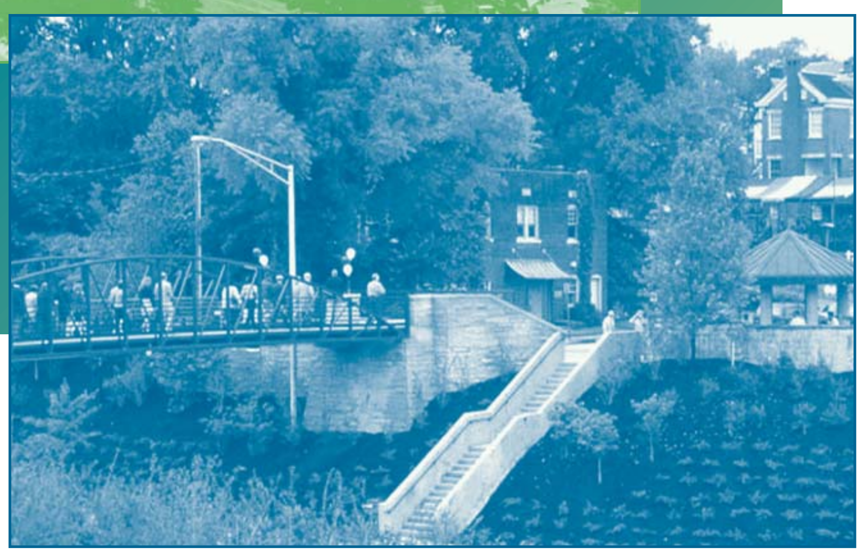
Technical and Regulatory Guidance

Planning and Promoting Ecological Land Reuse of Remediated Sites



July 2006

Prepared by
The Interstate Technology & Regulatory Council
Ecological Land Reuse Team

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EXECUTIVE SUMMARY

An ecological enhancement is a modification to a site which increases and improves habitat for plants and animals while protecting human health and the environment. Elements of ecological enhancement can include natural or green remediation technologies and/or an end use which restores or otherwise increases the ecological value of the land. Ecological elements may be designed into remediation and closure projects. Considered at the inception of planning a site cleanup, green and natural technologies, in addition to traditional technologies, can cost-effectively cleanup soil and groundwater contamination and restore, create, and/or improve habitat or the ecosystems. Designing an ecological end use as an integrated component of the remediation system can realize more benefits from the remediation process without compromising the selected remediation goals and objectives. Incorporation of ecological enhancements can benefit multiple stakeholders, such as regulatory agencies, the regulated community, local communities, and the general public. The team believes that greater benefits may be gained by integrating ecological land reuse into the initial remediation strategy, but this in no way is meant to preclude incorporation of ecological enhancements into remediation projects which are already underway.

The Interstate Technology and Regulatory Council (ITRC) Ecological Land Reuse Team has developed this guidance document to promote ecological land reuse as an integrated part of site remediation strategies and as an alternative to conventional property development or redevelopment. This reuse may be achieved through a design that considers natural or green technologies or through more traditional cleanup remedies. The decision process presented here helps stakeholders to integrate future land use and stakeholder input into an ecological land end-use-based remediation project. Key to the project success is an understanding of the service capacity (the ability to produce jobs, housing, environmental habitat, mineral resources, agricultural goods, and other societal values) at, near, and surrounding a remediation project. Integrating stakeholders input regarding their desires for community development and needs is critical. This type of an integrated project can gain strong support from the stakeholders and can transform them into strong advocates for projects integrating ecological elements into the future land reuse plans. The ITRC team is experienced in cleanup and ecological and habitat development techniques and in representing various interests (such as community stakeholders, consultants, the regulated community, government regulatory agencies, non-governmental organizations, and other government agencies). The team has incorporated various perspectives into this guidance to improve its applicability, usability, and value.

This document describes key decision points in a flow diagram format and defines the practicality of applying natural or green technologies to traditional remediation processes. Ecological benefits have not traditionally been designed into, nor credited to, the value of the reusable land until successful remediation was completed. Now, natural and green technologies can improve the ecology of the site as long as they support the intent of the land's use and do not jeopardize the elimination or reduction of the human or environmental risk. Consideration of ecological benefits, as well as the end use of an environmentally impacted site, is an integral component of the remediation process.

