important): 1999
Author / developer: The Environment Protection and Heritage Council (former National Environment Protection Council Assessment of Site Contamination - NEPC)
Type of tool: guideline
Field of application: quality of management, risk communication
Potential users: Local authorities, developers, project managers,
Brief description (aim, content): This Guideline provides a systematic approach to effective community consultation and risk communication in relation to the assessment of site contamination. It is not intended to be prescriptive but is intended to be used as a tool for effective consultation by consultants and regulators and should also provide a useful reference for all stakeholders including industry, government, landholders and the wider community. There are three principles to the approach taken in the preparation of this guideline: - that no assessment of site contamination should commence until an evaluation has been made regarding the probable need, nature and extent of consultation for the project - the interaction with the community cannot simply be a technical process, it requires skills in listening and communicating and should be a two-way process - That for sites with contentious issues, consultation with the community is considered to be essential. This is particularly the case when the contamination at the site has the potential (or perceived potential) to have an impact on any stakeholders.
DoW objective; contribution to sustainable brownfield development: As an indication, consultation with the community would be required in the following situations: - Amenity/nuisance: when the assessment or remediation of the site may affect the amenity of the locality, by way of temporary noise and odour emissions and dust. - Significant contamination: where high level of contamination has the potential to impact o the adjacent community, or where the contaminant types are controversial - Controversial sites: where the site or locality has a controversial history that may be related to the site contamination or the development of the site is controversial for political, economic or social reasons. A consultation and communications process is obviously an integral part of the wider goal of successful assessment and management of the site contamination
Sustainability objective affected by the tool: Objective 2.4 To improve social acceptance through identification of all stakeholders and risk communication

Tool in general use? Not documented
Usability restrictions: No usability restrictions
Language: English
Availability: Environment Protection and Heritage Council Secretariat National Environment Protection Council Service Corporation Level 5, 81 Flinders Street, Adelaide, South Australia 5000 Telephone: (08) 8419 1200 Fax: (08) 8224 0912 Email: exec@ephc.gov.au WWW: www.ephc.gov.au Document : http://www.ephc.gov.au/pdf/cs/cs_08_community_consult.pdf

4.5. Tool n° 42: A Standard Land Condition Record

Title of the tool: **A Standard Land Condition Record**
Year of development (+ up date if important): 2000, updated Guidance 2002
Author / developer: Working Group of the The Urban Task Force (UK Government public/private initiative) Current management of scheme by Institution of Environmental Assessment (IEMA), Lincoln, UK.
type of tool: Spreadsheet Tool for entry of all site factual data in standard format, to be passed on to new Owner. Basic 24 pages (on paper), but expands as more information is added electronically (intermediate level)
Field of application: In Transfer of Ownership of Site, provides quality assurance to Advisors of both Parties in transfer.
Potential Users: Owners, Developers, Project Managers (at end of project)
Brief description (aim, content): Sets out to be a definitive way to put down all Factual Data concerning Site, past Investigations and Remediations. Allows no interpretation, but does allow the writing of Caveats and Gaps in Informations, as well as Summarising all known information. Set out in 9 Sections – Executive Summary, Document Management, Land Referencing Info, Current Land Use, Surrounding Land, Proximity to Waters, History, Desk Study & Investigation, Remediation. Places emphasis on putting information in Annexes, with QA/QC, Constraints, Records, Data there. IMPORTANT – To carry full 'authority' must be signed by an accredited Specialist (SiLC; <100 no.)
DoW objective; Contribution to sustainable brownfield development: Should put 'comfort' on Information passed on being accurate, complete and professional.
Sustainability objective affected by the tool: Obj 2.4 – Identification of all Stakeholders and Risk Communication Obj. 6.2 – Facilitating efficient Project Delivery Obj. 6.4 – Framework for Flow of Information and improved Communication.
Tool in general use? Yes, but very slow to be taken up by Owners, probably due to few SiLC's being qualified/registered over past three years in UK. Needs Expert to fully authorise the content.

Usability restrictions: National application only in UK, but with modification could apply most Sections elsewhere in EU.
Language: English
Availability/Reference: No Document Reference number. Available in Paper, Disc and download. Downloadable FREE from website www.silc.org.uk ; press Download LCR.

Objective 5: To provide decision support tools for risk based land management

Indicators: **2.8 Surface and groundwater quality control** **2.9 Risk management framework** **2.10 Decision support tools**

Practices:

- **To adopt effective decision support tools for risk based land management**
- **To adopt a step-wise site investigation and evaluation procedure**
- **To use standard risk assessment and option appraisal procedures**
- **To implement digital soil masses modelling in order to reduce soil transport**
- **To use GIS / GPS as a tool for absolute reference of sampling points, in order to keep trace of them after site / area reorganisation**

How to achieve the objective 5: did you consider the following important aspects?

Risk based land management requires reference to standardised procedures, tools and data, in order to produce clear and verifiable documents.

For the Project Manager:

- Is there a national or local recommended methodology for risk based land management?
- Have you all the necessary skills available to apply the methodology?
- Did you define the tasks which the methodology should fulfil?

For the Project Developer:

- Does the proposed risk based approach refer to a recommended methodology?
- Are all aspects of the risk encompassed?

For consulting engineers and other persons in charge of contamination examination and remediation

- Do you manage contaminated sites using risk based land management? That means, does its choice of solution consider the following three components:
  - ✓ Will it make the site fit for the future use?
  - ✓ Will it protect the environment from imminent hazards?
  - ✓ Will it provide a long-term care, considering future generations?.
- Concerning environmental issues, does your risk assessment
  - ✓ examine and assess properly all possible contamination sources?
  - ✓ consider all possible receptors (humans, animals, plants)
  - ✓ consider all possible pathways (e. g. via soil, water and air) from the contamination source to the receptor?
- Do you use decision support tools for risk based land management anyway?
- Do you follow a stepwise procedure for your site investigation and evaluation? There are tools avaliable that help to do this!
- Do you use standard risk assessment and option appraisial procedures? This may facilitate the entire process considerably and help to saveguard the overall quality.
- Do you use computer programs that help you to optimise remediation concerning cost and environmental revenue?

For contracting authorities and other persons in charge of mandating or controlling a contamination examination and remediation

- Do you use decision support tools for risk based land management?
- Do you follow a stepwise procedure for your site investigation and evaluation? There are tools and best practice templates available that help to establish an appropriate stepwise approach.
- Do you use standard risk assessment and option appraisial procedures? This may facilitate administration and control considerably and help to saveguard the overall quality.
- Do you use computer programs that help you to optimise remediation concerning cost and environmental revenue?

Actions to be derived

- Risk based land management requires careful site characterisation, data on the usage of the different environmental media, risk calculation and media quality monitoring during and after site rehabilitation.
- Look for existing reference guides to implement stepwise procedures: in some cases these documents are national or regional references or may be produced by specialised offices or corporations.

- Do not refer to different approaches at a time for the same project as they may not be coherent between each other
- Take the following steps:
  - ✓ Identify the problems to solve
  - ✓ Develop possible options to solve the problems
  - ✓ Identify appropriate tools to realise these solutions
  - ✓ Select the option to be implemented
  - ✓ Implement the selected solutions using the selected tools
  - ✓ Monitor the implementation progress in order to check if the right solution and the right tool is being implemented.

For consulting engineers and other persons in charge of contamination examination and remediation

Take advantage of tools that help
- as general guidelines for risk based land management
- at contamination risk assessment
- at deciding about the most appropriate remediation method
- at optimising the remediation process
- at solving specific problems
- to learn from other experiences
- to select other tools

For contracting authorities and other persons in charge of mandating or controlling a contamination examination and remediation

Take advantage of tools that help
- as general guidelines for risk based land management
- at achieving a standardised, systematic, efficient and?faultproof approach for contamination risk assessment
- to safeguard quality standards
- to estimate costs
- to administrate the results of examinations, monitoring…
- at deciding about the most appropriate remediation method concerning economic and xx aspects
- to learn from other experiences
- at solving specific problems…

RISK ASSESSMENT

5.1. Tool n° 43: Assessing Risks from Contaminated Sites: Policy and Practice in 16 European Countries

Title of the tool: **Assessing Risks from Contaminated Sites: Policy and Practice in 16 European Countries**
Year of development (+ up date if important): 1999
Author / Developer: Professor Colin C. Ferguson Land Quality Management, SChEME, The University of Nottingham, University Park, Nottingham NG7 2RD **Publishing Organisation**: Environment Agency - Rio House - Waterside Drive Aztec West – Almondsbury -Bristol BS32 4UD Tel: 01454 624400 Fax: 01454 62409
Type of tool: Publication (22 pages, basic level)
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Field of application: Decision Support Tools used in Europe
Brief description (aim, content): A concerted action initiative on risk assessment for contaminated sites (CARACAS, 1996 – 1998) was funded by the European Commission under the Environment and Climate Programme and coordinated by the German Umweltbundesamt. A major outcome of CARACAS has been the publication of two books. The first (Ferguson et al. 1998) covers the scientific basis for risk assessment. The second (Ferguson & Kasamas 1999) provides authoritative and detailed reviews on policy and practice in the 16 European countries contributing to the CARACAS programme: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. This paper summarises policy and practice in those 16 countries.
DoW objective; contribution to sustainable brownfield development: Overview and analysis of decision support tools used in Europe
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: Technical part can be used unrestricted. Some parts are specific to home regulation
Language: English
Availability/Reference: Land Contamination & Reclamation, 7 (2), 1999