Ecological land reuse may have multiple advantages, and a single ecological element may have multiple benefits such as environmental, economic, or public. This guidance document categorizes several ecological reuses, without limiting their benefits, in order to offer a presentation of possible advantages. The potential advantages are shown below:

Environmental	**Economic**	**Public**
• attracts wildlife • hydraulically controls landfill leachate • biodegrades environmental contaminants • controls dust • reduces sediment transport and controls erosion • stabilizes stream banks • uses atmospheric carbon dioxide • improves groundwater recharge • minimizes human and environmental exposures • provides a harvestable resource • improves aesthetics • provides educational opportunities • provides recreational areas • provides migratory pathways • improves plant diversity	• is cost competitive • provides use for waste material • enables more efficient use of limited resources • provides institutional control • can potentially generate revenue • provides marketing and competitive advantages • increases property value • provides source of recoverable resources • provides potential for environmental offsets • potential for enhanced environmental stewardship • offers tax advantages • reduces natural resources damage liability	• provides recreational and tourism opportunities • provides educational opportunities • improves corporate reputation • improves goodwill through good neighbor • enhances workforce stability through improved morale • improves aesthetics • improves livability • increases natural resources

These benefits are included in a value system used to estimate the cost of cleanup alternatives at a contaminated site. A project team should consider the complete life cycle of the project, from technology selection to final disposition of the property, for an accurate economic picture of the alternatives. A comparison of the relative economic advantages of two alternative approaches, one having moderate initial costs, high O&M (operation and maintenance) costs, and a short duration and the other having low initial costs, moderate O&M/administrative costs and a long duration can be made through a net present value analysis. These cost elements can be broken down into three general categories: quantifiable values, semiquantifiable values, and qualitative values.

Items in each of the three value categories should be considered for every potential alternative in a project to fully evaluate its value in comparison to other alternatives. When properly done, they present a “story”—an objective and subjective description of the outcome that also explains the indirect benefits, which may not have a clear economic value. This process leads to inclusive decision making. Even if a factor is thrown out for lack of impact on the decision, it should still be considered to make sure all projects are evaluated consistently and completely. A comprehensive financial estimate, using as many of the pertinent factors as possible, will provide more sound decisions, thus offering optimal benefits to the site, the company, the community, and the ecology of the area.

Ecological service as a reuse element is still emerging; however additional information or data is necessary to fully realize the broad benefits of ecological land reuse. New research and reporting needs to accomplish the following:

- Explain and document the service capacity offered by a given area and how that capacity can be fulfilled by man-made systems.
- Track ecological land reuses and evaluate how they may positively impact the surrounding and interconnected systems.
- Better explain the methodologies to create ecological end-use projects that will provide the desired service.
- Document the impact ecological land reuse of remediated, reclaimed, or restored sites has on migratory flyways and corridors.
- Document the integration of environmental remediation technologies into a sustainable ecological end use.
- Integrate information from sites, which have restored or created ecological benefits, into a learning center or database which is readily available to all stakeholders.
- Provide the basis to move remediation away from pumps and pipes and toward more nonmechanical systems capable of the same level of environmental and human health protection, while providing a more wildlife- and human-friendly end use.
- Document ecologically based mechanisms that provide sustainable institutional controls.
- Better explain the mechanisms and institutional controls that can be placed on property to manage any residual threats (e.g. deed restrictions, uniform covenant program, or conservation easement).
- Develop a template that states can use, and adjust to their own use, to track and evaluate the environmental effectiveness of land use controls placed on a site, perhaps through a national organization that represents the states (see Section 4.8.2, ITRC ALT-4 2006).
- Document the improved quality of life of the individual and the livability of the community where green space is incorporated into the urban and suburban environment.

A case study from Chattanooga, Tennessee, most effectively demonstrates the successful application of ecological elements to improve the livability of an area while restoring a site. A working partnership between government, industry, and the community transformed an industrial wasteland into a vibrant, upscale downtown community—resulting in improved livability, increased property values, healthy environments, and controlled growth. Certainly not all future land use may be conducive to ecological elements or enhancements; however, in situations where ecological elements or enhancements may be integrated into the remediation process, whether using conventional or green remediation technologies, they can benefit the owners, operators, community, and ecosystem through the ecological elements used to remediate the site.