5.2. Tool n° 44: Risk Assessment for Environmental Professionals

Title of the tool: **Risk Assessment for Environmental Professionals**
Year of development (+ up date if important): 2001
Author / developer: Chartered Institution of Water & Environmental Management, (CIWEM), London **Authors:** Various. Editors – S.Pollard & J.Guy Lavenham Press, Suffolk, England CO10 9RN
Type of tool: A4 softback Book, with separate chapters written on Topics by recognised authority (intermediate level)
Field of application: Reference for all types of Risk Assessment methods (separate chapter each)
Potential Users: Developers, Regulators and Designers
Brief description (aim, content): Brings together authoritative UK (and American) views on both Technical (ecological, microbiological, chemical, natural) Hazards and variety of Risk Assessment Needs (Corporate, Government, Strategic, Policy, Project levels) and Models.
DoW objective; contribution to sustainable brownfield development: Not significantly mentioned, but strategic/corporate level is useful
Sustainability objective affected by the tool: Objective 2.4: to improve social acceptance through identification pf all stakeholders and risk communication Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes in UK; Book sells well
Usability restrictions: national application (written by Regulatory staff in UK)
Language: English
Availability/Reference: Available to buy. £25 from CIWEM, 15 John Street, LONDON WC1N 2EB. ISBN 1 870752 71 6

5.3. Tool n° 45: Risk Assessment for Contaminated Sites in Europe. Volume 1 Scientific Basis

Title of the tool: **Risk Assessment for Contaminated Sites in Europe. Volume 1 Scientific Basis**
Year of development (+ up date if important): 1998
Author / Developer: Editorial Board: Prof. Colin Ferguson (Chairman), Dr Dominique Darmendrail, Dr Karin Freier, Dr Bjorn Kaare Jensen, Dr John Jensen, Dipl.Ing. Harald Kasamas, Dr Arantzazu Urzelai, Dr Joop Vegter **Publishing Organisation**: European Commission - Environment and Climate Programme Concerted Action on Risk Assessment for Contaminated Sites in the European Union 1996–1998)
Type of tool: Book, (170 pages, intermediate level)
Field of application: Decision Support Tools used in Europe
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies

Brief description (aim, content): Report prepared as part of the Concerted Action on Risk Assessment for Contaminated Sites in the European Union (CARACAS). This programme was funded by the European Commission under the Environment and Climate Programme, and coordinated by the German Umweltbundesamt. **Content:** General introduction / Fundamental concepts of risk / Receptors: human health / Receptors: ecosystem health / Site and source characterisation / Pathways: transport and fate of contaminants / Models / Screening and guideline values / Better methods for risk assessment
DoW objective; contribution to sustainable brownfield development: Overview and analysis of decision support tools used in Europe
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: No restriction as book covers most of European Countries
Language: English
Availability/Reference: LQM Press PO Box 5095 Nottingham NG2 6FB UK http://www.caracas.at/

5.4. Tool n° 46: The CLEA model for human health risk assessment (Contaminated Land Re-ports CLR 7-10)

Title of the tool: **The CLEA model for human health risk assessment (Contaminated Land Reports CLR 7-10)**
Year of development (+ up date if important): 2002 + 2004 major update. Continuing developments
Author / developer: Environment Agency
Type of tool: Risk assessment tool. Spreadsheet and CD-Rom, plus Printed Papers (advanced level)
Field of application: The basic technical process can be adapted to apply in a range of regulatory and management contexts, subject to the specific constraints set by these contexts. Human Health & Soil ONLY
Potential users: Intended to assist all those involved in "managing" the land – in particular landowners, developers, industry, professional advisers and regulators.
Brief description (aim, content): The model seeks to compare the amount of contaminant that a receptor is estimated to take in from the soil with a toxicological assessment of risk over a lifetime exposure cycle. Set of Toxicological Reports, Soil Guideline Values, CD-ROM, downloadable programme Intended to replace List evaluation for Sites, and to have 'common ground' for regulation.
DoW objective; contribution to sustainable brownfield development: Provides a model procedure for 'standardising' risk evaluation for specific contaminants.

Sustainability objective affected by the tool: Objective 2.3: to ensure cost effectiveness and technical feasibility Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Currently in use in UK, but limited number of toxicological reports
Usability restrictions: Tool is tailored for use within the UK legal and regulatory framework – adaptation and development of the Model might not be necessary for adoption elsewhere in Europe. See NICOLE evaluation report for comparability with other Models (deemed 'conservative'). Some of algorithms in Model cannot be amended to be site-specific. Vapour pathway already discredited and to be amended with new Model in 2004.
Language: English
Availability/Reference: free download model from http://www.environment-agency.gov.uk/ CLR 7, 8, 9, 10 on Paper have following ISBN 1857 05732 5, 05733 3, 05734 1, 05749 X.

5.5. Tool n° 47: NORISC (Network Oriented Risk assessment by In-situ Screening of Contaminated sites) Decision Support System

Title of the tool: **NORISC (Network Oriented Risk assessment by In-situ Screening of Contaminated sites) Decision Support System**
Year of development (+ up date if important): 2003
Author / developer: NORISC Participants
Type of tool: Decision Support System (Computer Program, intermediate level)
Field of application: Contaminated land characterisation and assessment (start phase of contamination investigation)
Potential users: City planners, Decision-makers, Landowners, Investors and Stakeholders
Brief description (aim, content): The NORISC project has established a decision tool as core part of a decision support system (DSS) that combines the data in the catalogue of contaminated site characteristics and the user requirements with the register of potentially suitable investigation methods. This tool is based on the evaluation matrix that selects technically suitable sampling, geophysical, (hydro-) geological techniques, as well as field and laboratory analytical measurement and testing methods, ranking them by their cost and time attributes. By using it, you can easily assort an optimal set of different kinds of methodologies for a more reliable, cheap and fast on site and in situ investigation in urban areas, whilst providing an approach for revitalisation of abandoned industrial sites.
Contribution to sustainable brownfield development: Improves site characterisation and risk assessment
Sustainability objective affected by the tool: 2.5 To provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: None
Language: English

Availability / reference: www.norisc.com Summary of results: http://norisc.com/download/norisc_pdf.pdf

LAND MANAGEMENT

5.6. Tool n° 48: Contaminated Land Management: Ready Reference

Title of the tool: **Contaminated Land Management: Ready Reference**
Year of development (+ up date if important): 2002
Author / developer: J. Nathanail, R.P. Bardos and CP Nathanail
Type of tool: Manual (intermediate level)
Field of application: Contaminated Land management
Potential users: Developers, regulators, researchers and environmental consultants
Brief description (aim, content): Provides a one-volume compendium of key facts, techniques, considerations and potential pitfalls involved in the assessment and management of the risks associated with contaminated land. It presents the management process in a logical sequence with essential reference material at every step and acts as a screen to identify management options.
Contribution to sustainable brownfield development: Improving consultant and regulator access to current technical guidance on site characterisation, assessment and remediation.
Sustainability objective affected by the tool: 2.3 – To ensure cost effectiveness and technical feasibility
Tool in general use? Yes
Usability restrictions: None
Language: English
Availability / reference: LQM Press / EPP Publications

5.7. Tool n° 49: Polluted Sites Management (Gestion des Sites Pollués)

Title of the tool: **Polluted Sites Management (Gestion des Sites Pollués)**
Year of development (+ up date if important): 2000
Author / Developer: INERIS / BRGM for the French Ministry of Ecology and Sustainable Developement
Type of tool: Book and CD ROM (587 pages, advanced level).
Field of application: Decision Support Tools used in France
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): **Aim**: To provide guidelines to determine rehabilitation target on a risk based approach. **Content:** Risk based approach regarding health, environment, wealth
DoW objective; contribution to sustainable brownfield development: Step wise approach / Risk based management
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes in France
Usability restrictions: Specifically intended for home use (France)
Language: French
Availability/Reference: BRGM Editions, 3, avenue Claude Guillemin BP6009, 45060 Orléans cedex 02. Also downloadable from: http://www.fasp.info/OutilsMethodologiques/OMChimie/ListeGuidesChimie/GuidesOutils/EvaluationDetaillee/DescriptionEDR.html NB: a set of decision support tools regarding contaminated sites investigation, evaluation and management can be down loaded from: http://www.fasp.info/OutilsMethodologiques/OMChimie/ListeGenerale.htm

5.8. Tool n° 50: Review of Decision Support Tools for Contaminated Land Management, and their Use in Europe. A report from the Contaminated Land Rehabilitation Net-work for Environmental Technologies

Title of the tool: **Review of Decision Support Tools for Contaminated Land Management, and their Use in Europe. A report from the Contaminated Land Rehabilitation Network for Environmental Technologies**
Year of development (+ up date if important): 2002
Author / Developer: Paul BARDOS, Anita LEWIS (r3 Environmental Technology Limited, United Kingdom), Stephen NORTCLIFF (University of Reading, United Kingdom), Claudio MATIOTTI (Aquater, Italy), Franck MAROT (ADEME, France), Terry SULLIVAN (BNL, USA) Published by: Umweltbundesamt GmbH (Federal Environment Agency Ltd) Spittelauer Lände 5, A-1090 Wien, Austria
Type of tool: Report, 192 pages intermediate level
Field of application: Decision Support Tools used in Europe
Brief description (aim, content): The report reviews the Working Group's view of the principal decision making criteria for contaminated land management and remediation: driving forces for the remediation project, risk management, sustainable development, stakeholder satisfaction, cost effectiveness and technical feasibility.
DoW objective; contribution to sustainable brownfield development: Overview and analysis of decision support tools used in Europe
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: None
Language: English
Availability/Reference: Down loadable from http:// www.clarinet.at

5.9. Tool n° 51: Guidelines on Remediation of Contaminated Sites

Title of the tool: **Guidelines on Remediation of Contaminated Sites**
Year of development (+ up date if important): 2002
Author / Developer: Danish Environmental Protection Agency
Type of tool: Guidebook 290 pages advanced level
Field of application: Decision Support Tools used in Europe
Potential users: all stakeholders affected by environmental issues, e. g. planners, consulting engineers and remediation companies
Brief description (aim, content): Introduction / Strategy / Initial Survey Site Investigations / Risk Assessment / Quality Criteria For Soil, Air And Groundwater / Reporting / Design / Remedial Measures / Operation And Evaluation / References / Appendices.

DoW objective; contribution to sustainable brownfield development: Overview and analysis of decision support tools used in Europe
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: Technical part can be used unrestricted. Some parts are specific to home regulation
Language: English
Availability/Reference: Environmental Guidelines No. 7 2002 (Vejledning fra Miljøstyrelsen) http://www.mst.dk/udgiv/publications/2002/87-7972-280-6/html/default_eng.htm

5.10. Tool n° 52: The REC decision support system for comparing soil remediation alternatives

Title of the tool: **The REC decision support system for comparing soil remediation alternatives**
Year of development (+ up date if important): : 1997
Author / developer: E. Beinat, MA van Drunen, R Janssen, MH Njiboer, JGM Kohlenbrander and JP Okx
Type of tool: Decision Support Tool (Collection of documents, advanced level)
Field of application: Beginning of remediation planning Can be used as a complement before using tool no. 53 (Environmental balancing of soil remediation measures)
Potential users: Policy makers, site owners and soil remediation companies
Brief description (aim, content): REC is a Decision Support System for the analysis and evaluation of possible clean-up strategies for a contaminated site. The aim of REC is to support the choice of the most effective and efficient strategy for soil remediation for the site concerned. With REC, the user can measure the results of clean-up in terms of: **Risk Reduction.** The degree to which a remedial action reduces the risks for humans, ecosystems and other targets on the site. High risk reduction indicates residual risks after remediation are low. **Environmental Merit.** The degree to which a remedial action achieves a positive environmental balance. Operations prevent the spreading of contamination and increase the stocks of clean soil and groundwater. However, they also use up resources and may pollute other media. Environmental merit is the balance between environmental benefits and costs. High scores indicate that a limited use of natural resources and a limited pollution transfer. **Costs.** The total costs necessary for the clean-up of the site. Costs include preparation, operation, maintenance and monitoring costs at all phases of the operation. Low costs indicate that the operation is very efficient in achieving a given risk reduction and a given environmental merit.

REC Project description: http://130.37.129.100/english/o_o/instituten/IVM/research/rmk/index.html New location: http://www.falw.vu.nl/Onderzoeksinstituten/index.cfm?home_file.cfm?fileid=EA9454E9-7E6F-4DBF-A34D63D78A93D022&subsectionid=602C4835-C246-41FA-8DD706E7084B0D06
Contribution to sustainable brownfield development: The REC system has four main advantages: It allows a systematic analysis of decision options highlighting their strengths and weaknesses. It introduces a structure for the evaluation, which simplifies the decision process and streamlines the multiple factors involved in clean-up management. It increases the understanding of the decision and its effectiveness by allowing the user to focus on a few clear and strategic issues. It offers evidence on the advantages and disadvantages of the possible choices in a simple, concise and direct way, which facilitates communication between decision actors.
Sustainability objective affected by the tool: 2.5 To provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: None (?)
Language: English / Dutch
Availability / reference: CUR / NOBIS, Büchnerweg 1, Postbus 420, 2800 AK Gouda, Tel: 0182-540680 Fax: 0182-540681

5.11. Tool n° 53: Environmental balancing of soil remediation measures

Title of the tool: **Environmental balancing of soil remediation measures (Umweltbilanzierung von (Altlastensanierungsverfahren)**
Year of development (+ up date if important): 1999
Author / Developer: **Editor:** Landesanstalt für Umweltschutz Baden-Württemberg (State office for envirionmental protection), Dr. Wolfgang Kohler
Type of tool: database (decision support tool, advanced level)
Field of application: remediation planning and realisation, regional contaminated site management Can be used as a complement after using tool no. ?53 (The REC decision support system for comparing soil remediation alternatives)
Potential users: stakeholders in charge of decisions about remediation measures, e. g. consulting engineers, remediation companies, project managers, planners and respective public administration
Brief description (aim, content): **aim:** Facilitate the consideration of environmental aspects for remediation decisions (instead of limiting to economical and efficiency aspects) by ranking soil remediation options for a particular risk management problem concerning their potential environmental impacts.

content:

Generally acknowledged procedures for eco-balances were adopted to remediation questions.

Typical environmental data are linked to an array of remediation processes. These data are processed to generic LCA data and to a LCA model. Automated calculation of the life cycle impact assessment. Transformation of the results of the life cycle impact assessment and of the life cycle inventory to a "disadvantage factor table".

The tool based on a database of generic life cycle inventories (LCIs) for about 60 unit processes used in remediation projects, for example: Mobilisation / demobilisation of equipment; Transport of persons; Drilling and construction of wells (including material consumption); Discharge to groundwater; Groundwater treatment by air stripping; Data for the LCIs, based on "average" equipment and services.

The modular concept allows to identify the most harmful steps within the remediation process and to focus on its optimisation. Application examples and explanations are included.

overview report about lca instruments
http://www.schweizerbart.de:80/pubs/topdf/pubs/bookspdf/es/schriftenr-182024209-desc.html.pdf description

description article: http://www.cau-online.de/aktuell/lca_4_26.pdf

description in German:

http://www.xfaweb.baden-wuerttemberg.de/alfaweb/berichte/abstracts/band29.html

DoW objective; Contribution to sustainable brownfield development: Technology selection criteria, databases on technologies and case studies

Decision support about the most sustainable remediation measure, focusing on the environmental impact

Sustainability objective affected by the tool;

Objective 2.5: to provide decision support tools for risk based land management

Objective 2.3: to ensure cost effectiveness and technical feasibility

Objective 2.1: to reduce negative environmental impacts on the site and on the neighbourhood including human health risks during rehabilitation works

Tool in general use? unknown.

Usability restrictions:?

Language: German

Availability / reference:

CD-ROM with online manual, Euro 35,00 + VAT sold by Gesellschaft für Angewandte Hydrologie und Kartographie mbH, Freiburg; e-mail: ahk@prolink.de; phone: +49-761-70522-0
developer: http://www.ahk-freiburg.de/

5.12. Tool n°54: US EPA Data Quality Objective Process

Title of the tool: **US EPA Data Quality Objective Process**
Year of development (+ up date if important): 2000
Author / developer: US Environmental Protection Agency
Type of tool: Systematic planning tool
Field of application: Quality assurance
Potential users: Project managers and planners
Brief description (aim, content): The Data Quality Objectives Process has been developed by the US Environment Protection Agency. It is used to develop Data Quality Objectives that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions. This is a standard working tool for project managers and planners for determining the type, quantity, and quality of data needed to reach defensible decisions.
Contribution to sustainable brownfield development: Improves data quality and provides a decision support tool to reach defensible decisions
Sustainability objective affected by the tool: 2.5 To provide decision support tools for risk based land management
Tool in general use? Yes
Usability restrictions: Based on USA legal and regulatory framework may need adaptation to apply in a European context.
Language: English
Availability / reference: http://www.epa.gov/quality1/qs-docs/g4-final.pdf

5.13. Tool n° 55: The Integrated Risk Information System (IRIS)

Title of the tool:

The Integrated Risk Information System (IRIS)

Year of development (+ up date if important): n/a

Author / developer: U.S. Environmental Protection Agency (EPA)

Type of tool: an electronic database

Field of application: quality of management,

Potential users: Local authorities, developers, project managers,

Brief description (aim, content):

The Integrated Risk Information System (IRIS), prepared and maintained by the U.S. Environmental Protection Agency (U.S. EPA), is an electronic database containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

IRIS is a tool that provides hazard identification and dose-response assessment information, but does not provide situational information on individual instances of exposure. Combined with specific exposure information, the data in IRIS can be used for characterization of the public health risks of a given chemical in a given situation, that can then lead to a risk management decision designed to protect public health.

The heart of the IRIS system is its collection of computer files covering individual chemicals. These chemical files contain descriptive and quantitative information in the following categories:

- Oral reference doses and inhalation reference concentrations (RfDs and RfCs, respectively) for chronic noncarcinogenic health effects.
- Hazard identification, oral slope factors, and oral and inhalation unit risks for carcinogenic effects.

To aid users in accessing and understanding the data in the IRIS chemical files, the following supportive documentation is provided:

US EPA's Process for IRIS Assessment Development and Review

An alphabetical list of the chemical files in IRIS.

IRIS Guidance documents.

A discussion of the limitations of IRIS information.

An IRIS glossary of scientific terms, and a A definition of acronyms and abbreviations used.

DoW objective; contribution to sustainable brownfield development:

The information in IRIS is intended for use in protecting public health through risk assessment and risk management. These two processes are briefly explained below.

Risk assessment has been defined as "the characterization of the potential adverse health effects of human exposures to environmental hazards" (NRC, 1983). In a risk assessment, the extent to which a group of people has been or may be exposed to a certain chemical is determined, and the extent of exposure is then considered in relation to the kind and degree of hazard posed by the chemical, thereby permitting an estimate to be made of the present or potential health risk to the group of people involved.

Risk assessment information is used in the risk management process in deciding how to protect public health. Examples of risk management actions include deciding how much of a chemical a company may discharge into a river; deciding which substances may be stored at a hazardous waste disposal facility; deciding to what extent a hazardous waste site must be cleaned up; setting permit levels for discharge, storage, or transport; establishing levels for air emissions; and determining allowable levels of contamination in drinking water.

Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use?
Usability restrictions: No usability restrictions
Language: English
Availability: IRIS Hotline c/o EPA Docket Center, Mail Code 28221T EPA-West Building 1301 Constitution Avenue NW Washington, DC 20005 hotline.iris@epa.gov, http://www.epa.gov/iris/

5.14. Tool n° 55: Valorisation system for post-industrial terrains and Regional System on Spatial Information for planning of restructuring and emergency response for Silesian Voivodship (RSIP)

Title of the tool: **Valorisation system for post-industrial terrains and Regional System on Spatial Information for planning of restructuring and emergency response for Silesian Voivodship (RSIP)**
Year of development (+ up date if important): 2002-2003
Authors: Instytut Systemów Przestrzennych i Katastralnych S.A., Ul. Wincentego Pola 16, 44-100 Gliwice, Poland, (RISP) Glowny Instytut Gornictwa Plac Gwarkow 1, 40-166 Katowice, Poland The RSIP is result of Research Project No 10T120472001 founded by Polish National Science Committee and Silesian Voivodship Marshal Office (Methodology for valorisation system for post-industrial terrains)
Type of tool: GIS Data Base equipped with validation modules for screening and categorised of post-industrial sites
Field of application: To support decision makers from different administrative level by providing information on sites affected by industrial activities in one place, enabling to make evaluation of sites by set criteria, Additionally to that, system enables to communicate on line t public information on state of environment.
Potential Users: Public authority decision makers (access to restricted information depending on administrative right) and general public (access to information available for public – executing the law on access on information on state of environment)

Brief description (aim, content):

The system allows to integrate all information on geographical space and on environment produced by different authority (voivodship, poviat and municipality as it required by their administrative competency) in one single data base allowing to check data consistency and evaluate them by different criteria. The data base is depositary of information stored in other dedicated data bases. The information is refreshed while source information is updated. The search of data base is accessible via internet using MS Internet Explorer and results of query in the form of map might be transferred to computer station of authorised user.

The Valorisation system for post-industrial terrains is subsystem of Regional System on Spatial Information (which perform more function needed to support decision making by self-governing administration not only related to environment) consists of two main modules related to terrains affected by industry:

- 1. - Sub-module 1 a. Prediction of surface subsidence on active underground mining areas

Sub-module 1.b. Prediction of surface subsidence and on post mining areas (underground mining was phased out)

The module by analysing the available geomechanical data and information on planned extraction of coal seam and/or historical data on already extracted coal seams are able to predict the surface deformation (subsidence), its size and possible propagation, and its tension on buildings and infrastructure locate in given area. Base on this calculation there are three main categories including three sub-categories of land usage – A, B (B1, B2, B3) and C. Category A, while no deformation of surface is expected, allows to use land without any precautions regarding construction of buildings and infrastructure; Category B, while some deformation (continuous or non continuous) and/or gassy hazard may occur, requires to take some precaution included in design (or retrofitting works) of buildings and infrastructure located on given plot; Category C, while some flooding or submerge of land is predicted, the usage of land is limited for specific usage (temporary or for recreational purpose).

- 2. - Valorisation of industrial sites, where production have been phase out and terrains idle for new usage.

The module allows to classify the site with respect to current or potential adverse impact on human health and the environment using for evaluation the following information:

Description of site location, Type of contaminants or materials likely to be present at site (and/or description of historical activities), Approximate size of site and quantity of contaminants, Approximate depth to water table, Geologic map or survey information (soil, overburden, and bedrock information), Annual rainfall data, Surface cover information, Proximity to surface water, Topographic information, Flood potential of site Proximity to drinking water supply, Uses of adjacent water resources, Land use information (on-site and surrounding).

Some pieces information are available from general geo- physiographical and spatial information described above and collected by RSIP GIS data base, some information must be collected by site review. Systems works on detailed data supplied by operator or using default values most likely occurred on Silesia Voivodship, and/or information of contaminants associated with particular branch of industry.

Class A (Score 70 to 100): Action Required

The available information indicates that action (e.g., further site characterization, risk management, re-mediation, etc.) is required to address existing concerns. Typically, Class 1 sites show a propensity to high concern for several factors, and measured or observed impacts have been documented.

Class B (Score 50 to 69.9): Action Likely Required

The available information indicates that there is high potential for adverse off-site impacts, although the threat to human health and the environment is generally not imminent. There is probably no indication of off-site contamination, however, the potential for this was rated high and therefore some action is likely required.

Class C (Score 40 to 49.9): Action May Be Required The available information indicates that this site is currently not a high concern. However, additional investigation may be carried out to confirm the site classification, and some degree of action may be required. Class D (Score <37): Action Not Likely Required The available information indicates there is probably no significant environmental impact or human health threats. There is likely no need for action unless new information becomes available indicating greater concerns, in which case the site should be reexamined. It might be additional class E while there is insufficient information to classify the site. In this event, additional information is required to address data gaps. This classification system is based on The Canadian Council of Ministers of the Environment's (CCME) National Classification System for Contaminated Sites developed to establish a rational and scientifically defensible system for comparable assessment of contaminated sites across Canada.
DoW objective; contribution to sustainable brownfield development: Gathers all information available on terrains affected by industry (brownfields and mining and post-mining areas –being affected by subsidence resulting from underground extracting of coal seem) in one stop.
Sustainability objective affected by the tool: Objective 2.5: to provide decision support tools for risk based land management
Tool in general use? Yes, by Decision Makers (authority) and general public for information on contaminated sites.
Usability restrictions: Presently the system is available on pilot scale for Municipality of Bytom and Poviat tarnowskie Gory. In the next stage, the collocation of three regional servers and one server in Voivodship Marshal Office is foreseen, as well as parallel tender for works related to collect data on post industrial sites located within administrative border of Silesian Voivodship. However, software solution reflects specific administrative and legal system of Poland it might be transferred to other country. Methodology of site valorisation might be used directly in any country. Methodology of prediction of subsidence on active mining area and areas, where underground coal extraction has been phased out might be adopted while geo-mechanical data are available.
Language: Polish, English for classification base on The Canadian Council of Ministers of the Environment's (CCME) methodology prepared for National Contaminated Sites Remediation Program (NCSRP).
Availability/Reference: Silesian Marshal Voivodship Office, Department of Geodesy www.ispik.pl, www.gig.katowice.pl

RESCUE
www.rescue-europe.com
Regeneration of European Sites in Cities and Urban Environments

CHAPTER 7.

CONCLUSIONS

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The underpinning aims of Workpackage 2 were (Description of Work section 2) related to –

- 'Driving down the cost of environmental remediation and recovery'
- 'Enhancing ecological regeneration by -
  - reducing the consumption of natural resources'
  - site preparation for construction purposes'

The thematic topics that were addressed in pursuit of these aims were –

- Analysis and critical review of current practices in contamination management and reuse of spoil and debris in the UK, France, Germany and Poland.
- Evaluation of the current practices, cross-checked against sustainability principles.
- Identification of Strengths, Weaknesses, Gaps, Good, Best, Promising Good and Promising Best Practice.
- Compilation and derivation of tools for to support the realisation of Sustainable Best Practice in brownfield contamination management and reuse of soil and debris.

The deliverables that have been developed to achieve these aims are –

- Technical guidance on the sustainable management of contamination and reuse of soil and debris –
  - Chapter 5 – Good/Best Practices discussion
  - Chapter 6 – Tools and recommendations
  - Annexe V – Sustainability Cross Check
  - Annex VI – Compilation of Good, Best, Promising Good and Promising Best Practices
  - Annex VII – Results of the Tools Transferability Checks.
- Proposals to promote the reuse of soil and debris through the use of tax incentives, legal incentives and more sophisticated project evaluation criteria for public funding programmes. These proposals have been integrated into D2-5.2 prepared by Workpackage 6.

In support of five sustainability objectives, Workpackage 2 has presented thirteen practices, eleven of which being Best Practice and two being Promising Best Practice, and seventy five tools to enable their achievement.

Best/Promising Best Practice	Objective(s) satisfied	Sustainability dimensions			
		Social	Environmental	Economic	Institutional
2.1.1 To undertake sufficient measurements to assess all environmental impacts	Objective 1	■	■	■	
2.2.1 To implement an on site waste management platform	Objectives 1 & 2		■	■	
2.2.2 To adopt a waste management plan to optimise recycling and reuse of soil and debris	Objectives 1 & 2		■	■	
2.2.3 To use economies of scale to deal with non-economic size (CLUSTER approach)	Objectives 1, 2 & 3		■	■	
2.2.4 To minimise transport needs of contaminated soil and waste material ie to manage slightly contaminated material on site or nearby	Objective 2		■	■	
2.3.1 To apply a model procedure for verification of the entire remediation process.	Objective 3			■	■
2.3.2 To use a directory of costs and services for contaminated site redevelopment	Objective 3			■	
2.4.1 To apply public communication and participation	Objective 4	■			
2.4.2 To organise an awareness - raising campaign to avoid social resistance	Objective 4	■			
2.5.1 To adopt effective decision support tools for risk – based land management	Objective 5	■	■	■	■
2.5.2 To adopt a step – wise site investigation and evaluation procedure	Objective 5	■	■	■	■
2.5.3 To implement digital soil mass modelling to reduce soil transport	Objective 5		■	■	
To use GIS/GPS as a tool for absolute reference of sample points.	Objective 5		■		

Fig1: Achievement of sustainability objectives by best and promising best practices.

Although the relative importance of the objectives and the dimensions is project specific and stakeholder specific, an illustration of the relationship between practices, objectives and dimensions informs the decision-making process and guides towards relatively sustainable outcomes. In Workpackage 2, each sustainability objective impacts upon one or more sustainability dimensions – Compare Chapter 5, Good/Best Practices discussion – with four objectives impacting on one dimension, six impacting on two dimensions, one impacting on three dimensions and two impacting on all four dimensions.

WP2 has highlighted several highly relevant aspects that it is necessary to appreciate if sustainable management of contamination and reuse of soil and debris are to be realised.

- Sustainable outcomes are unlikely unless sufficient resources are devoted to characterising soil and debris, physically, chemically and volumetrically. These characteristics determine the optimal approach to soil management and reuse and are usually ill-defined in traditional (landfill disposal focused) site investigation reports.

- The Directive-driven shift from landfill disposal to soil recycling dictates that, in many cases, soil recycling facilities will be located on sites in city centre locations or in densely populated residential areas. There will be an increasing need for clear and transparent communication channels with the public to inform, reassure and engage.

- Increasing disposal costs will facilitate increasing use of soil recycling technologies. As technologies mature and become routine, the focus will be on logistical solutions that employ technology, not on technology per se. The RESCUE project discovered one such logistical solution, the CLUSTER project, which is due to begin commercial life in 2005.

- The RESCUE definition of a best practice requires the practice to achieve one sustainability objective. However, two of the practices achieve two objectives, and one of them achieves three (Fig 1). There is therefore a need for a more sophisticated classification eg 'better practice' to reflect the potential sustainability benefits of particular practices.